<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ivanova D., Y. Kiselova-Kaneva, D. Ivanov - ANTIOXIDANT POTENTIAL OF</td>
<td>7</td>
</tr>
<tr>
<td>MEDICINAL HERBS FROM THE NORTHERN BLACK SEA COASTAL ZONES</td>
<td></td>
</tr>
<tr>
<td>Ivanova D., D. Ivanov - ETHNOBOTANICAL USE OF LICHENS: LICHENS FOR</td>
<td>11</td>
</tr>
<tr>
<td>FOOD REVIEW</td>
<td></td>
</tr>
<tr>
<td>Kalevski S., N. Peev, D. Hartonov, S. Dyankov - SEVERE HEAD INJURY</td>
<td>17</td>
</tr>
<tr>
<td>ASSOCIATED WITH MULTISYSTEM INJURIES</td>
<td></td>
</tr>
<tr>
<td>Turnovska T., R. Vasileva, V. Atanasova, P. Gatzeva, G. Kavlakov,</td>
<td></td>
</tr>
<tr>
<td>At. Alexandrova, G. Mihailova - ON SOME PROBLEMS WITH BREASTFEEDING</td>
<td>21</td>
</tr>
<tr>
<td>OF INFANTS</td>
<td></td>
</tr>
<tr>
<td>Kalevski S. - RECURRENT LUMBAR DISC HERNIATION OUTCOME ANALYSIS OF</td>
<td>25</td>
</tr>
<tr>
<td>REPEAT DISCECTOMY</td>
<td></td>
</tr>
<tr>
<td>Iotova V., S. Galcheva, K. Petrova - OBESITY IS INCREASING FAST AMONG</td>
<td>31</td>
</tr>
<tr>
<td>Varna SCHOOL CHILDREN IN THE LAST 5 YEARS (2002-2007)</td>
<td></td>
</tr>
<tr>
<td>Zlatarova Z.L., K.G. Dokova, D. Kamburova - INCIDENCE OF EYELID</td>
<td>35</td>
</tr>
<tr>
<td>MALIGNANCIES IN VARNA REGION</td>
<td></td>
</tr>
<tr>
<td>Baykova D. - DIETARY PATTERN OF CHILDREN LIVING IN REGION WITH</td>
<td>39</td>
</tr>
<tr>
<td>NON-FERROUS METALS OUTPUT</td>
<td></td>
</tr>
<tr>
<td>Dimitrova T., Z. Zlatarova - WORK WITH VIDEO DISPLAY TERMINALS AND</td>
<td>45</td>
</tr>
<tr>
<td>REFRACTION ABNORMALITIES</td>
<td></td>
</tr>
<tr>
<td>Dimitrova T., M. Atanasova, E. Karaslavova - ANXIETY LEVEL AND</td>
<td>49</td>
</tr>
<tr>
<td>CARDIOVASCULAR RISK IN THE SPHERE OF TOURISM</td>
<td></td>
</tr>
<tr>
<td>Radoinova D., I. Burulianova - 45 YEARS DEPARTMENT OF FORENSIC MEDIC</td>
<td>53</td>
</tr>
<tr>
<td>AND MEDICAL LOW IN MEDICAL UNIVERSTY “PROF. DR. PARASKEV STOYANOV”</td>
<td></td>
</tr>
<tr>
<td>VARNA</td>
<td></td>
</tr>
<tr>
<td>Petrova E. - OCCUPATIONAL DISEASES: GENERAL CHARACTERISTICS,</td>
<td>57</td>
</tr>
<tr>
<td>PECULIARITIES AND CHARACTER OF THE SYSTEM OF HEALTH SERVICE AND</td>
<td></td>
</tr>
<tr>
<td>FINANCIAL COVER OF THE ACTIVITY IN OCCUPATIONAL DISEASES MEDICAL</td>
<td></td>
</tr>
<tr>
<td>AREA IN BULGARIA AND IN SOME CENTRAL EUROPEAN COUNTRIES</td>
<td></td>
</tr>
<tr>
<td>Marinov P., Iovcheva M. - ACUTE PESTICIDE INTOXICATIONS IN VARNA</td>
<td>61</td>
</tr>
<tr>
<td>REGION, BULGARIA, DURING THE PERIOD 1991-2005</td>
<td></td>
</tr>
<tr>
<td>Georgieva L., L. Tzvetkov - EDUCATION SATISFACTION OF MEDICAL</td>
<td>65</td>
</tr>
<tr>
<td>AESTHETICS STUDENTS AT MEDICAL COLLEGE OF VARNA</td>
<td></td>
</tr>
<tr>
<td>Popova S., A. Kerekovska - IMMIGRANTS AND HEALTHCARE IN BULGARIA: THE</td>
<td>69</td>
</tr>
<tr>
<td>RESPONSES BY POLICY AND LEGISLATION</td>
<td></td>
</tr>
<tr>
<td>Yanakieva T., T. Turnovska, P. Nedeva, R. Totzeva, R. Karaivanova,</td>
<td>75</td>
</tr>
<tr>
<td>St. Mladenova - CONTENT OF HEAVY METALS, URANIUM, RADIUM AND RADON</td>
<td></td>
</tr>
<tr>
<td>IN DRINKING WATER FROM UNDERGROUND WATER SOURCES IN PROXIMITY</td>
<td></td>
</tr>
<tr>
<td>TO OLD MINES</td>
<td></td>
</tr>
<tr>
<td>Turnovska T., Bl. Marinov, St. Mandadjieva - CHARACTERISTICS</td>
<td>81</td>
</tr>
<tr>
<td>OF RESPIRATORY FUNCTIONS AND PHYSICAL CAPACITY IN CHILDREN LIVING</td>
<td></td>
</tr>
<tr>
<td>UNDER CONDITIONS OF LOW-DEGREE AIR POLLUTION</td>
<td></td>
</tr>
<tr>
<td>Yanakieva T., T. Turnovska, M. Panova, D. Terzieva - ANALYSIS OF SOME</td>
<td>85</td>
</tr>
<tr>
<td>HEALTH INDICATORS WITH FORMER MINERS</td>
<td></td>
</tr>
<tr>
<td>Prakova G., P. Gidikova, E. Slavov, G. Sandeva, R. Deliradeva - SERUM</td>
<td>91</td>
</tr>
<tr>
<td>NEOPTERIN IN SILICOSIS PATIENTS AND WORKERS EXPOSED TO INORGANIC DUST</td>
<td></td>
</tr>
<tr>
<td>Porojanova S., M. Atanasova, K. Petrova, K. Yaneva - SCHOOL MATURITY</td>
<td></td>
</tr>
<tr>
<td>AND READINESS FOR EDUCATION OF BILINGUAL CHILDREN FROM THE PREPARATORY</td>
<td></td>
</tr>
<tr>
<td>CLASSES FROM VARNA</td>
<td>95</td>
</tr>
</tbody>
</table>
Yustiniyanova B., M. Koleva - SCHOOL POLICY IN RELATION TO SMOKING AND POSSIBILITIES FOR PREVENTION ................................................................. 99
Petrova E. - OCCUPATIONAL DISEASES. EPIDEMIOLOGICAL TRENDS OF THE OCCUPATIONAL DUST DISEASES, PREVENTION AND EARLY DIAGNOSIS. .................... 103
AUTHOR'S INDEX ......................................................................................... 107
PERMUTERM SUBJECT INDEX. ................................................................. 109
INSTRUCTIONS TO AUTHORS .................................................................. 111
ANTIOXIDANT POTENTIAL OF MEDICINAL HERBS FROM THE NORTHERN BLACK SEA COASTAL ZONES

Ivanova D., Y. Kiselova-Kaneva, D. Ivanov*

Department of Biochemistry, Molecular Medicine and Nutrigenomics, *Department of Pharmacy, Medical University “Prof. Dr. Paraskev Stoyanov” - Varna

Reviewed by: Assoc. Prof. T. Yankova

ABSTRACT

Aqueous-alcoholic extracts of 32 plants used in Bulgarian phytotherapy for treatment of respiratory, gastrointestinal and other inflammatory disorders and widely distributed in the Northern Black Sea coastal zones were screened in vitro for antioxidant activity and phenolic compounds content. The antioxidant potential presented as UAE (Uric acid equivalents) of the plant extracts was determined using the ABTS cation radical decolorization method. The content of total polyphenols was measured spectrophotometrically according to the Folin-Ciocalteu procedure and calculated as quercetin equivalents (QE). Four Bulgarian medicinal plants were established to have very high antioxidant properties: Fragaria vesca, Hypericum perforatum, Agrimonia eupatoria and Rubus sp. diversa) (UAE above 10 mM); another 10 plants had intermediate antioxidant capacity - higher than 4 mM; and other 5 - higher than 2 mM. Interestingly, those plants comprised 58% of all studied plant species and the high antioxidant potential of these medicinal plants could be a major factor contributing to their healing properties. Polyphenol content varied from 39.52 ±15.17 µM to 293.07 ±62.01 µM. A positive correlation (r =0.98) between antioxidant activity and polyphenol content was found, suggesting that the antioxidant capacity of the aqueous-alcoholic plant extracts is mainly due to their polyphenol content.

Key words: Bulgarian medicinal plants, aqueous-alcoholic extracts, antioxidant activity, total polyphenol content

INTRODUCTION

Medicinal plants, known also as medicinal herbs, include a variety of plants used in medicinal or veterinary practice for prophylaxis and treatment of diseases - generally the term “medicinal plant” refers to the application of a plant. They are also often known as drug- or poison- plants since the medical usefulness is often only a matter of the dilution factor in which the active ingredient is introduced into or onto the human body. Since thousands of years ago people were apparently aware of hundreds of medically active compounds that were directly derived from plants. Such biologically active compounds from plant origin may range from alkaloids to glycosides, vitamins, waxes, tanning matters, essential oils, coumarins, lipids, pigments, saponins, phytocides, or flavonoids. A number of medicinal plants are recognized nowadays as functional foods, food additives and a source for nutraceuticals, because of their active ingredients, and others are used by the pharmaceutical and cosmetic industries. Medicinal properties of plants are often described as anti-inflammatory, bactericide, bacteriostatic, immunostimulating or other, and are related to the induction of resistance to various inflammatory diseases - gastrointestinal, urinary tract infections, respiratory or skin diseases etc. Part of the medicinal herbs’ properties are attributed to the antioxidant activities of their constituents, including vitamins A, C and E and polyphenols and various concepts dominate assigning the biological activity of polyphenols to their properties as reducing agents, hydrogen donors, metal chelators and radical quenchers (9,11) or immunostimulators (1,2).

Despite the wide distribution of Bulgarian medicinal plants, only few recent systematic studies explore their antioxidant potential (6-8) and no investigation had been carried out since now on the distribution of plant species with high antioxidant properties. The present study aims at screening the in vitro antioxidant activity and polyphenol content of medicinal plants widely distributed in the Northern wet Black Sea regions and used in Bulgarian phytotherapy for treatment of respiratory, gastrointestinal and other inflammatory disorders.

MATERIALS AND METHODS

Plants

Thirty two Bulgarian medicinal plants were selected based on two major criteria: (i) established wide everyday use by the Bulgarian population for treatment of inflammatory...
conditions of various etiology and (ii) distribution in the vicinity of the town of Varna and the Northern Black sea coastal zones (3-5). The plants available on the market without prescription (commercial products of “Thalloderma” Pharmaceutical Laboratories) were collected from the region in the summer of 2008.

**Plant extracts**

Plant extracts were prepared as described earlier (8), with variations in the solvent type and concentration. Briefly, 250 mg dried plan material was blended into a fine powder and extracted 3 times (3 min each) with 40% (v/v) ethanol/water. Plant material/solvent ratio was kept to 1:20 w/v (0.250g:5ml). The supernatants from each extraction step were combined (3.5ml from the first step, 4.5ml from the second and 5ml from the third - 13 ml totally) and were diluted with 40% (v/v) ethanol/water to total volume of 25ml. Antioxidant activity and total polyphenol content were measured in a clear filtrate.

**Antioxidant activity of plant extracts**

The antioxidant activity of plant extracts was determined by the ABTS (2,2’-azinobis(3-ethylbenzthiazoline-6-sulfonic acid)) radical decolorization assay (10). The extent of decolorization as percentage inhibition of the pre-formed ABTS+ radical cation, proportional to the concentration of antioxidants, was calculated relative to the reactivity of uric acid as a standard. Results are presented as meanuric acid equivalents (mM UAE) ±S.D. (n, number of independent experiments = 3-6). ABTS, uric acid and potassium persulfate were purchased from Aldrich Chemical Company, Inc., Milwaukee, USA. Measurements were performed using a Perkin Elmer spectrophotometer.

**Total polyphenol content**

Phenolic compounds were assayed, according to the spectrophotometric method of Singleton and Rossi (12). Samples (7 µl, five replicates) were introduced into test tubes; 1000 µl of Folin-Ciocalteu’s reagent diluted ex tempore with distilled water I ratio 1:10, and 800 µl NaHCO₃ (7.5%) were added. The tubes were mixed and incubated at 60°C for 10 min. Absorption at 760 nm was measured (Perkin Elmer spectrophotometer). The total phenolic content was expressed as means quercetin equivalents (µM QE) ±S.D. Quercetin and Folin-Ciocalteu’s reagent were obtained from Sigma-Aldrich Chemie GmbH, Taufkirchen, Germany.

RESULTS AND DISCUSSION

Measurements of antioxidant activity and polyphenol content of aqueous-alcoholic extracts demonstrated considerable variations within the plant species: from 0.28 ±0.16 mM UAE for *Humulus lupulus* to 16.13 ±0.28 mM for *Fragaria vesca* (Table 1). Similar variations were evident from our previous studies (5,6) of water-phase antioxidant activity of medicinal plants. Totally, very high antioxidant properties were established for aqueous-ethanolic extracts of four Bulgarian medicinal plants: *Fragaria vesca*, *Hypericum perforatum*, *Agrimonia eupatoria* and *Rubus sp. diversa* (UAE above 10 mM); another 10 plants had intermediate antioxidant capacity - higher than 4 mM; and other 5 - higher than 2 mM. Interestingly, those plants comprised as much as 58% of all studied plant species. The high antioxidant potential of these medicinal plants could be a major factor contributing to their healing properties.

There were variations in the polyphenol content as well: from 39.52 ±15.17 µM for *Valeriana officinalis* to 2930,70 ±62,01 µM QE for *Fragaria vesca*, and the higher polyphenol concentrations were measured for the extracts with higher antioxidant activity. A positive correlation (r=0.98) between antioxidant activity and polyphenol content was found (Fig. 1), suggesting that the antioxidant capacity of the aqueous-alcoholic plant extracts is mainly due to their total polyphenol content. Similarly, a high positive correlation was established earlier for aqueous-methanolic extracts of 23 Bulgarian herbs (8) and for the water infusions of those plants (6,7).

**Fig. 1. Correlation between the antioxidant activity and total polyphenol content of aqueous-ethanolic extracts (40%, v/v) of 32 medicinal plants from the Northern**

**CONCLUSION**

Medicinal plants of North Black Sea coastal zones represent an excellent source of polyphenols with more than a half of all studied plant species exhibiting considerable antioxidant capacity. Our findings along with the numerous properties attributed to plant polyphenols give reason to suggest that the high polyphenol content of Bulgarian herbs is the major factor contributing to plants’ healing properties.

**REFERENCES**

Table 1. Antioxidant activity and total polyphenol content in aqueous-etahnolic extracts (40%, v/v) of 32 medicinal plants from the Northern Black sea coastal zones.

<table>
<thead>
<tr>
<th>Plant name</th>
<th>Part of plant tested</th>
<th>Antioxidant activity means ±S.D. [mM UAE]</th>
<th>Total polyphenols means ±S.D. [µM QE]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fragaria vesca L.</td>
<td>Leaves</td>
<td>16,13 ±0,28</td>
<td>2930,70 ±62,01</td>
</tr>
<tr>
<td>Hypericum perforatum L.</td>
<td>Aerial parts</td>
<td>13,49 ±0,29</td>
<td>2585,49 ±21,46</td>
</tr>
<tr>
<td>Agrimonia eupatoria L.</td>
<td>Aerial parts</td>
<td>11,59 ±0,29</td>
<td>2095,11 ±52,13</td>
</tr>
<tr>
<td>Rubus sp. diversa</td>
<td>Leaves</td>
<td>10,14 ±0,28</td>
<td>1741,94 ±43,26</td>
</tr>
<tr>
<td>Sambucus ebulus L.</td>
<td>Fruits</td>
<td>7,22 ±0,31</td>
<td>1587,92 ±32,45</td>
</tr>
<tr>
<td>Salvia officinalis L.</td>
<td>Leaves</td>
<td>5,80 ±0,04</td>
<td>1308,72 ±22,33</td>
</tr>
<tr>
<td>Crataegus monogyna Jacq.</td>
<td>Leaves, flowers</td>
<td>4,62 ±0,06</td>
<td>985,13 ±40,21</td>
</tr>
<tr>
<td>Frangula alnus Mill.</td>
<td>Roots</td>
<td>4,51 ±0,32</td>
<td>1033,71 ±207,02</td>
</tr>
<tr>
<td>Sambucus nigra L.</td>
<td>Flowers</td>
<td>4,38 ±0,09</td>
<td>893,88 ±108,53</td>
</tr>
<tr>
<td>Crataegus monogyna Jacq.</td>
<td>Fruits</td>
<td>4,37 ±0,05</td>
<td>1058,60 ±41,25</td>
</tr>
<tr>
<td>Populus alba L.</td>
<td>Leaves, flowers</td>
<td>4,36 ±0,22</td>
<td>940,01 ±22,33</td>
</tr>
<tr>
<td>Polygonum aviculare (L.) L.</td>
<td>Aerial parts</td>
<td>4,17 ±0,12</td>
<td>801,02 ±34,14</td>
</tr>
<tr>
<td>Arctium lapponum L.</td>
<td>Roots</td>
<td>4,13 ±0,05</td>
<td>440,06 ±127,99</td>
</tr>
<tr>
<td>Helichrysum arenarium (L.) Moench.</td>
<td>Flowers</td>
<td>4,05 ±0,82</td>
<td>803,67 ±21,46</td>
</tr>
<tr>
<td>Matricaria chamomilla L.</td>
<td>Flowers</td>
<td>2,60 ±0,05</td>
<td>639,92 ±25,10</td>
</tr>
<tr>
<td>Pulmonaria officinalis L.</td>
<td>Leaves</td>
<td>2,39 ±0,11</td>
<td>782,43 ±24,53</td>
</tr>
<tr>
<td>Asparagus officinalis L.</td>
<td>Aerial parts</td>
<td>2,29 ±0,15</td>
<td>378,55 ±52,92</td>
</tr>
<tr>
<td>Achillea millefolium L.</td>
<td>Flowers</td>
<td>2,10 ±0,02</td>
<td>558,49 ±108,97</td>
</tr>
<tr>
<td>Taraxacum officinalis L.</td>
<td>Aerial parts</td>
<td>2,05 ±0,11</td>
<td>805,62 ±114,44</td>
</tr>
<tr>
<td>Plantago major L.</td>
<td>Leaves</td>
<td>1,60 ±0,14</td>
<td>508,92 ±45,17</td>
</tr>
<tr>
<td>Apium graveolens L.</td>
<td>Leaves</td>
<td>1,62 ±0,06</td>
<td>348,70 ±74,92</td>
</tr>
<tr>
<td>Mentha spicata L.</td>
<td>Leaves</td>
<td>1,61 ±0,02</td>
<td>546,98 ±61,33</td>
</tr>
<tr>
<td>Verbena officinalis L.</td>
<td>Aerial parts</td>
<td>1,60 ±0,08</td>
<td>710,02 ±67,67</td>
</tr>
<tr>
<td>Galega officinalis L.</td>
<td>Aerial parts</td>
<td>1,11 ±0,02</td>
<td>426,77 ±64,39</td>
</tr>
<tr>
<td>Urtica dioica L.</td>
<td>Leaves</td>
<td>1,04 ±0,13</td>
<td>204,03 ±54,00</td>
</tr>
<tr>
<td>Ononis spinosa L.</td>
<td>Roots</td>
<td>0,88 ±0,03</td>
<td>204,03 ±22,33</td>
</tr>
<tr>
<td>Astragalus glycyphyllos L.</td>
<td>Aerial parts</td>
<td>0,74 ±0,03</td>
<td>308,16 ±15,33</td>
</tr>
<tr>
<td>Prunus spinosus L.</td>
<td>Fruits</td>
<td>0,72 ±0,05</td>
<td>293,82 ±42,93</td>
</tr>
<tr>
<td>Capsella bursa-pastoris (L.) Medic.</td>
<td>Aerial parts</td>
<td>0,66 ±0,05</td>
<td>202,65 ±37,18</td>
</tr>
<tr>
<td>Taraxacum officinalis L.</td>
<td>Roots</td>
<td>0,64 ±0,02</td>
<td>243,01 ±140,70</td>
</tr>
<tr>
<td>Valeriana officinalis L.</td>
<td>Roots</td>
<td>0,59 ±0,04</td>
<td>39,52 ±15,17</td>
</tr>
<tr>
<td>Humulus lupulus L.</td>
<td>Flowers</td>
<td>0,28 ±0,16</td>
<td>78,73 ±50,20</td>
</tr>
</tbody>
</table>


Traditional uses of lichens for food, food preparation, and chemical constituents of lichens with regards to their nutritional value are briefly reviewed. Reports that indicate significant use of lichens, primarily as food material, are gathered together and presented. The cohesion of data from available studies gives reason to accept that lichens present a great potential source of functional foods. It remains a challenge to explore the effect of lichens in food with respect to the nutrigenomics advent and explore them as a source for nutraceuticals, new foods and food additives.

Key words: lichens, food, nutritional value, ethnobotanical use

INTRODUCTION

“Lichens are the most overlooked of the conspicuous organisms in the natural landscape. The eye often cannot see what the mind does not already know.” Sylvia Sharnoff

Most data about ethnobotanical use of lichens originate from legends across the whole world, few have been recorded by travelers, and many are being lost with the advances of civilization. The unique biochemical compounds produced by lichens have made them useful to people in traditional cultures as food, source for dyes, fragrances and medicines.

Lichens grow in all continents and the lichen flora varies upon the climate and relief. It is estimated that lichens are the dominant vegetation on 8% of the earth’s terrestrial surface. Thus lichens are a part of many food webs which include humans, vertebrates, and invertebrates. There are records of lichens being used as food by many different human cultures for millennia, 107 peoples have used lichens in North America alone. Lichens are eaten by people in America, Europe, Asia, and Africa, and perhaps elsewhere (23,29,30,40). A century ago it had been prophesized that lichens were to become the great popular food of the masses, because of their cheapness and nutritive properties (36). This did not happen, but lichens had frequently been used as famine food by people. And there are also many peoples who have used lichens for food on a more regular basis, even as a delicacy (like Umbilicaria esculenta (Miyoshi) Minks. in Japan) or a dessert (like Cetraria islandica (L.) Ach. in Scandinavia and France).

Even though that some lichens are thought to be among the oldest living organisms on Earth, as a general they are less familiar than vascular plants, and are frequently grouped with other fungi or with mosses in many studies. Nomenclature is often vague, particularly in the older literature. In the northern regions, and in higher elevation habitats, where lichen use seems to be heaviest in winter, fewer studies have been done. For those reasons scientists in their search for new functional foods, nutraceuticals and food additives are prone to ignore lichens due to their size, slow growth, and very insufficient knowledge on their composition and biological properties of their constituents.

Nutritional value of lichens

There are two major problems that people have generally encountered when eating lichens. These are secondary lichen compounds, many of which are acids and thus have an acidic flavor, and complex carbohydrates, that are difficult to digest and are irritating to the digestive tract. Lichens produce a wide array of both primary (intracellular) and secondary (extracellular) compounds. Primary metabolites include amino acids, polyols, carotenoids, polysaccharides, and vitamins. Secondary metabolites are often called lichen acids - produced primarily by the mycobiont, they are deposited externally on the hyphae of the cortex and/or medulla. Lichen acids are derived from three chemical pathways: shikimic acid pathway, a source of pulvinic acid derivatives (yellow pigments), mevalonic acid pathway (a source of terpenes), and acetate-polymalonate pathway, in which the majority of lichen compounds are produced (depsides, depsidones, usnic acid, anthraquinones, xanthenes, aliphatic acids). Common

Address for correspondence:
D. Ivanova, Dept. Biochemistry, Molecular Medicine and Nutrigenomics, Prof. P. Stoyanov Varna University of Medicine, 55 Marin Drinov Str., BG-9002, Varna, Bulgaria
e-mail: divanova@mu-varna.bg
products of the mevalonic acid pathway include steroids and triterpenes like zeorin (found in many Cladonia taxa). Acetate-polymalonate pathway includes the most common lichen compounds: derivatives of orcinol β-orcinolunits, depsides, depsidones, depsiones, anthraquinones (most are red-purple pigments in the cortex or apothecia), xanthones (fluorescent), as well as aliphatic fatty acids. Usnic acid (an extremely common yellow-green cortical pigment) is one of the medically useful lichen acids.

![Fig. 1. Usnic acid](image)

Few lichen compounds have been found to be poisonous, such as usnic (Fig. 1) and vulpinic (Fig. 2) acids, and if these compounds would have to be ingested in significant amounts, they could be fatal for humans. Usnic acid is a prominent secondary lichen metabolite that has been used for various purposes worldwide. Crude extracts of usnic acid or pure usnic acid have been marketed in the United States as dietary supplements to aid in weight loss. The US Food and Drug Administration (FDA) received numerous reports of liver toxicity related to the ingestion of dietary supplements that contain usnic acid (13). Besides those, many other lichen compounds are herbivore deterrents, and can be very bad tasting, a digestive irritant, and would probably even be toxic if eaten in large quantities for extended periods of time.

![Fig. 2. Vulpinic acid](image)

The second problem with eating lichens is that the complex carbohydrates in lichens are not easily broken down in the human digestive tract (18). Several types of lichens that were eaten in different parts of the world (22, 28) were usually treated prior consumption to remove some of the toxic compounds or to break lichen polysaccharides into simple sugars that could be absorbed by human intestinal mucosa. Some lichens were even collected partially digested from caribou rumens (reindeer lichen, Cladonia spp.). Lichens contain a variety of polysaccharides - evenin, usnin (36), cellulose and inulin (22), lichenin (soluble in hot water, \(\alpha-(1-3)(1-4)-D\)-glucan), isolichenin (soluble in cold water, \(\beta-(1-3)(1-4)-D\)-glucan). Crude fiber in the lichens contains a significant amount of lichenin and isolichenin, carbohydrates that are digestible by ruminants. After lichenin and isolichenin are hydrolyzed in the rumen digestive tract, they yield glucose and other readily digestible simple sugars. In addition, a high fiber content of Cladonia spp. broken down by rumen bacteria and protozoa may liberate large amounts of energy which would be advantageous to ruminants living under extreme winter conditions (33). Lichen carbohydrates were fairly well studied over a century ago, after Külz suggested in 1874 that they could be eaten as substitute carbohydrates by diabetics (36).

People have traditionally used various preparation methods to make lichens edible by removing the lichen secondary compounds and hydrolyzing the lichen polysaccharides. The most frequently used preparation technique is boiling or steaming, used in North America, Europe, and India. Boiling would help to hydrolyze the lichen polysaccharides into digestible forms. It is recorded that people would often boil the lichen and afterwards discard the water to remove lichen compounds. The lichens were also often soaked or rinsed with water. Sometimes North Europeans and North American natives used ash water to soak the lichens. As wood ash is alkaline, it could have been more effective in removing the acidic lichen compounds or help to hydrolyze lichen polysaccharides. Addition of diluted acids, or acidic ingredients like onion, was common when cooking lichens. Acids could also have helped to hydrolyze lichen polysaccharides, or increase solubility of certain lichen compounds.

Lichens may also provide some other nutrients to the diet. Lal and Rao (1956) found calcium and iron levels to be higher in some lichens than in cereals and thus comparable to green leafy materials (19). The calcium to phosphorus ratio they found was from 2 to 14, and they considered that lichens could serve as a good source of calcium.

Lichens are generally regarded as low in protein but this is true for the species most sought after by caribou and deer. The fruticose Cladonia, Cetraria genera, and the arboreal Alectoria, Bryoria, and Usnea, all of which are the favoured forage of caribou, contain a rough average of 2% crude protein. However, some of the foliose lichens, such as Peltigera spp. and Lobaria spp. have much more protein (33). Several species of Peltigera had a fairly high content of crude protein (from 17% to 21%), and Peltigera canina (L.) Wildl. has been found to be relatively high in essential amino acids. In addition, the digestibility of lichen protein may be low - results of Swedish experiments, reported by Nordfeldt et al. (1961), indicated low lichen proteins digestibility (25).
Various studies have shown lichens to contain some vitamins, but results have not been consistent. Lichens which were the principal food for reindeer in winter contained little carotene. Cladonia arbuscula (Wallr.) Flot. and Cladonia rangiferina (L.) F.H.Wigg., important winter feeds for reindeer and caribou, contained vitamin D and it was speculated that they represented a vital source of vitamin D for the animals, especially during winter (39).

Scarce data indicate a relatively high antioxidant content of lichen extracts (4,12,14), generally with regards to their usage as remedies in folk medicines. On the other hand, research on antioxidant properties of lichens is mainly focused on lichen adaptation to the environment (7,41).

One disadvantage of eating lichens, particularly for humans, is that lichens can accumulate toxins from their environment. Cetraria islandica (L.) Ach. and Cladonia spp. have been found to contain particularly high levels of lead, cadmium, and mercury, and Parmelia saxatilis (L.) Ach. and Xanthoria parietina (L.) Th.Fr. have been found to absorb enough beryllium from their environment to become harmful to animals (22). Xanthoparmelia conspersa (Ach.) Hale can accumulate toxic levels of selenium salt (22). Moreover, lichens absorb and accumulate radioactive fallout far more than vascular plants and pass it along in the food chain. The natural radionuclides Po$^{210}$ and Pb$^{210}$ both accumulate in lichens, as well as Cs$^{37}$ and Sr$^{90}$ from nuclear explosions (2).

Besides being scarce, the various findings of different studies on the nutritional value of lichens have not been consistent. This variation probably partly arises from variation in nutrient composition between and within species. Some of the variation is also likely experimental error as some of the studies are quite old.

**Human use of lichens for food**

Reports that indicate significant use of lichens, primarily as food material, are gathered together and briefly reviewed. It is worth noting that even a given usage may appear to be a rather small percentage of the diet, it could yet play an important strategic role. In many instances lichens are one of the few foods available in winter, so they could be especially important during the most stressful periods for people living in the North. In other cases lichens may ensure supplementation with vital nutrients, contributing to overall diet composition.

**Lichens for food**

Most data about lichen usage for food are related to the Northern parts of Europe and America. The Icelandic ‘Joðsbók’ (law book) refers to ‘gros’ (lichen, seems to refer to Cetraria islandica (L.) Ach.) that has been mentioned in 1280 as a natural product which could not be collected without the landowner’s permission." (2). Flavocetraria nivalis (L.) Körnfeil & Thell was sometimes collected for food along with Cetraria islandica (L.) Ach. (2). A method for making glucose “molasses” from Flavocetraria nivalis (L.) Körnfeil & Thell and Cetraria islandica (L.) Ach. and was developed during World War II (in 1934-3) in former Soviet Union because of beet sugar, potatoes and grain used instead for military purposes. Syrup with brown tinge and caramel flavor was prepared from Cetraria islandica (L.) Ach., and the glucose yield was 78% of dry lichen weight (24). In Scandinavia the hardened jelly of this lichen was often mixed with lemon juice, sugar, chocolate, almonds, etc. (23). In Scandinavia, Iceland, Northern Europe and Britain nd Northern Russia Cetraria islandica’s lower parts were removed, soaked in ash water or lye water for several days, boiled, rinsed, dried, ground, mixed with flour, then cooked as bread, gruel, or jelly. During the 1900s, C. islandica was used so extensively for bread that it became scarce and picking it became forbidden unless it was to be used for human consumption." (1). Cetraria ericetorum Opiz was chopped up and added to various types of soups for flavoring by the Eskimos (26).

Lobaria quercizans (Ach.) Michx. was a favorite old food of in the area of Great Lakes in North America (43). Lobaria scrobiculata (Scop.) DC. was eaten plain, right from the tree by the Eskimo in Alaska; Nephroma arcticum (L.) Torex. was eaten boiled with fish eggs in Alaska and western Canada (42). The Eskimo stored it until winter and then boiled with crushed fish eggs (26).

In North America Umbilicaria muhlenbergii (Ach.) Tuck. was cleaned, broken into small pieces and added to fish broth to make a thick soup (several handfuls of lichen to one medium-sized fish). Hot water was poured over the lichen pieces before use and discarded, boiled 5-10 minutes, thickened as it cooled. This soup was considered good nourishment for a sick person since it would not upset the stomach (20). Indigenous peoples in Canada considered Umbilicaria muhlenbergii (Ach.) Tuck. agreeable and nutritious when boiled with fish (35). Most of the Great Lakes region natives would starve without Umbilicaria sp. (8,43). Umbilicaria spp. were emergency and famine food for Canadian indigenous people (18). Umbilicaria vellea (L.) Hoffm., was considered to be pleasant food than the other species of this genus (35).

Native American tribes and some European travelers in boreal North America used lichens for food prepared in different ways. Various lichens on rocks or trees after being washed in ashes and water, were boiled in grease. Bryoria fremontii (Tuck.) Brodo & D. Hawksw. was cooked in various ways - rinsed in fresh water for several hours to overnight, sometimes worked with hands, steam cooked in a covered pit with plant material (often onion) for several days, dried, then stored or roasted over fire until crumbly then boiled in water to form molasses. Although it was usually cooked as above, sometimes the lichen was eaten raw in times of famine. “After babies were weaned they were given a mixture of saskatoon berry juice and ‘syrup’ of boiled black tree lichen” (11). “It was believed that pregnant women should not eat this lichen because it would make their babies dark” (37). Sometimes the lichen was boiled and eaten with fish, grease, or berries (18). Another lichen, used in the diet, Nephroma arcticum (L.) Torex. was collected and stored until winter, then boiled with crushed fish eggs and eaten. Cetraria ericetorum Opiz, Umbilicaria muhlenbergii (Ach.) Tuck.
Hypogymnia physodes (L.) Nyl. and Flavocetraria cucullata (Bellardi) Körnfei & Thell were chopped and boiled in soup. Umbilicaria spp. and Lasallia spp. were often boiled in several changes of water and eaten in soup or alone. Lobaria scrobiculata (Scop.) DC. was eaten raw right off tree. Lobaria amplusissima (Scop.) Forssell, and other unidentified lichens on white pine were boiled until looked like scrambled eggs, then eaten; or dried, boiled, then used in broth. Lobaria amplusissima (Scop.) Forss. was also made into porridge. Umbilicaria muehlenbergii (Ach.) Tuck. was added to fish broth to make a thick soup. There were traditions to use lichens for food also in Japan - Umbilicaria esculenta (Miyoshi) Minks. was eaten in soups and salads (30). The Japanese consumed several hundred kilograms annually of Umbilicaria esculenta (Miyoshi) Minks. as a delicacy in soups, or deep fried." (30). Known as “Iwa-take” meaning “rock mushroom”, Umbilicaria esculenta (Miyoshi) Minks. was very difficult to collect, very expensive, used as a “dainty” in a high-class dinner (17).

In India Everniastrum cirrhatum (Fr.) Hale ex Sipman after being boiled and liquid removed, was fried and eaten as a vegetable. Parmotrema chinense (Osbeck) Hale & Ahti, Parmotrema reticulatum (Taylor) M. Choisy, and Peltigera canina (L.) Wild. were also used as food (29).

Interestingly, in France lichens were used in manufacture of chocolates and pastries, where lichenin was a filler and substituted for commercial starch (23). In 19th century in Egypt Pseudevernia furfuracea (L.) Zopf and Evernia prunastri (L.) Ach. imported from Greek islands were used in breadmaking (3). In Egypt and Turkey it was used also for jelly production, or fermented (35). No data about lichen usage for food in Bulgaria were found. West Central Asians and North Africans used Aspicilia esculenta (Pall.) Flagey ground, mixed with meal to one-third its weight, and made into bread, or it had been fermented with honey (40).

Additionally to being used as food for humans, Cetraria islandica (L.) Ach. was used to feed domestic animals in Sweden, mainly during World War II - for pigs (1) and cows (23). It has been reported that in the years of famine in Scandinavia “a farmer having 10 cows and some sheep and goats uses yearly 60 sledge loads of lichens for his stock.”. In Harjedalen (Sweden) various lichens were collected, placed into small blocks and frozen during the winter and later used as food for cattle. It was considered that the cow’s milk was more beneficial and plentiful on this diet (1). In times of food shortage in Alaska (Cook Inlet) Cetraria islandica (L.) Ach. was fed to dogs (16). The Eskimo near Bethel, Alaska used “caribou food” lichens soaked overnight with ashes from fire, rinsed, boiled with meat into thick jelly for dog food (15).

Lichens as spices and delicacies

In India Parmelia abetassina Kremp. and Parmelia physodes (L.) Nyl., were sold in the market and were used as food material and as condiment in curry. The lichens were considered to be a delicacy (9). Parmotrema nilgerrense (Nyl.) Hale was a principal component of Kabal Garam Masala, a spice mixture which was usually added at the end of cooking in India. “Shops and street sellers in the markets offered the stock "dagafaal" (stone flowers), a mixture of Parmotrema tinctorum (Delise ex Nyl.) Hale, P. nilgerrense, (Parmotrema reticulatum (Taylor) M. Choisy, Parmotrema sancti-angelii (Lyngse) Hale, Ramalina, and Usnea sometimes was included (29). The curry additive Kabal Garam Masala included a high proportion of various Parmeliaceae (especially Parmotrema and Everniastrum species) as well as Ramalina and Usnea. In addition, the above lichens were also sold loose and added to curry as a bulking agent with mild preservative properties. The amount of material collected for these purposes placed a heavy burden on the diminishing lichen flora of the Indian territories (30).

In Western Saudi Arabia, Kuwait, and Oman Parmotrema tinctorum (Delise ex Nyl.) Hale was used as a food spice. Flavocetraria cucullata (Bellardi) Körnfei & Thell in Alaska was used as condiment for fish or duck soup (42).

Lichen tea

Cladonia rangifera (L.) F.H.Wigg. was used by French fur traders in Quebec as a tea when provisions were exhausted (35). N. arcticum was taken as an infusion to treat “weakness” in Alaska (42). Apart from their food value, lichens may be important as a source of free water during periods of cold and low temperatures (6), mainly to animals. Sometimes raw thallus of Bfremontii was chewed as thirst quencher (38).

Use of lichens in alcohol production

Cladonia rangifera rangifera (L.) F.H.Wigg. and other lichens were used to make brandy from lichen-derived alcohol. The industry was growing near Stockholm in 1883, but closed in 1884 because local lichen supplies were exhausted (34).

In Europe Lobaria pulmonaria (L.) Hoffm. was used as a substitute for hops (21). There are reports that in the India Himalayas regions Darjeeling and Sikkim the lichen was used for brewing, however this may refer to reports of European/Russian use rather than local use (5). There are data that in Russia and Siberia lichens were used instead of hops in one or more monasteries which served bitter and highly intoxicating beer to travelers (23). The beer of a certain Siberian monastery which was noted for its peculiar bitterness owed this to Lobaria pulmonaria (L.) Hoffm. (32). A method for making glucose “molasses” from Cladonia stellaris (Opiz) Pouzar & Vyszda was developed during World War II (in 1934-3) in former Soviet Union because beet sugar scarce and potatoes and grain used for military purposes. The syrup was so bitter that “better applied to the production of alcohol or as a medium for growing food yeasts” than used as syrup. Glucose yield was 75% of dry weight (24).

Lobaria pulmonaria (L.) Hoffm. was used instead of hops for making beer in Siberia, while in Northern Europe and other parts of Northern Russia Anaptychia ciliaris (L.)
Korh., Bryoria spp., Cetraria islandica (L.) Ach., Cladonia rangiferina (L.) F.H.Wigg, Ramalina farinacea (L.) Ach., Ramalina fastigiata (Pers.) Ach., Ramalina fraxinea (L.) Ach., and Usnea florid (L.) F.H.Wigg. were used to make brandy: the lichen was steamed under pressure for several hours, weak acid was added, steamed again, neutralized with alkali, and fermented. Molasses were made from Alectoria ochroleuca, Cetraria, and Cladonia spp. in Northern Russia: the lichens were soaked in weak alkali, hydrolyzed with dilute sulfuric acid, neutralized with chalk, and purified with activated carbon.

In Tarahumara uplands (Mexico) Usnea subfuscus Sinton was widely used as catalyst in making fermented corn (and com stalk) beverages (27).

Tobacco substitutes

In Mauritania Parmelia paraguariensis Lygne was used as tobacco and was imported from several hundred kilometers to the Northwest (29)

In India crude drug ‘chharila’, extracted from three Parmelia spp. is sold in Indian bazaars and used in Ayurvedic and Unani systems of medicine, considered to be a good cephalic snuff (31). A novel Dictyonema sp. was used by the native Indians in Ecuador as a hallucinogen in shamanistic rituals (10).

CONCLUSION

The cohesion of the data from available studies of the lichen nutritional value and usage gives reason to think that lichens present a great and worth to be rediscovered potential source of functional foods. Data about the effect of lichens used for food on gene expression levels, protein and metabolite variations in humans virtually do not exist. This is a great challenge to explore the effect of lichens in food with respect to the nutrigenomics advent and compare with data about other potential sources for nutraceuticals and new food additives.

REFERENCES


15. Jones A. Nauriat Niginaqtuat (Plants that We Eat). Anore Jones and Manilag Association, 1983.


43. Yarnell R. A. Aboriginal relationships between culture and plant life in the Upper Great Lakes Region. Anthropological Papers, Univ. of Michigan, 1964.
SEVERE HEAD INJURY ASSOCIATED WITH MULTISYSTEM INJURIES

Kalevski S., N. Peev, D. Haritonov, S. Dyankov

Department of Neurosurgery, Medical University - Varna, Clinic of Neurosurgery, “St. Anna” District Hospital

Reviewed by: Assoc. Prof. R. Radev

ABSTRACT

The incidence of severe head injury (SHI) varies between 20-30/100000. In the developed countries, the SHI contributes for over 50% of the dead outcomes among the trauma patients. Many investigations statistically prove that associated with SHI multisystem injuries negatively affect the outcome. In the present study we aim to investigate which organs and system having concomitant injury with SHI have a maximal negative influence to the outcome. We also aim to systematize the influencing factors, also to revise the treatment strategy. Our investigation is based on a cohort of 57 consecutive patients with dead outcome admitted to “St. Anna” Hospital for the period 2004 - 2006 year. The patients are classified according the localization of the associated injuries. A clinico-therapeutic classification was also made based on the severity of the patient’s condition, also according to the necessary urgent management.

Key words: severe, head, multisystem, injury, classification, management, outcome

INTRODUCTION

The incidence of severe head injury (SHI) varies between 20-30/100000. In the developed countries, the SHI contributes for over 50% of the dead outcomes among the trauma patients (2,5,13). In the USA 25% of all hospitalized trauma patients are patients with SHI. Furthermore over 60% of the dead outcomes among trauma patients in the hospitals is related to SHI (2,16).

Many investigations statistically prove that associated with SHI multisystem injuries negatively affect the outcome (4). In recent days multiple factors and mechanisms that are involved in the secondary brain damage were identified (11). The majority of them are as a result of concomitant injury to other organs and systems, that specifically trigger a chain of pathologic events that cause brain edema ischemia hypotonia, hypoxemia, hypercapnia, etc. (2,5,11,15).

In the present study we aim to investigate which organs and system having concomitant injury with SHI have a maximal negative influence to the outcome. We also aim to systematize the influencing factors, also to revise the treatment strategy.

MATERIAL AND METHODS

Our investigation is based on a cohort of 57 consecutive patients with dead outcome admitted to “St. Anna” Hospital for the period 2004 - 2006 year. On admission patients are with SHI - GCS < 8 p. and concomitant injuries to other organs and systems.

Patient’s records, imaging, perative protocols and pathologoanatomical findings are analyzed. In the investigated group 38 (67%) are men and 19 (33%) are women with mean age 49,5 (4-88).

In the first 24 hours 23 (40%) of the patients died, while 15/23 (65,2%) died due to asphyxia because of chest injury or aspiration of blood or gastric contents. The average hospitalization period is 6.33 days (0-84). Among the most common reasons for polytrauma are acceleration - deceleration - car accidents - 34 (59,6%), falls from height - 15 (26,3%), also everyday life trauma - 8 (14,1%).

The patients are classified according the localization of the associated injuries, respectively “C” for cerebrum, “T” for thorax, “A” for abdomen and “O” for orthopedic.

Tabl. 1.

<table>
<thead>
<tr>
<th>Bi-regional</th>
<th>Tri-regional</th>
<th>Quad-regional</th>
</tr>
</thead>
<tbody>
<tr>
<td>n=23</td>
<td>n=7</td>
<td>n=7</td>
</tr>
<tr>
<td>n=10</td>
<td>n=3</td>
<td>n=3</td>
</tr>
<tr>
<td>n=7</td>
<td>n=7</td>
<td></td>
</tr>
<tr>
<td>CT</td>
<td>CTA</td>
<td>CTAO</td>
</tr>
<tr>
<td>CA</td>
<td>CTO</td>
<td></td>
</tr>
<tr>
<td>CO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>70%</td>
<td>17%</td>
<td>12,5%</td>
</tr>
</tbody>
</table>

The most common are the bi-regional injuries - 40 cases (70%): CT - 23; CA - 10; CO - 7; Next come the tri-
A clinico-therapeutic classification was also made based on the severity of the patient’s condition, also according to the necessary urgent management.

I. Immediate - 24 cases with impaired vital functions necessitating imperious medical treatment - asphyxia, pulmonary aspiration, pneumothorax, haemothorax
II. Urgent - 21 cases that necessitated operative treatment within 1 hour after the trauma - massive intracranial haematomas, hemorrhages, etc.
III. Pressing - 7 cases that necessitated operative treatment within 4 hour after the trauma - fractures of big bones, acute ischaemias, ruptured internal organs, etc.
IV. Postponed - treatment procedures that are necessary but that could be postponed until the condition of the patient is stabilized - facial fractures, urethral ruptures, fractures of small bones etc.

The severity of the patient’s condition is evaluated with GCS. Patients with GCS less than 8 are considered as SHI. All of the clinical diagnosis are confronted with the pathoanatomical diagnosis and with the therapeutic approach.

RESULTS

In the investigated cohort of 57 cases, 23(40%) died within the first 24 hours after the trauma due to ARDS following chest trauma, asphyxia, aspiration of blood or gastric contents, primary brain stem contusion. Between the first and seventh day died 30(52,6%) of the patients due to large brain contusions, severe brain edema, brain stem dysfunction, circulation or/and respiration failure. After the 15th day died 4 with myocardial infarction or pulmonary trombembolism, etc.

In the followed cohort we found 30 combined fractures of the calvaria and the skull base, 13 skull base fractures, 6 calvarial fractures. In 8 of the cases the diagnostic imaging did not reveal skull fractures. The CT-Scans revealed 32 massive supratentorial brain contusions, 21 brain stem contusions and 4 contusions of the pineal gland. All of the CT-Scan findings were subsequently confirmed with pathoanatomical diagnosis.

Managing the patients included in the present study we performed 27 craniotomies for evacuation of intracranial haematomas causing acute brain compression - Marshal type IV, extended hemorrhagic contusions, dislocated and causing brain compression skull fractures.

In 86% of the cases the neurosurgical interventions precede the surgical interventions treating trauma consequences in other organs and systems. In the rest of the cases the impaired vital functions are treated before the neurosurgical treatment.

The most common - 23 cases (40%), are bi-regional associated lesions (CT) that require immediate treatment at the place of the accident, during the medical transportation, also in the emergency unit.

DISCUSSION

Many authors emphasize a tendency of significant decrease of the mortality among the patients with SHI (8). However they often exclude patients with severe associated lesions, also those that reach the intensive care units with a big delay (14).

Kuhne et al. (6) study the dead outcome among the patients with SHI, so they found increased risk of mortality in the age above 55 years. This subgroup of patients has twice as big risk of multi-organ injuries if compare with the patients less than 55 years old.

In the group of patients that we investigated, 62% are in the age of 55 years, even though the patients that are less than 55 years old have more extended brain damage, also more severe associated multisystem lesions.

Tepas et al. (12) attribute the increased mortality among the elderly patients to the concomitant morbidity.

Based on this some authors (1,4,7) create prognostic models, finding relation between factors as age, GCS, CT, associated lesions, arterial hypotension, intracranial hypertension, coagulopathy, etc. on the one hand and mortality on the other.

It is noticeable that in the group that we investigated 40% died within 24 hours and almost all SHI cave been combined with chest trauma or asphyxia. The period of the first 24 hours after the trauma is the most important period for the injured patients. It is comprised of prehospital resuscitation, stabilization of the vital parameters, diagnostic process in emergency care unit, neurosurgical procedures followed by admission in intensive care unit. Hence, it is extremely necessary a complex clinical-therapeutic plan for treatment of patients with SHI to be worked out. Furthermore it should include the whole period of treatment from the place of the accident to the admission in the specialized clinic.

Respecting the management of SHI, two main methodologies that present the modern conventional good medical practice, were published in the last 10 years - the European (EBIC) (10) and the American (Brain Trauma Foundation) (3).

Regardless some unessential differences, we also support the idea that the neurosurgical evaluation and specific treatment should be started immediately after the vital functions are stable. The complex treatment of these patients should be put in to practice by well trained team under supervision of neurosurgeon following appropriate algorithm.

CONCLUSION

1. Stabilization of the vital functions should treating the patients with SHI and associated multisystem injuries be considered should be considered as an absolute priority.
2. The treatment of such patients should be done in specialized for intensive care units by well trained teams under supervision of neurosurgeon.
3. Regardless of the severity of the injury, patients in the age over 55 years have increased risk of dead outcome if compared to the patients under 55.

REFERENCES

ON SOME PROBLEMS WITH BREASTFEEDING OF INFANTS

Turnovska T., R. Vasileva, V. Atanasova, P. Gatzeva, G. Kavlakov, At. Alexandrova, G. Mihailova

Department of Hygiene and Ecomedicine, Medical University, Plovdiv

Reviewed by: Assoc. Prof. B. Varbanova

ABSTRACT

The aim of the present study is to analyze breastfeeding with children from the city of Plovdiv. Material and methods: The initial information was collected in the month of June 2005 through a retrospective passive survey conducted with 200 mothers whose children attended 2 day care centers and 2 kindergartens in the city of Plovdiv. The survey questionnaire formulated by the research team included two sets of questions: Relating to the mother and relating to the child. Results: At the time of giving birth to the children participating in the survey, the greatest relative share was of mothers at the age of 24 to 30 (64.21%), followed by those at the age of 31-35 - 8.95%. According to their level of education, the highest percentage is of mothers with secondary (55.7%) and higher (41.58%) education; there are no mothers with elementary education, and those without any school attendance are 1.58%. Only 4 (2.10%) of the surveyed women did not breastfeed their children at all. 68.95% of the surveyed women claim that they do not know anything about the ‘exclusive breastfeeding’ method which is recommended by WHO. The most frequent reason for the mothers to cease breastfeeding was insufficiency of breast milk - in 26.84% of the cases, followed by ‘Others’ - 11.5%, ‘Health problems of the mothers’ - 3.16%, ‘The infant consistently did not gain enough weight’ - 1.05%, etc. The average anthropometric indicators of the children (both at the time of birth, and the current readings) correspond to Bulgarian standards. Conclusions: 1. Almost all mothers taking part in the survey (97.89%) wanted to and started to breastfeed their infants. The main reason for the discontinuance of breastfeeding is the insufficient amount of their breast milk. 2. The relative share of the mothers who did not feel prepared for breastfeeding is large. 3. There is evidence that the medical workers in the birth preparation centers have unsatisfactory knowledge of the current recommendations of the WHO in the sphere of breastfeeding. 4. The ‘exclusive breastfeeding’ method is not sufficiently well-known and it is not applied.

Key words: infants, exclusive breastfeeding

An infant’s feeding predetermines to a great extent the health status of a child not only before reaching one year of age, but also afterwards, to a considerable extent. Studies show that breastfeeding lowers the risk of contracting a number of infectious diseases, including bacterial meningitis (9), diarrhea (8,18), respiratory-tract infections (7,13), allergic diseases (21), etc. This is owing to the presence of various anti-infective factors in breast milk - immunoglobulin (Ig A, Ig M), phagocytes, T-cells, lysozyme, lactoferrin, etc., which increase a breast-fed child’s immunity (11). A decrease in morbidity also leads to a decrease in child mortality (14). Breastfeeding is a prerequisite for a child’s better physical and mental development (16,22). Breast-fed children have been reported to be at a lower risk of arterial hypertension (17) and obesity (6) at a later stage in life.

Undoubtedly there are numerous benefits from breastfeeding for mothers as well - quicker recovery after giving birth (12), less risk of breast cancer, ovarian cancer, risk of rheumatoid arthritis (19) etc. The American Academy of Pediatrics also stresses the advantages of breastfeeding for society - reduction in health care expenditure, funding of programs connected with women’s and children’s nutrition, a decrease in parents’ absences from work, reducing expenses on transportation of special foods for children, energy for producing them, transportation and making their packaging safe, etc. (10). Despite the numerous advantages of breastfeeding, evidence shows it is not typical of American culture (15). The American Academy of Pediatrics reports that, with regard to scope and duration, breastfeeding in the USA is considerably below The Aims of Healthy People 2010 program (23). In contrast, breastfeeding is typical of Bulgarian culture. However, the socio-economic changes during the period of transition to market economy had a negative effect on the nutrition model of the majority of the Bulgarian population. The existing lack of balance in the nutrition of the population creates the possi-
ability of a rise in states of malnutrition amongst large groups of the population, including amongst expectant mothers. National studies show that milk and dairy-products consumption amongst them is insufficient (1,4). This is directly associated with the reported problems with breastfeeding - only 30% of infants are breastfed for 6 months (2), and the significance of breastfeeding for this period of development of the infant is well-recognized (20,5). In connection with this, the so-called method of ‘exclusive breastfeeding’ became extremely popular. For the present research we set as a goal to analyze breastfeeding with children from the city of Plovdiv.

MATERIAL AND METHODS

The initial information was collected in the month of June 2005 through a retrospective passive survey conducted with 200 mothers whose children attended 2 day care centers and 2 kindergartens in the city of Plovdiv. The survey was carried out with the assistance of the nurses working at the day care centers and kindergartens. In order to avoid accidental errors in the entering of the children’s anthropometric indicators, the survey was not anonymous. The survey questionnaire formulated by the research team included two sets of questions: 1. Relating to the mother: ‘Did you experience any complications during your pregnancy and during the delivery of this child?’, How many hours after giving birth were you given your infant to breastfeed? Were you prepared for successful breastfeeding? Are you familiar with the ‘exclusive breastfeeding’ method? Did you encounter any problems with breastfeeding? What was the duration of a breastfeeding session? How many months did you breastfeed your child? What kind of reasons made you stop breastfeeding?’ etc. and 2. Relating to the child: ‘When the infant was only breast fed, did it receive any other food?’, At what age did the child utter its first sentence?’, etc. Analysis of variance, correlation, alternative, and graphic analyses were used in the statistical processing of the results.

RESULTS AND DISCUSSION

The usable survey questionnaire forms are 190, where some questions lack answers in some of the survey forms. At the time of giving birth to the children participating in the survey, the greatest relative share was of mothers at the age of 24 to 30 (64.21%), followed by those at the age of 31-35 - 8.95%. According to their level of education, the highest percentage is of mothers with secondary (55.79%) and higher (41.58%) education; there are no mothers with elementary education, and those without any school attendance are 1.58%. Only 4 (2.10%) of the surveyed women did not breastfeed their children at all. The majority of the mothers did not have any complications during pregnancy and delivery - 82.63%. 43.68% of the surveyed mothers were given their children six hours after birth, and 46.31% - between the 5th and 6th hour. Most of the mothers (65.26%) did not have problems during breastfeeding (mastitis, rhagades, general somatic illnesses, etc.), nevertheless, only with 12.11% of them it lasted 20-30 min. In the majority of cases (56.32%) a breastfeeding session was 10-20 min. long, and with 18.95% - no more than 10 min. In contrast to this, the answers to the question: ‘Were you sufficiently prepared for successful breastfeeding before giving birth?’ yielded a high percentage of negative answers - 38.95%. Obviously the majority of the mothers (57.37%) felt prepared; the number of those who did not know how long a breastfeeding session should last, is not small either. Keeping in mind the high level of education of the surveyed women, which might allow us to presuppose certain amount of self-preparation with a number of them, we consider the comparatively large number of mothers who were unprepared for breastfeeding to be a result of serious failures in the work of the birth preparation centers. In support of this, 68.9% of the surveyed women claim that they do not know anything about the ‘exclusive breastfeeding’ method which is recommended by WHO. In order to ‘check’ the veracity of the answers, we also asked the question: ‘When the infant was only breast fed, did it receive any other liquids - tea, water?’ Only 4.74% of the mothers said: ‘No’. This demonstrates that the 28.95% of them, claiming to be familiar with the mentioned method, probably were not sufficiently convinced of its correctness, since they did not put it into practical use. This makes us conclude that it is possible for the level of knowledge of doctors and maternity nurses caring for pregnant women to be low, or not to be updated regularly. The fact that 78.42% of the mothers substituted one of the breastfeeding sessions with some other food between the 4th and 6th month means that the majority of them adhered to the standard infant-feeding scheme established in Bulgaria. It has to be noted though, that with 1.58 % of the infants the first substituted breastfeeding session occurred between the 9th and 12th month, and with 0.53% > even after the first year. The most frequent reason for the mothers to cease breastfeeding was insufficiency of breast milk - in 26.84% of the cases, followed by ‘Others’ - 11.5%, ‘Health problems of the mothers’ - 3.16%, ‘The infant consistently did not gain enough weight’ - 1.05%, etc. The main anthropometric indicators of the children taking part in the survey are presented in Table 1. It shows that the average indicators both at the time of birth, and the current readings (in the month of June 2005) correspond to Bulgarian standards (3). However, seven of the children (3.68%) were prematurely born (body mass under 2500 g), and 2 of them were respectively 1500 and 1580 g. In order to estimate the significance of breastfeeding with prematurely born children, we analyzed the individual development and health status of each one of them. The findings showed that
the current height and body mass of 1 of these children (born weighing 2100 g) corresponded to Bulgarian standards (X ±SD), which for the age of 5 years and 6 months is 115 cm and 19 kg.

Table 1. Anthropometric indicators of the children taking part in the survey

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Statist. parameters</th>
<th>Altogether for the group</th>
<th>8-35 months</th>
<th>36-72 months</th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height at the time of birth</td>
<td>X</td>
<td>50.1</td>
<td>50.21</td>
<td>50.03</td>
<td>50.06</td>
<td>50.13</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>2.75</td>
<td>1.86</td>
<td>3.15</td>
<td>2.61</td>
<td>2.89</td>
</tr>
<tr>
<td>Body mass at the time of birth</td>
<td>X</td>
<td>3254</td>
<td>3365</td>
<td>3191</td>
<td>3334</td>
<td>3175</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>515</td>
<td>452</td>
<td>540</td>
<td>544</td>
<td>476</td>
</tr>
<tr>
<td>Current height</td>
<td>X</td>
<td>101.59</td>
<td>91.09</td>
<td>108.13</td>
<td>101.71</td>
<td>101.46</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>11.88</td>
<td>6.62</td>
<td>9.5</td>
<td>9.7</td>
<td>13.94</td>
</tr>
<tr>
<td>Current body mass</td>
<td>X</td>
<td>16.79</td>
<td>13.94</td>
<td>18.53</td>
<td>16.97</td>
<td>16.62</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>4.27</td>
<td>2.35</td>
<td>4.25</td>
<td>3.77</td>
<td>4.74</td>
</tr>
</tbody>
</table>

The child's mother has secondary education, she did not experience any complications during the time of pregnancy and labor, a breastfeeding session lasted 10-20 min., and she adhered to the breastfeeding regime; the child nursed for 6 months, from the 4th month it was additionally formula-fed, it was sick with respiratory-tract illnesses up to 2 times in the 1st year of its life. Of the other 6 children, 5 are 'above or below norm' with regard to their body mass (underdevelopment with more than 2 SD), and the 6th child falls in 'extended norm' (up to - 2 SD). These children nursed 3 to 6 months, additionally formula-fed (one of them also fed with yoghurt). Two of the children were sick on more than 4 occasions in the first year of their lives, mainly with respiratory-tract and allergic illnesses. The other 4 children were sick no more than 2 times. From the group of the prematurely born children, 4 started walking some time between the 9th and the 12th month, and two - between the 13th and the 18th month. Teething was 'late' with 3 of these children - after the 6th month. All seven children started talking before the end of their second year of life. It is rather impressive that the mothers regard their preparation for breastfeeding as insufficient. It is a paradox that according to 2 of them their children gained weight well. This shows not only the lack of good contact between the mothers and the birth preparation centers but also the absence of such contact with the child-monitoring centers. Obviously the prematurely-born children, though breastfed in the first few months of their lives, did not manage to make up the underdevelopment in their physical growth and biological maturity, which is indicated by the late teething and beginning of walking with some of them.

**CONCLUSIONS**

1. Almost all mothers taking part in the survey (97.89%) wanted to and started to breastfeed their infants. The main reason for the discontinuance of breastfeeding is the insufficient amount of their breast milk.
2. The relative share of the mothers who did not feel prepared for breastfeeding is large.
3. There is evidence that the medical workers in the birth preparation centers have unsatisfactory knowledge of the current recommendations of the WHO in the sphere of breastfeeding.
4. The 'exclusive breastfeeding' method is not sufficiently well-known and it is not applied.

**LITERATURE**

1. Байкова, Д., С. Петрова, К. Ангелова и др. Прием на детето. В: Национално проучване на здравето и хранителния статус на населението в България, 1998 година (Петрова С. и кол.). Хигиена и здравеопазване, 2000, 3-4.
2. Доклад за здравето на нацията в началото на 21 век. Анализ на провежданата реформа в Здравеопазването. Министерство на здравеопазването, Август, 2004, стр. 68.
3. Методика за провеждане на профилактични прегледи за лица от 0-18 год. ДВ бр. 16/2003, стр.32.
4. Петрова, С., Д. Байкова, К. Ангелова, Л. Иванова, В. Дулева, М. Янчева. Хранителна консумация на населението в България. Хигиена и здравеопазване, 2000, 1, 22-25.


RECURRENT LUMBAR DISC HERNIATION
OUTCOME ANALYSIS OF REPEAT DISCECTOMY

Kalevski S.

Department of Neurosurgery, ENT and Ophthalmology, Varna Medical University

Reviewed by: Assoc. Prof. N. Deleva

ABSTRACT

BACKGROUND CONTEXT: Recurrent lumbar disc herniation is the most common reason for unsatisfactory results following disc excision and it occurs in 2% to 13% of surgically treated patients. There have been many studies on recurrent disc herniation, but these studies often reviewed recurrence along with other causes of failed disc surgery. Specific studies on long-term outcomes of the repeat discectomy are relatively lacking in the literature. PURPOSE: To investigate the long-term functional outcomes of the repeat discectomy using ODI and VAS, and the risk factors of recurrent disc herniation. STUDY DESIGN: A prospective evaluation of 21 patients with recurrent disc herniation. PATIENT SAMPLE: All of the 21 patients selected for the study have at least one reoperation for recurrent disc herniation. OUTCOME MEASURES: The outcome is measured using VAS and ODI questionnaires filled in by the patients themselves. METHODS: Recurrent disc herniation was defined as disc herniation at the same level (ipsilateral or contralateral) and disc herniation at a different level, with pain-free interval greater than 1 month. The levels of disc herniation were: L2-L3 (1 case), L3-L4 (1 case), L4-L5 (9 cases), L5-S1 (9 cases), two levels L4-L5 and L5-S1 (1 case). Nine men and 12 women of mean age 43.7 (18-57) years were studied. In order to evaluate the pain syndrome and functional impairment, we used the visual analog scale (VAS) 0 – 100 mm and Oswestry Disability Index (ODI) 2.0 before the initial surgery, before the reoperative surgery, as well as on follow-ups after the first and sixth month, first year, and after five and more years. RESULTS: A group of 489 consecutive patients with primary discectomy is investigated. We identified sixty-four patients (13.09%) reoperated for a variety of reasons (including complications). Out of the whole group of the reoperated, 21 patients (32.8%) with RDH are selected. There is a tendency of deterioration that is reflected by the ODI values that range from 10 to 48 (31% mean) after the follow-up that varies from 1 to 8 years (4.8 mean). Nevertheless, only two of the patients (9.5%) are not satisfied with the treatment altogether. The two patients claim that the results after the treatment do not meet their expectations before the initial discectomy. CONCLUSIONS: In the group that we investigated for a long enough time (mean of 4.8 years follow-up), 43% of the patients with primary discectomy are reoperated due to RDH. Only 2 of the patients (9.5%) had unsatisfactory results after the reinterventions. The age, gender, preoperative symptoms, life style or the occupation are not recognized as factors that could increase the risk of RDH. Only disc protrusions require reinterventions due to RDH three times more frequently than primary extrusions or sequestrations, sions require reinterventions due to RDH three times more frequently than primary extrusions or sequestrations.

Key words: recurrent lumbar disc herniation, reoperations, Oswestry Disability Index, Visual Analog Scale, lumbar disc surgery, revision surgery, outcome study

BACKGROUND

Lumbar discectomy is an effective method for 75-90% of patients suffering from lumbar radiculalgia resistant to the conservative treatment (10). However, despite the advancement in diagnostics and surgical procedures, 10-20% of the patients (15,23,26) (according to other authors 20-40% (1,3,4,8,11,14,16,21,24) had dissatisfactory or bad postoperative results and further reoperative treatment was necessary. Many authors have investigated the reasons for these dissatisfactory results, but their conclusions are often contradictory. The reasons that are commonly emphasized are inadequate neural decompression, recurrent disc herniation (RDH), underestimated associated lateral or central stenosis, wrong level of operation, bad patient selection, epidural and epineural fibrosis, arachnoiditis, segmental instability,
facet joint disease, nerve root injury, infectious complications, dural tear, etc. (5,6,8,11,13-16,21,23,24)

Occurring in 2-13% of the patients with persisting and recurring lumboradiculalgia (11,18,23), RDHs are the most common reason for unsatisfactory postoperative results. The RDH could be located at the level of the initial surgery - ipsilaterally or contralaterally, or at a different level (3-6,8,12,13,18,23,24). If the syndrome of lumboradiculalgia recurs several pain-free months after the initial discectomy, the most probable diagnosis is RDH.

Furthermore, many authors prove that the reoperative surgery for RDH yields good results that are comparable to the results from the initial discectomy (3,4,12,18,23).

An accurate preoperative diagnosis and meticulous following of the surgical procedure are crucial for the successful treatment of RDH.

The goals of this research are: to analyze the functional results of a group of reoperated RDH patients; to identify the factors that have a negative influence on these results; and to assess the patient's satisfaction with their surgeries when compared to their expectations before their initial discectomy.

MATERIAL AND METHODS

For a period of 1-8 years (mean 4.8), 21 patients with repeat discectomy are followed. All of the patients have initial microdiscectomy, using the standard open interlaminar Yasargil, Caspar and Loew approach that is comprised of limited unilateral laminotomy, medial arthrectomy and disc enucleation through a small posterolateral rectangular incision of annulus fibrosus. All of the patients have at least one reoperation for RDH.

In the final stage of the operative procedure the neural structures are isolated from the adjacent tissues using autograft fat tissue, fixed to the paraspinal muscles. The 21 patients (9 men and 12 women with mean age of 43.4 years) under observation are a subgroup, presenting 32.8% of a bigger group of 64 patients reoperated for a variety of reasons. The whole cohort of 64 reoperated patients is a subgroup selected from a bigger group of 489 patients that had undergone primary lumbar discectomy. Among these patients, all of whom were treated in one hospital, 254 (51.9%) are men and 235 (48.1%) are women, with mean age of 44.3 (17-74) years. The subgroup of the patients with RDH is comprised of those who have recurrent disc herniation at the operated level (ipsilateral or contralateral) or at an adjacent level. It has been proven that the levels adjacent to the herniated disk are exposed to additional load that causes an accelerated degenerative process, hence the rupturing of annulus fibrosus. Thus, we believe that the adjacent level should also be considered in respect to RDH. This is the reason why the herniated disk at adjacent level, termed "de novo" disc herniation by some authors, is directly related to the primary discectomy (5,6,8,12,20,27).

Furthermore, the recurrence of the pain syndrome and deterioration of the functional status of the patient that has already undergone initial lumbar surgery often necessitates another surgical procedure, even though it is preformed to another level.

We define one month to be the minimal period of of pain relief, as after the sixth month the formation of epidural fibrosis becomes a normal occurrence and contributes to the pain. The patients with associated foraminal stenosis or massive epidural fibrosis are excluded from the investigated group.

Lumbalgia or/and severe radicular pain that do not respond to conservative management and at least for more than six weeks and DH with compression of nerve root confirmed by CT or MRI are considered as indications for the initial surgery.

All the patients of the investigated group show positive stretching phenomena (less than 60 degree) and loss of sensation in the corresponding to the affected nerve root dermatome. Some of the patients also show hypotonia of the affected myotome of the affected muscles, as well as loss of tendon reflexes.

Two of the patients had bladder dysfunction. The diagnosis is based on MRI or CT findings and is confirmed with the intraoperative findings. The indications for reoperative surgery are similar to those taken into consideration for the initial surgery. The findings from the clinical examination of the patients that are considered for the reoperative surgery are supplemented to the findings from the initial surgery.

All recurrent disc herniations are confirmed with MRI without contrast enhancement and with CT (Fig. 1).

Fig. 1. Visual Analog Scale (VAS) score of 21 patients. 1 = before primary discectomy, 2 = before reinterventions, 3 = after a 5-year follow-up. ***, P < 0.001 (Kruskal-Wallis test or Tukey-Kramer pair-wise comparisons).

The same standard open discectomy is used for the redo interventions, respecting the rules of the reoperative spinal surgery. In order to evaluate the pain syndrome and functional impairment, we use the visual analog scale (VAS) 0 -100 mm (21) and Oswestry Disability Index (ODI) 2.0 before the initial surgery, before the reoperative surgery and on follow-ups. The patients manually fill out the VAS and ODI questionnaires. The ODI questionnaire is an instrument that is comprised of ten questions, each with six possible answers that reflect the everyday activity of the patients.
Recurrent lumbar disc herniation outcome analysis of repeat discectomy

It is the most universal questionnaire that affords precise assessment of the effectiveness of the implemented treatment. Furthermore, it is also possible to make deductions for the quality of life, as the test-retest with SF-36 is 0.99 (7,14). The answers to the questions are evaluated on a scale from 0 to 5, where 5 points is the highest value of possible functional impairment. The maximum total of the questionnaire is 50 points. A score of 0 - 10 points refers to minimal functional impairment, 11 - 20 points corresponds to moderate impairment, 21 - 40 - to severe disability. A score of 41 - 50 points refers to bed-ridden patients. The scores in points are transformed in percent by dividing by 5 and multiplying by 10.

The same questionnaires are filled out on the follow-ups after the first and sixth month, first year, and after five and more years.

The subjective evaluation of the treatment outcome is compared with the expectations of the patients. Each case is marked with “yes” or “no” according to the patient’s satisfaction with the treatment. We use the following statistical methods in order to objectify the results.

Statistical Analysis

Statistical significance of VAS and ODI data was evaluated using nonparametric tests (Mann-Whitney U test and Kruskal-Wallis test) or one-way ANOVA followed by Tukey-Kramer's post hoc comparisons. Data was expressed as means ± s.e.m. Differences were considered significant when P<0.05.

RESULTS

A group of 489 consecutive patients with primary discectomy was investigated. Multilevel disc herniations were found in 12 (2.45%) of them (11 patients with herniations on two levels and 1 on three levels). Sixty-four patients (13.09%) were reoperated for a variety of reasons (including complications). Out of the whole group of the reoperated, 21 patients (32.8%) with RDH are selected - one on level L2-L3, one on L3-L4, 9 on L4-L5 and 10 on L5-S1. One reoperative procedure was performed in a subgroup of 18 patients and 3 patients underwent two reoperations (one with RDH, one with infection and one with cerebro-spinal fluid leak). The cumulative risk for RDH for a period of approximately five years is estimated at 4.3%.

The primary discectomy in the investigated group was preformed on the following levels: L2-L3 - 1 patient; L3-L4 - 1 patient; L4-L5 - 9 patients and L5-S1 - 9 patients. One patient has primary discectomy on two levels: (L4-L5 and L5-S1). Disc protrusions were found in 16 cases, extrusions - in 4 cases and sequestrations - in 1.

Through the reoperative procedures, we found 11 (52.4%) ipsilateral RDHs, 7 (33.3%) contralateral RDHs and 3 (14.3%) at adjacent level RDH. The period of pain relief is found to be 1 - 54 months (mean 22 m). The duration of the pain syndrome due to nerve root compression is mean 3.8 months (7 days - 14 m) - before the primary discectomy, while before the re intervention it is 2.4 months (1 m - 8 m). While 13 (61.9%) of the patients relate the reappearance of recurring pain to a physical exertion or trauma, the rest claim that the pain syndrome had returned gradually. Five patients had a 1-6 month pain-free interval, 10 patients were pain-free for up to 2 years, and 6 patients for over two years. The strength of the pain before the primary discectomy was 8.1 mean, according to VAS and 7.5 mean before the reinterventions. (Fig. 2).

![ODI values](image)

**Fig. 2. ODI score of 21 patients before operation or after operation at 1, 6, 12, and 60 month time-points. *** P ≤ 0.001 (Kruskal-Wallis test or Tukey-Kramer pair-wise comparisons).**

After mean of 5 years, the score at the follow-up was 1-4 points (1.6 mean).

It is notable that the extent of herniation is related to the kind of the RDH. All of the contralateral RDHs (n-7) are considered to be a result of primary disc protrusion, while 2/3 of RDHs at adjacent level are due to extrusions and 1/3 is due to sequestration. The 11 ipsilateral RDHs are due to 9 protrusions and 2 extrusions. All of the patients had disc compression of the corresponding nerve root that is associated with limited or moderately developed epidural fibrosis, which necessitated limited adhesiolysis and caudally elongated laminectomy in 14 of the studied patients. Within a period of several months (3-7) three patients underwent a second re intervention. The first patient was diagnosed with retained disc fragment. The intraoperative finding was a retained disc fragment compressing the caudal part of the nerve root canal. A deep wound infection intractable to the conservative treatment was the reason for the re intervention of the second patient. Pseudomeningocele due to unrepaired incidental dural tearing was the reason for the re intervention in the third patient.

None of the reoperated patients had segment instability, thus, none of the patients had stabilization procedures (arthrodese).

Surgical results

One month after the re intervention 16 patients (76.2%) had excellent or good results - before the reintervention ODI is mean
85% (90 - 55), while after the reoperation ODI improved to mean 26%. The rest of 5 patients (23.8%) have mean improvement - ODI 46% and have persisting of the complaints. On the sixth month, ODI is mean 24%, while 17 (81%) of the patients are with good and excellent results and are satisfied with the treatment and the achieved functional status. After one year follow-up, ODI is 21% mean, while 90.5% (19/21 patients) are satisfied after the treatment was undertaken. After the follow-up varying between 1 and 8 years (4.8 mean), there is a tendency of deterioration that is reflected by the ODI values that range from 10 to 48 (31% mean).

Nevertheless, only two of the patients (9.5%) are not satisfied with the treatment altogether. The two patients claim that the results after the treatment do not meet their expectations from before the initial discectomy (Fig. 3).

![Fig. 3. T2 and T1 weighted MRI images demonstrating big left-sided retained disc fragment on L5-S1 level of 43-years old patient with persisting postoperative pain syndrome three months after the primary discectomy.](image)

**DISCUSSION**

RDHs are one of the most common reasons for reinterventions. They were found in 2-13% (2,19,20,23) of the patients reoperated after lumbar disc surgery and are considered to be a reason for reintervention in 12.4 - 76% of all reoperated patients (3,12,19,22).

After a 5-year follow-up, we found that RDHs comprise 4.3% of all primary discectomies. As a reason for recurrent complaints and reinterventions, RDHs are 32.8% of all reoperated patients. Approaching the problem mechanically, many authors (2,5,9-11,17,21,23,24) try to strictly define RDH by calling it "true RDH". Thus, they confine it to a presence of disc material on the same side or contralaterally at the operated level that is found after a minimum of 6 months pain-free interval after the primary discectomy.

Like many other authors (6,8,12,19,20), we approach the RDH clinically. However, we also consider the point of view of the patients, who go through another surgical procedure due to the same or similar complaints. This is the reason why when considering RDH, we also include the "de novo" DH (6) that is at the adjacent to the initial discectomy level, especially when the risk of reinterventions is evaluated during the prolonged follow-up. It is well known that after disc enucleation, the adjacent segments are subjected to extra load, hence accelerated degenerative changes. The latter is a normal attendant of the progressing degenerative disease and demands additional specific treatment.

Papadopoulos et al. (18) investigated the clinical results of a group of 27 patients with two months pain-free period, reoperated due to RDH on the same level and side as the initial discectomy. The results are confronted with the results of another group of 30 patients with primary discectomy. The two groups were followed-up for a long enough period of time - 53.6 months mean for the one group and 40.9 months mean for the other one. The gained satisfactory results based on the filled in questionnaires from the patients of the groups are comparable (According to the patients' answers in the questionnaires, the results of the two groups are comparable/similar); therefore, the authors recommend repeated discectomy to treat patients with RDH.

Cinotti et al. (3,4) prospectively analyzed groups of patients with RDH on the same level, ipsilateral or contralateral to the primary discectomy side. They found that there is no difference between the functional status of patients operated once and those that were reoperated.

Suk et al. (23) and Dai et al. (5) in their studies come up with similar results, as they do not succeed in establishing factors that negatively influence the results from the reinterventions.

Erbayraktar et al. (6) follow the results of 14 patients with RDH. Five of the patients are with RDH at another level. Based on the good results that were obtained, they recommend reoperative treatment of the patients with RDH. Similar results and conclusions were gained by Kayaoglu et al. (12) when they studied a group of 17 reoperated patients with RDH on the same level and 9 patients with RDH on another level. 82.4%, of the subgroup of patients with same-level RDH showed excellent and good results in while a 100 % of the patients with RDH at another level had excellent results.

In contrast, Fritsch et al. (8) claim that most of the patients with RDH on the same or another level show unsatisfactory results when followed for a long enough time. Using ODI for following their patients, Skaf et al. (21) observed the best functional results in the subgroup of patients with RDH among the reoperated patients.

Hakkinen et al. (10) found 17 patients with RDH in a group of 166 patients with primary discectomies that were followed for a period of five years. Of the patients with RDH, 12 (71%) had RDH on the same level and side, while 5 (29%) had RDH on a different level and side. The authors did not find a relationship between the number of reoperations, age, gender, preoperative symptoms, physical activity and the occupation of the patient (Tabl. 1).

Our results are concordant with those of most of the authors. The functional results that we gained following our patients for a long enough time commensurate with the functional results of the patients with primary discectomies that are
We do not find any factors that increase the risk of RDH. Based on our investigation, we conclude that the primary protrusions are the more common reason for RDH than the extrusions and sequestrations.

Morgan-Hough et al. (15) obtain similar results and make similar conclusions - they consider the protrusion as an imminent process of serial fragmentation of the disc material, while the extrusion and sequestration are considered to be the end stage of the process.

Furthermore, considering the process of disc enucleation from a technical point of view, only the last two kinds of disc fragmentation allow the disc enucleation to be fully done. Therefore, there are less residual disc fragments that compress neural structures. We realize that it is very difficult to compare the results of investigations made by different authors, in different times, using different diagnostic tools and operative techniques, different patient selection, follow-up time, etc.

Nevertheless, something practical could be found in every single investigation made by the different authors. Furthermore, there is always a pursuit to reduce the number of the patients that permanently stay with unsatisfactory results in respect to the whole process of performing lumbar discectomy. Therefore, RDH patients, rather than patients necessitating re-intervention for other structural reasons, have the best chances to have good results from the treatment. Only 2/21 patients in our investigation with mean of 4.8 years follow-up had unsatisfactory results and regret having undergone the primary discectomy.

**CONCLUSION**

In the group that we investigated for a long enough time (mean of 4.8 years follow-up), 4.3% of the patients with primary discectomy are reoperated due to RDH. Only 2 of the patients (9.5%) had unsatisfactory results after the reinterventions. The age, gender, preoperative symptoms, life style or the occupation are not recognized as factors that could increase the risk of RDH. Only disc protrusions require reinterventions due to RDH three times more frequently than primary extrusions or sequestrations.

**REFERENCES**

1. Atlas SJ, Keller RB, Chang Y, Deyo RA, Singer DE. Surgical and nonsurgical management of sciatica secondary to a lumbar disc herniation. Five-year outcomes from the Maine Lumbar Spine...
OBESITY IS INCREASING FAST AMONG VARNA SCHOOL CHILDREN IN THE LAST 5 YEARS (2002-2007)

Iotova V., S. Galcheva, K. Petrova

Dept. of Pediatrics and Medical Genetics, 1Dept. of Hygiene and Ecology
Medical University - Varna

Reviewed by: Assoc. Prof. V. Madjova

ABSTRACT

Childhood obesity persists and increases with age, thus leading to early morbidity and mortality. Countries on the Balkans report extremely high rates of growing childhood obesity with time, especially in pre-pubertal children. The present study aims to assess trends of obesity increase among pre-pubertal children during the last 5 years (2002-2007) in the city of Varna. Two representative cross-sectional student’s populations aged 7-9 years were compared - one measured in 2001/2002 (Gr. I, n=1004) and Gr. II, n=1043, studied in 2006-2007. Both groups were measured using standard procedures. The prevalence of obesity is most markedly expressed, especially right before puberty among the 9 year old children. It has greatly increased in 5-years time under surveillance, significantly both among boys (p<0.001) and among girls (p=0.0027). There is no significant difference in obesity prevalence between girls and boys - 10.4% vs. 10.6% (p>0.05). Both mean BMI and the level of the BMI 95th percentile are steeply increasing. The mean BMI of the mothers is lower in 2007 (22.0 ±2.6 kg/m²) than it was in 2002 (22.8 ±2.5 kg/m²), p<0.01. The mean BMI of the boys’ fathers doesn’t change while the girls’ fathers show significant BMI increase - 25.00 ±3.7 vs. 26.9 ±2.9 kg/m² (p<0.001). In a linear regression analysis the most significant factors for obesity for Gr. I are BMI of the mother (p<0.0001), father (p<0.0001) and number of family members (p=0.001) and for Gr. II - birth weight (p<0.0001), family history (p<0.0001), decreased frequency (p=0.001) and duration (p=0.01) of physical activity, and increased sodas consumption (p=0.035). The present study provides evidence of increasing obesity among pre-pubertal children in the city of Varna. More regulations should be introduced in order to prevent/reverse the trend towards increase of childhood obesity.

Key words: obesity, childhood, trend of increase, BMI, risk factors

STUDY POPULATIONS AND METHODS

For the purposes of the current study 2 representative cross-sectional student’s populations were compared. The inclusion and exclusion criteria were the same for both study populations. Inclusion criteria were permanent residence in Varna, presence at school on the day of the measurement and assent to participate. Only children with severe debilitating diseases like bone dysplasias, genetic syndromes, etc., as well as obvious mental retardation were excluded. Both studies were approved by the local office of the Ministry of Education.

The first study evaluated children aged 7-9 years (before their 10th birthday) from unselected Varna schools who were included in a project to compare childhood obesity on the Balkans (unpublished data). They were born in 1992-93, measured in 2001/2002 and here we would refer to them as group I (Gr. I). After applying inclusion/exclusion criteria a total of 1004 children took part in the study.
The second group (Gr. II) was studied in 2006-2007 as a part of a population-based project to create waist circumference reference for Bulgarian children. Again, all the children included in the present comparative study (n=1043) were prepubertal aged 7 to 9 years (before their 10th birthday) and strictly complying with the inclusion/exclusion criteria.

Both groups were measured from investigators authoring this paper and using standard procedures. The children were barefooted or in socks only, and the head was put in the so called “Frankfurt plane” position. A portable stadiometer (Tanita 2000) was used for the measurements of height, while weight was assessed using the school meters for the first group and a single portable one (Seca) for the second group. The height (m) and weight (kg) data were used to calculate BMI (kg/m$^2$) and the figures were compared to International Obesity Task Force BMI reference available for international comparisons (6).

Both datasets contained data gathered through questionnaire about the current height/weight (resp. BMI) of both parents (self-reported), their level of education, the number of family members, family history of obesity, daily hours in front of the television set, and computer time only for Gr. II. The latter also provided data about the frequency and duration of daily/weekly physical activity, birth weight, and fizzy drinks consumption.

All the data comparisons and analyses are done using the statistical package SPSS 11.0 for Windows.

**RESULTS**

The gender distribution in both datasets is equal, Gr. I consisting of 490 boys (51.2%) and 514 girls (48.8%), p>0.05, and Gr. II - 544 boys (47.8%) and 499 girls (52.2%), p>0.05.

The prevalence of obesity is most markedly expressed, especially right before puberty among the 9 year old children (Fig. 1). It has greatly increased in 5-years time under surveillance, significantly both among boys (p<0.001) and among girls (p=0.0027). At present there is no significant difference in obesity prevalence between girls and boys - 10.4% vs. 10.6%, resp. (p=0.05).

Comparing BMIs of the parents, we found that the mean BMI of both girls’ and boys’ mothers is lower in 2007 (22.0 ±2.6 kg/m$^2$) than it was in 2002 (22.8 ±2.5 kg/m$^2$), p<0.01. The mean BMI of the boys’ fathers doesn’t change while the girls’ fathers show significant BMI increase - 25.00 ±3.7 vs. 26.9 ±2.9 kg/m$^2$ (p<0.001).

In a linear regression analysis the most significant factors for the presence of obesity for Gr. I are BMI of the mother (β=0.229, p<0.0001), father (β=0.18, p<0.0001) and number
Obesity is increasing fast among Varna school children in the last 5 years ...

Not only the relative share of obese children has increased but also the cumulative fat mass as reflected by children’s BMIs has increased significantly in the 5 years time. Since there are a lot of data and publications supporting the usefulness of BMI as the main parameter to evaluate obesity, also in childhood (14), we regard these results as very alarming. The relatively bigger increase among girls is even more bothering. In a recent paper Sewell at al. provide evidence about “imprinting” of obesity in the offspring of obese women (21) - the children of obese women have less lean and more fat mass already at birth. There are also data about obstetric complications and remote health consequences such as breast cancer specific for obese women. Another alarming trend is the pronounced increase in the 95th BMI centile, especially among 8 and 9 years old students. This means that the relative grade of the obesity of obese children increases, hence more and earlier co-morbidities could be expected. This is found also in other populations (11), and in fact the frequency of metabolic syndrome, one of the major identifiable risk factor clusters in childhood, is increasing in parallel thus posing major and undisputable health threats for the future (22). This very fast increase really puts forward the question how often the anthropometric references should be renewed.

One of the unexpected findings was the BMI decrease in the mothers of all students. In other studies from different parts of the world this is related to socioeconomic status, more educated and wealthy parents having less obese children while obesity is much more prevalent among lower socioeconomic groups (5,24).

Similar patterns are also found about smoking and physical inactivity as well as more time for TV viewing (10). If education is still a good correlate of social status in our society, obviously this is not true for a recently developed country like ours and deserves further exploration. The significant increase of girls’ fathers BMI with time is in concert to faster increasing female obesity, thus implying more to a relationship between increasing societal wealth and childhood obesity. The same was reported by do B louza-Chabchoub et al. from Tunisia (8) and maybe more typical for developing economics, or may alternatively reflect more aggressive marketing of unhealthy foods and life-styles in societies with less strict regulations (9).

Looking towards the possible contributors for the fast obesity increase the strongest underlining factor is parental obesity/family history. Of course, this is telling us about possible genetic determinants but also about the influence of the home/built environment (17) upon the accumulation of fat mass in the children. As recently published by Christakissik Fowler, the neighbourhhood/non-genetic close environment has great impact on the obesity development - “network phenomenon” in such strictly defined and followed cohort as the Framingham Heart study cohort is (6).

One of the most intriguing although not unexpected findings from the current study is the direct correlation between less frequent and shortened physical activity and obesity, even in these relatively young children. Ball et al. (3) report the same correlation only in boys in whom physical inactivi-


REFERENCES

1. Галчева С., Йотова В., Маджова В., Цанева В. Подход към детско-юношеското затълзване в общемедицинската практика. Социална медицина 2006, кн.: 4: 7-11

2. Йотова В., К. Петрова, В. Цанева. Честота и риск от затълзване сред зрелищни от гр. Варна. Педиатрия 2005, 1: 31-34


INCIDENCE OF EYELID MALIGNANCIES IN VARNA REGION

Zlatarova Z.I., K.G. Dokova¹, D. Kamburova²

Department of Neurosurgery, Otorhinolaryngology and Ophthalmology, Medical University - Varna, Specialized Eye Hospital - Varna, ¹Department of Social Medicine and Health Care Organisation, Medical University - Varna, ²Regional Cancer Dispensary Varna

Reviewed by: Assoc. Prof. E. Kontrova

ABSTRACT

Aim: To study the incidence of malignant eyelid tumors and particularly of eyelid basal cell carcinoma in Varna region between 1996 and 2005. Material and Methods: Data for the incident eyelid cancer cases were obtained from the Regional Cancer Dispensary and the patient register of the Specialized Eye Hospital in Varna. The data for the numbers of the population of Varna district at risk were received from the local office of the National Statistical Institute. The age standardized rates were derived by the direct method using the "world" standard population. Results: The average age-adjusted incidence for all malignant eyelid tumors was 3.47 per 100 000 per year, for BCC 3.02 per 100 000. The age-adjusted malignant eyelid tumor incidence for females was 2.9 per 100 000, in male it was significantly higher - 4.25 per 100 000. The age adjusted incidence for all malignant eyelid tumors among the urban and rural population were respectively 3.49 per 100 000 and 2.91 per 100 000. Conclusion: The incidence of all malignant eyelid tumors and BCC has increased for the period 1996-2005. There is a statistically significant difference in rates between sexes, men suffering more often than women. Incidence increases with age, especially after 60 years.

Key words: basal cell carcinoma, eyelid tumors, incidence, Varna

Epidemiological studies of non-communicable diseases have not been a priority in the scientific research in Bulgaria. More specifically, incidence of eyelid malignancies is not extensively studied with one exception for Plovdiv region (2). We aim to study retrospectively the incidence of malignant eyelid tumors and particularly of eyelid basal cell carcinoma in Varna region for the period 1996 - 2005.

MATERIALS AND METHODS

Data for the incident eyelid cancer cases for the period 1996-2005 were obtained from the Regional Cancer Dispensary in Varna and the patient register of the Specialized Eye Hospital in Varna. The Regional Cancer Dispensary is part of a national cancer dispensary system. One of its main tasks is keeping a computerized cancer register analogous to cancer registers in western countries with similar potential for epidemiological studies. According the existing health regulations whenever a new case of cancer is diagnosed the responsible physician is obliged to fill in three copies of a standard "quick notification form", send two of them to the regional cancer dispensary closest to the patient's permanent address registration and keep one for the patient records. Data received from the Regional Cancer Dispensary was cross-checked with the patient register in the Specialized Eye Hospital in Varna for determining all incident cases or search for additional cases. A computerized population register based on unique 10 digit personal identification numbers incorporating date of birth and sex is maintained and continuously updated by the Varna municipal office for residential registration. This database was used for estimating the numbers of the population of Varna district at risk by sex, place of residence (urban/rural) five year age groups, for every one of the ten year period (1996-2005). This data were prepared and received upon request from the local office of the National Statistical Institute. Calculations of age and sex specific and age-standardized incidence were made. The age standardized rates were derived by the direct method using the "world" standard population (3). Comparisons between incidence rates were made with z-test. All statistical analysis was made with SPSS ver 11.5.

RESULTS

The regional cancer dispensary provided a list of 152 patients from their database with histological diagnosis-eyelid malignant tumor. From this list 26 of the patients were ex-
cluded, as they were residentially ineligible and five more because they were recurrent cases. From the patient registers of the Specialized Eye Hospital were retrieved four additional patients who had underwent operation for newly diagnosed eyelid malignant tumor.

All cases were histological verified. The most common histological type was eyelid basal cell carcinoma (BCC) found in 109/125 (87.2%) of the patients, followed by squamous cell carcinoma (9.6%). There was one case (0.8%) of each - sebaceous gland carcinoma, Merkel cell carcinoma, malignant histocitoma and Kaposi sarcoma. The average age adjusted incidence for all malignant eyelid tumors was 3.47 per 100 000 per year (with 95% CI from 2.84 to 4.09), and for BCC 3.02 per 100 000 per year (with 95% CI from 2.44 to 3.60). Figure 1 shows the trends for age standardized incidence rates for all eyelid cancers and eyelid BCC among residents of Varna district from 1996 to 2005.

Thus for the ten year studied period 125 patients were retrieved as registered with newly diagnosed eyelid malignant tumor, 55 (44%) female and 70 (56%) male. From all patients 81/125 (65%) lived in the urban and the rest 35% in the rural area. All patients had one tumor. The median age at diagnosis was 69 years (range 30-87) for females and 70.5 years (range 47-84) for males. Over the 10-year period there were only two patients (1.6%) under 40 years, both of them female.

The age adjusted malignant eyelid tumor incidence for females was 2.9 per 100 000 per year (95% CI from 2.10 to 3.69), while in male it was significantly higher - 4.25 per 100 000 per year (95% CI from 3.24 to 5.26). The average annual age standardized incidence rate for eyelid BCC among women was 2.7 (95% CI from 1.94 to 3.48) and
INCIDENCE OF EYELID MALIGNANCIES IN Varna region

Among men 3.49 (95% CI from 2.58 to 4.39) per 100 000. Absolute numbers and rates for all eyelid malignant tumors and BCC for the period by sex are presented in Table 1. The incidence of malignant eyelid tumors increased with age for both sexes and is presented at figure 2.

The age-adjusted incidence among the urban population was 3.49 per 100 000 per year (95% CI from 2.76% to 4.23%) for all malignant eyelid tumors and 3.03 per 100 000 per year (95% CI from 2.35 to 3.71) for BCC. The adjusted rates for the rural population were respectively 2.91 per 100 000 (95% CI from 1.68 to 4.13) for all malignancies and 2.62 per 100 000 (95% CI from 1.47 to 3.77) for BCC. There was no statistically significant difference in age-standardized rates between urban and rural population. The trends are presented at figure 3.

DISCUSSION

A similar retrospective approach has been applied in other countries with existing cancer registry system (12,13). The validity of our results depends mainly upon:
- the completeness with which cases have been registered and retrieved;
- the validity of their classification as 'first in lifetime'
- the validity of case classification as "malignant eyelid tumor" and the accuracy with which cases have been correctly matched to their source population.

The completeness of the cancer dispensary register is theoretically guaranteed by the existing explicit regulations for compulsory notification of each cancer case. We were not able to find any validation epidemiological study either on local or national level, but the fact that the biggest specialized eye hospital serving the whole eastern Bulgaria is based in Varna allowed for cross-check of the cancer register with the hospital patient register. Only four additional cases or 0.03% of the cases for the ten year period were retrieved from the hospital register. In order to define the "first ever in lifetime" cases, every case from the cancer register list was cross-checked with the patient's records in the hospital register.

Concerning the third point all cases have been histological verified. Finally the fact that the same populations register was used to check residential eligibility of cases and for calculating population at risk, deals adequately with the fourth point.

The annual age-standardized rates for all malignant eyelid tumors were low in the beginning of the period 1996-1998, after-words they raised approximately two times, remained somewhat stable until 2004 when they started to decline. The trends for BCC incidence have followed the general trend for eyelid malignancies.

The most common histological type of malignant eyelid tumors for Varna region is BCC, which corresponds to results from other studies in USA (4,5,15,10) and Australia (6,9) and some Asian countries (7, 8), but differs from those in the other Asian countries (1,14).

In our study men had significantly higher incidence of malignant eyelid tumors than women. The direction of the gender difference for BCC was the same although not statistically significant. Results from similar research in Plovdiv, Bulgaria for the period 1978-1987 also show higher incidence for males (2). The same gender difference was observed in other studies e.g. in Olmsted, Minnesota (4), in Singapore (7) and in Finland (12).

A possible explanation for this gender difference in Varna region could be the prevailing typical male professions at the seaside, resulting in men's longer exposure to harmful atmospheric factors, in a region with more intensive sunshine. Studies which show higher incidence rates for eyelid malignant tumors in women are the one in Uzbekistan (11).

Similar to all other studies we also observe an increase of incidence with age for both sexes. But while there was a steady increase of incidence with age for females, there was a sharp (4 times) raise for males above 60 years, reaching two times higher levels than in women. That could be explained by the fact that women pay more attention to their facial skin and use different sun-protection creams.

Analysis by place of residence show a little bit higher rates among the urban population. In the only other Bulgarian study the difference by place of residence is in the opposite direction with age-adjusted incidence of non-pigment malignant eyelid tumors in the urban area 2,76 per 100000 and 4,45 per 100 000 in the rural area (2). We found only one other study in Uzbekistan (11) analyzing incidence of malignant eyelid tumors by place of residence. Their results indicate higher rates for towns.

Our research on the incidence of eyelid malignancies and specifically of eyelid BCC is among the first of its kind in Bulgaria. It could serve as a basis in two directions - a study of the incidence of eyelid malignancies in the whole country and a study of the incidence of other malignancies for Varna region. We found that the incidence of all malignant eyelid tumors and BCC has increased for the period 1996-2005. There is a statistically significant difference in rates between sexes, men suffering more often than women. Incidence increases with age, especially after 60 years more sharply for men. The most common eyelid cancer is BCC.

REFERENCES

5. Cook BE Jr, Bartley GB. Treatment options and future prospects for the management of eyelid malig-


DIETARY PATTERN OF CHILDREN LIVING IN REGION WITH NON-FERROUS METALS OUTPUT

Baykova D.

National Center of Public Health Protection, Sofia

Reviewed by: Assoc. Prof. V. Madjova

ABSTRACT

The non-ferrous industrial plant in Plovdiv has been built and functioned for decades. Research show that despite the fresh and clean air, the soil and vegetation used by people and live-stock are polluted with lead. Children are a risky age group, because of their on-going growth and development, as well as the abilities for adaptation of the child's organism. The aim of this study is to evaluate the nutrient and energy intake and food consumption of children aged 10-14 years, from the village of Kuklen - nearby the non-ferrous industrial plant in Plovdiv. The present epidemiologic survey was conducted in 2003 and included 49 children aged 10-14 years, differentiated by sex - 22 boys and 27 girls. The "24 hour recall" of food consumption for the previous day method was used. Results show that the average mixed protein (animal and vegetative) intake is 54.1 g for boys and 45.2 g for girls and delivers 10% of the daily food energy (E%). Fats provide 38-39 E% (Dietary Reference Intakes for Bulgarians, 2005 are 25-30 E%). Carbohydrates deficit tendency is observed - 51-52 E% (recomm. 55-65 E%). The food energy in boys meets the recommendations, while that for girls covers 84% of the requirements. All researched children show intake deficiency of vitamin B1, calcium, zinc, iron. The intake of nutrients and energy is relevant to the food consumption. Milk in the daily menu is inadequate: 97.3-95.7 g (recomm. 400 g, 380 g resp.). The consumption of cheese is also unsatisfactory 21 g for boys and 12 g for girls (recomm. 35 g/day). Too low is the consumption of vegetables - 68 g/day for boys and 85 g/day for girls, which covers 22-30% of the recommendations. Boys have consumed 226 g (i.e. 63% of the recommendations) of fruits, while girls - 205 g (i.e. 97% of the recommendations). In conclusion, various suggestions for the development of a complex interventional program are made in order to diminish the risk of potential chemical food pollutions and to balance the food intake.

Key words: children, 10-14 years, intake, nutrients, energy, food consumption, ecologically risky region

The non-ferrous industrial plant in Plovdiv has been built and functioned for decades. It is situated in an area of well-developed and active agriculture and stock-breeding. Research show that despite of the clean air, soil and vegetation used by people and live-stock are polluted with lead (1,2). There are objective health risk circumstances for the population which inhabits the district south of the city of Plovdiv (incl. the village of Kuklen) and uses the land for agriculture and stock-breeding, respectively - for the regionally consumed food of animal and vegetative origin (3). Children are age group at risk, because toxic effects caused by lead upon the central nervous system, hemopoiesis, renal function, etc. can be manifested in much lower tissue concentrations in children, compared to adults. References show that there is a sex differentiation of the health risk. Boys aged 10-14 years are at a higher risk compared to girls of the same age and there is a tendency to decrease this distinction with age progression.

MATERIAL AND METHODS

The present epidemiologic survey was conducted in May, 2003 and included 49 children aged 10-14 years, differentiated by sex - 22 boys and 27 girls, inhabiting an ecologically risky area - the village of Kuklen on the south of the city of Plovdiv. This study is a part of a complex investigation of the health risk for the same population (3). The "24 hour recall" of food consumption for the previous workday method was used. Fotoalbums for evaluation of the consumed food were used for precise collection of the information. Data analysis was performed by computer software for evaluation of the food intake, while statistical analysis - with SPSS-10 software.
Evaluations were made in accordance with the Dietary Reference Intakes for Bulgarians, 2005 (4) as well as national and international Recommendations for healthy nutrition of children (Dietary Guidelines) (5-7).

RESULTS

Results show that the average protein intake (table 1) is 54.1 g for boys aged 10-14 years and 45.2 g for girls and delivers 10.3% of the daily food energy (E%). These values comply with the reference dietary intake (RDI) of protein - 43 g for boys and 42 g for girls and 10-15 E% (4). In regard to mean-group values the protein intake is satisfactory. Analysis on the individual level shows that medians are close to the mean values. Bearing in mind the fact that in our nutritional pattern only half of the consumed protein is of high biological value, it is clear that there is a risk of deficiency in terms of high biological value protein intake. In all of researched children there is an overconsumption of fats (table 1), which deliver 38-39% of the total daily food energy (E%), while the recommendations are 25-30 E% (4). A trend in deficiency of the carbohydrates intake is observed - 51-51 E% for all boys and girls (table 1), while the recommendations stand for 55-65 E% (4). The energy of the consumed food is 2114.5 kcal for boys and 1787.1 kcal for girls with energy requirements of 2610 kcal/day for boys and 2138 kcal/day for girls aged 10-14 years with moderate physical activity. It is clear that the real energy food intake of boys covers 84% of the recommendations (4). Medians do not differ substantially among the mean-group values.

RDI for vitamin B1 is 1.2 mg for boys, while the established consumption is 0.8 mg (table 2). For girls the intake is 1.1 mg recommended consumption and 0.6 mg real consumption. Boys consume 65%, while girls - 55% of the recommended amount of vitamin B1. The average intake of vitamin B2 (table 2) is 1.2 mg for boys and 1.0 mg for girls, with RDI - 1.3 mg and 1.0 mg resp. Vitamin C (table 2) with RDI of 45 mg for both boys and girls is consumed in amounts of 74 mg and clearly complies with the recommendations (PR, 2005).

Table 1. Average nutrients and energy daily intake of boys and girls aged 10-14 years from the village of Kuklen

<table>
<thead>
<tr>
<th></th>
<th>Boys</th>
<th></th>
<th>Girls</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
<td>54.1</td>
<td>20.3</td>
<td>54.5</td>
<td>18.9</td>
</tr>
<tr>
<td>Total</td>
<td>10.3</td>
<td>2.9</td>
<td>9.5</td>
<td>2.4</td>
</tr>
<tr>
<td>E%</td>
<td>89.7</td>
<td>34.3</td>
<td>81.2</td>
<td>29.7</td>
</tr>
<tr>
<td>Fats</td>
<td>37.9</td>
<td>5.6</td>
<td>38.6</td>
<td>6.9</td>
</tr>
<tr>
<td>E%</td>
<td>272.6</td>
<td>91.1</td>
<td>251.6</td>
<td>226.9</td>
</tr>
<tr>
<td>Carbo</td>
<td>51.7</td>
<td>5.9</td>
<td>52.5</td>
<td>51.2</td>
</tr>
<tr>
<td>hydrates</td>
<td>2114.5</td>
<td>677.9</td>
<td>1930.6</td>
<td>1787.1</td>
</tr>
<tr>
<td>Energy</td>
<td>0.8</td>
<td>0.5</td>
<td>0.6</td>
<td>0.3</td>
</tr>
<tr>
<td>Vitamin</td>
<td>1.2</td>
<td>0.8</td>
<td>0.9</td>
<td>1.0</td>
</tr>
<tr>
<td>Vitamin</td>
<td>74.0</td>
<td>67.7</td>
<td>63.2</td>
<td>73.5</td>
</tr>
<tr>
<td>C (mg)</td>
<td>17.6</td>
<td>9.6</td>
<td>14.4</td>
<td>18.9</td>
</tr>
<tr>
<td>Vitamin</td>
<td>593.1</td>
<td>489.1</td>
<td>397.7</td>
<td>810.4</td>
</tr>
<tr>
<td>A (mg)</td>
<td>450.7</td>
<td>247.9</td>
<td>397.3</td>
<td>397.9</td>
</tr>
<tr>
<td>Vitamin</td>
<td>5.8</td>
<td>2.3</td>
<td>5.3</td>
<td>5.5</td>
</tr>
<tr>
<td>E (mg)</td>
<td>8.8</td>
<td>5.5</td>
<td>6.5</td>
<td>7.3</td>
</tr>
<tr>
<td>A (mg)</td>
<td>2114.5</td>
<td>677.9</td>
<td>1930.6</td>
<td>1787.1</td>
</tr>
<tr>
<td>Boys</td>
<td>0.6</td>
<td>0.3</td>
<td>0.6</td>
<td>0.9</td>
</tr>
<tr>
<td>Girls</td>
<td>351.7</td>
<td>179.4</td>
<td>366.8</td>
<td>1461.5</td>
</tr>
</tbody>
</table>

The intake of the fat-soluble vitamin E (table 2) also covers the Dietary Reference Intakes for Bulgarians, 2005 (4) for both sex groups - boys and girls: 18-19/day mg alfa-TE with recommended for 10 mg/day alfa TE. Vitamin A (table 2) is consumed in average amount of 592 mcg RE for boys and 810 mcg RE for girls (RDI - 600 mcg PE for both sexes).

Table 2. Average vitamins and minerals daily intake of boys and girls aged 10-14 years from the village of Kuklen

<table>
<thead>
<tr>
<th></th>
<th>Boys</th>
<th></th>
<th>Girls</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Vitamin</td>
<td>0.8</td>
<td>0.5</td>
<td>0.6</td>
<td>0.3</td>
</tr>
<tr>
<td>B1 (mg)</td>
<td>1.2</td>
<td>0.8</td>
<td>0.9</td>
<td>1.0</td>
</tr>
<tr>
<td>B2 (mg)</td>
<td>74.0</td>
<td>67.7</td>
<td>63.2</td>
<td>73.5</td>
</tr>
<tr>
<td>C (mg)</td>
<td>17.6</td>
<td>9.6</td>
<td>14.4</td>
<td>18.9</td>
</tr>
<tr>
<td>Vitamin</td>
<td>593.1</td>
<td>489.1</td>
<td>397.7</td>
<td>810.4</td>
</tr>
<tr>
<td>A (mcg)</td>
<td>450.7</td>
<td>247.9</td>
<td>397.3</td>
<td>397.9</td>
</tr>
<tr>
<td>Calcium</td>
<td>5.8</td>
<td>2.3</td>
<td>5.3</td>
<td>5.5</td>
</tr>
<tr>
<td>Zinc</td>
<td>8.8</td>
<td>5.5</td>
<td>6.5</td>
<td>7.3</td>
</tr>
<tr>
<td>Iron</td>
<td>2114.5</td>
<td>677.9</td>
<td>1930.6</td>
<td>1787.1</td>
</tr>
<tr>
<td></td>
<td>0.6</td>
<td>0.3</td>
<td>0.6</td>
<td>0.9</td>
</tr>
<tr>
<td></td>
<td>351.7</td>
<td>179.4</td>
<td>366.8</td>
<td>1461.5</td>
</tr>
</tbody>
</table>
for girls, the average iron intake per day is 7.3 mg for girls - 49% of RDI.

Traditional low is the daily fish consumption. None of the girls have consumed any fish during the course of the study, while the boys have consumed 5.5 g (recommendations for 24 g/day net weight) (5).

The consumption of eggs in the daily menu of the boys is 8.6 g - 41% of the recommendations, as of the girls - 13.2 g

Table 3. Average daily food consumption of boys and girls per day aged 10-14 years from the village of Kuklen

<table>
<thead>
<tr>
<th>Food group (g)</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Median</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk and milk products</td>
<td>97.3</td>
<td>133.5</td>
<td>39.2</td>
<td>95.7</td>
<td>107.1</td>
<td>73.3</td>
</tr>
<tr>
<td>Milk</td>
<td>76.1</td>
<td>127.5</td>
<td>11.4</td>
<td>83.2</td>
<td>102.8</td>
<td>33.3</td>
</tr>
<tr>
<td>Meat and meat products</td>
<td>65.9</td>
<td>70.6</td>
<td>45.0</td>
<td>48.6</td>
<td>64.1</td>
<td>30.0</td>
</tr>
<tr>
<td>Meat</td>
<td>41.6</td>
<td>62.9</td>
<td>0.0</td>
<td>36.1</td>
<td>55.4</td>
<td>0.0</td>
</tr>
<tr>
<td>Meat products</td>
<td>24.4</td>
<td>40.2</td>
<td>0.0</td>
<td>8.1</td>
<td>13.3</td>
<td>0.0</td>
</tr>
<tr>
<td>Fish and other seafood</td>
<td>5.5</td>
<td>25.8</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Eggs</td>
<td>8.6</td>
<td>14.3</td>
<td>0.0</td>
<td>13.2</td>
<td>31.2</td>
<td>0.0</td>
</tr>
<tr>
<td>Fats</td>
<td>30.5</td>
<td>19.9</td>
<td>25.5</td>
<td>29.0</td>
<td>15.4</td>
<td>26.7</td>
</tr>
<tr>
<td>Milk oils</td>
<td>9.1</td>
<td>13.5</td>
<td>7.0</td>
<td>4.9</td>
<td>7.5</td>
<td>0.0</td>
</tr>
<tr>
<td>Plant oils</td>
<td>18.9</td>
<td>13.7</td>
<td>14.5</td>
<td>21.3</td>
<td>11.6</td>
<td>22.5</td>
</tr>
<tr>
<td>Bread and pastry</td>
<td>281.1</td>
<td>146.7</td>
<td>257.2</td>
<td>210.4</td>
<td>89.7</td>
<td>197.3</td>
</tr>
<tr>
<td>Bread</td>
<td>141.9</td>
<td>68.6</td>
<td>150.0</td>
<td>110.4</td>
<td>51.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Rice</td>
<td>5.1</td>
<td>10.8</td>
<td>0.0</td>
<td>8.2</td>
<td>15.9</td>
<td>0.0</td>
</tr>
<tr>
<td>Potatoes</td>
<td>121.2</td>
<td>173.8</td>
<td>0.0</td>
<td>144.6</td>
<td>168.4</td>
<td>52.5</td>
</tr>
<tr>
<td>Beans</td>
<td>12.1</td>
<td>21.2</td>
<td>0.0</td>
<td>11.0</td>
<td>33.1</td>
<td>0.0</td>
</tr>
<tr>
<td>Vegetables</td>
<td>67.6</td>
<td>52.3</td>
<td>66.9</td>
<td>84.9</td>
<td>70.1</td>
<td>67.7</td>
</tr>
<tr>
<td>Fresh vegetables</td>
<td>5.4</td>
<td>15.2</td>
<td>0.0</td>
<td>5.4</td>
<td>14.9</td>
<td>0.0</td>
</tr>
<tr>
<td>Fruits</td>
<td>225.8</td>
<td>259.3</td>
<td>125.0</td>
<td>205.1</td>
<td>138.6</td>
<td>200.0</td>
</tr>
<tr>
<td>Fresh fruits</td>
<td>28.9</td>
<td>53.1</td>
<td>0.0</td>
<td>24.1</td>
<td>41.9</td>
<td>0.0</td>
</tr>
<tr>
<td>Nuts and seeds</td>
<td>0.9</td>
<td>2.3</td>
<td>0.0</td>
<td>2.0</td>
<td>7.6</td>
<td>0.0</td>
</tr>
<tr>
<td>Sugar and sugar products</td>
<td>62.4</td>
<td>55.7</td>
<td>48.0</td>
<td>44.7</td>
<td>46.0</td>
<td>25.0</td>
</tr>
<tr>
<td>Sugar</td>
<td>12.3</td>
<td>23.2</td>
<td>0.0</td>
<td>5.3</td>
<td>18.7</td>
<td>0.0</td>
</tr>
<tr>
<td>Sugar products</td>
<td>50.1</td>
<td>48.6</td>
<td>39.0</td>
<td>39.3</td>
<td>43.9</td>
<td>25.0</td>
</tr>
<tr>
<td>Honey</td>
<td>1.1</td>
<td>5.3</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Spices</td>
<td>3.1</td>
<td>2.6</td>
<td>3.2</td>
<td>3.9</td>
<td>3.5</td>
<td>2.8</td>
</tr>
<tr>
<td>Alcohol-free beverages</td>
<td>50.0</td>
<td>84.5</td>
<td>0.0</td>
<td>81.1</td>
<td>119.1</td>
<td>0.0</td>
</tr>
<tr>
<td>Tea</td>
<td>27.3</td>
<td>71.9</td>
<td>0.0</td>
<td>11.1</td>
<td>40.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Salt</td>
<td>1.3</td>
<td>0.9</td>
<td>1.0</td>
<td>1.5</td>
<td>0.1</td>
<td>1.0</td>
</tr>
</tbody>
</table>

These characteristics of the energy and nutrient intake correlate with the average food and food groups' consumption (table 3).

The consumption of milk is unsatisfactory (4 times lower than the recommendations) in all researched boys and girls - 97.3 g for boys (recomm. for 400 g) and 95.7 g for girls (recomm. for 380 g) (5). Cheese is also insufficient in the children's daily menu - 21 g for boys and 12 g for girls, with recommendations for 35 g/day for both (5).
CONCLUSIONS

1. The average mixed protein intake (of animal and plant origin) is 54.1 g for boys and 45.2 g for girls and is a source of 10.3 E%. Fats deliver 38-39% of the total daily food energy (E%), with recommendations for 25-30%. A trend for deficiency in carbohydrate intake is observed - 51-52 E% for all boys and girls, with recommendations for 55-65 E%. Food energy for boys meets the recommended ones, while for girls they cover 84% of the requirements.

2. The average intake of calcium is unsatisfactory - 451 mg for boys and 398 mg for girls (recomm. 1300 mg/day). Boys consume 65% and girls - 55% of the recommended dietary intake (RDI) of vitamin B1. The average daily intake of iron is 9 mg for boys, which is 82% of RDI and 7.3 mg for girls - 49% of RDI.

3. Both boys and girls have consumed insufficient amount of milk - 97.3-95.7 g (recomm. 400-380 g, resp.). The consumption of cheese is low - 21 g for boys and 12 g for girls, with recomm. for 35 g/day. The consumption of eggs is deficient - 42-70% of the recommendations, as is the consumption of fish, bread, rice (55% of the recommendations).

4. The consumption of vegetables is too low - 68 g/day for boys and 85 g/day for girls, with recomm. for 35 g/day. The consumption of milk meets 55% of the recommendations for both subgroups.

5. Boys have consumed 226 g (i.e. 63%) of the recommended amount of fruits, and girls - 205g (97% of the recomm.).

REFERENCES


WORK WITH VIDEO DISPLAY TERMINALS AND REFRACTION ABNORMALITIES

Dimitrova T.¹, Z. Zlatarova²

¹Department Medico-biological sciences, ²Department of Neurosurgery, Otorhinolaryngology and Ophthalmology, Medical University of Varna

Reviewed by: Assoc. Prof. E. Kontrova

ABSTRACT

Working with video display terminals becomes more and more widely spread in the ever-changing world of labour. Aim: To study the ophthalmologic status in relation to the work conditions. The ophthalmological status was studied of 455 workers, divided in two groups: I group: 232 persons working half of their working time with video display terminals, with mean age of 42.08 ±0.8 years; II group (control): 223 persons working without overload of the optical analyser, with mean age of 41.5 ±0.9 years. Among those who passed a prophylactic ophthalmological examination, 168 (36.9%) persons were without diagnosed deviations in the refraction (emetropes). In 77 (21.8%) from the persons with deviations myopia was diagnosed, in 71 (25.9%) it was hypermetropia, in 27 (9.9%) it was astigmatism, and in 99 (36.1%) presbyopia. Prolonged and continuous (without a physiological regime of work and rest) work with a video display terminal affects the vision sharpness.

Key words: video display, refraction abnormalities

I group: 232 persons working half of their working time with video display terminals, with mean age of 42.08 ±0.8 years; II group (control): 223 persons working without overload of the optical analyser, with mean age of 41.5 ±0.9 years.

RESULTS

After the ophthalmological examination those working with video display terminals and the control persons were divided according to the refraction into persons with myopia, hypermetropia, astigmatism, presbyopia and emetropia. Among those who passed a prophylactic ophthalmological examination, 168 (36.9%) persons were without diagnosed deviations in the refraction (emetropes). In 77 (21.8%) from the persons with deviations myopia was diagnosed, in 71 (25.9%) it was hypermetropia, in 27 (9.9%) it was astigmatism, and in 99 (36.1%) presbyopia. Prolonged and continuous (without a physiological regime of work and rest) work with a video display terminal affects the vision sharpness.

AIM

To study the ophthalmological status in relation to the work conditions.

MATERIALS AND METHODS

Within the framework of the compulsory periodic prophylactic examinations the ophthalmological status was studied of 455 workers with mean age 41.77 ±0.62 years, total length of service 20.46 ±0.6 years, and specialised length of service 15.34 ±0.6 years. A questionnaire was given on the working conditions, lifestyle and hereditary chronic diseases.

Address for correspondence:
T. Dimitrova, Dept. of Medico-biological sciences; Medical University - Varna; Varna, 9002, Marin Drinov Str., 55
e-mail: tvd@mnet.bg
various authors it affects from 10 to 25% of the adult population in the world. Among the persons from group I myopia was statistically reliably established more frequently. Among them 55 persons or 23.7% needed correction of the myopic refraction against 22 or 9.9% from the control group (Mann-Whitney U 22287.5 p<0.001).

![Graph showing incidence of diagnosed refraction anomalies according to their type (%).](image)

**Fig. 1. Incidence of the diagnosed refraction anomalies according to their type (%)**

One of the main risk factors related to myopia is work that demands continuous fixation on small objects at a short distance. The chance to establish myopia among the persons in group I is 2.839 (CI95%1.664-4.843 p<0.001) against those of group II. After standardising by age the probability increases to 3.121 (CI95%1.796-5.423 p<0.001), and after adjustment by length of service it reaches 3.885 (CI95%2.003-7.536 p<0.001). Other authors also report on myopia of the vision after work with video display terminals. However, it is a matter of a reversible condition at the end of the working day (3).

![Graph showing distribution of the affected persons according to their age (%).](image)

**Fig. 2. Distribution of the affected persons according to their age (%)**

Work with video display terminals is associated with 1,573 (CI95%1.078-2.295 p<0.05) risk of refraction abnormalities. After standardising by age the risk increases to 1.648 (CI95%1.029-2.642 p<0.05). And after taking into consideration the length of the specialised service the ratio of the chances reaches 1.813 (CI95%1.042-3.152 p<0.05) for refraction anomaly among those working with video display terminals as against those who do not use them.

When analysing the studied by age groups statistically reliable differences in the relative share of the persons with refraction anomalies in group I (48.4%) and group II (25%), such differences were established only in the group of 20 to 30 years of age (p<0.05). For that age 18 (58.1%) of the persons working with video display terminals and 13 (25%) of the persons working without them showed refraction anomaly (X square 4.752 Mann-Whitney U 617.5 p<0.05). The ratio between the chances showed that among the persons we studied it is those between 20 and 30 years of age and working with video display terminals that are more in danger of refraction abnormalities with RR 4.154 (CI95%1.06-10.743 p<0.05). According to data from other authors the patient who most often complains of computer vision syndrome is a 38-year-old woman with an average stage of short-sightedness who uses a monitor about 5 hours a day (6).

The specialised length of service that includes work with a video display terminal has a statistically reliable influence on the probability for the appearance of a refraction disorder in general and is not connected with just such disorder. According to our data, the professional length of service working with a video display terminal does not alter the risk for the appearance of myopia, for example. For the alteration in the vision sharpness, according to other authors, the weekly hours spent at the computer are accountable, and not the years in the length of service when computers were used, or the type of the work task performed (7,9).

Stress at the workplace assessed subjectively by the persons who had a prophylactic examination on a scale from 1 to 10 also reliably affects the spread of myopia among the people in group I. Those who gave a 7 or more for the strain at work, myopia was diagnosed in 29 (32.6%) of the examined against 12 (18.8%) of the other persons from group I (p<0.05). Psycho-emotional strain is considered as a risk precipitating factor of the work task when working with a video display terminal by other authors as well (4,5,10,11). Among persons in hypostress refraction anomaly was diagnosed in 14 (77.8%) persons in group I as compared to 18 (46.2%) from group II (p<0.05). Among those working in hyperstress conditions myopia was established in 29 (32.6%) persons from group I as compared to 2 (5.1%) persons from group II (p<0.001). Among those who worked without strain of the optical analyser the probability to establish disorder of the refraction was 4.083 (CI95%1.139-14.644 p<0.05) in hypostress and 8.942 (CI95% 2.015-39.688 p<0.01) in hyperstress. In persons who displayed eustress no differences were found out in the incidence of disorders in the vision sharpness between groups I and II.

The analysis of the deviations in the vision sharpness shows that in group II the abnormalities of the vision are without statistically reliable differences in the distribution between the two sexes. Seventy-two (50.0%) of the men and 50 (63.3%) of the women were affected (p<0.05). In group I the ratio is similar but there prevail the groups of persons with refraction anomalies: 30 (61.2%) of the men and 122 (66.7%) of the women (p<0.05). Men working with strain of their vision are older (46.3 ±1.9 years) than women (41.1 ±0.8 years p<0.05), while in the control group there is no reliable difference in the mean age of both sexes (men are with mean age of 40.9 ±1.2 years, and women of 42.4 ±1.5 years p<0.05). In group I short-sightedness affects more often the women 52 (28.4%) against 3 (6.1%) in men (p<0.001).
Short-sightedness is established more often in women working with a video display terminal: 52 (28.4%) from group I and 11 (13.9%) from group II (p<0.05). In men those who strain their optical analyzer more frequently show long-sightedness: 12 (24.5%) from group I against 10 (6.9%) from group II (p<0.001). According to the literature the female sex is considered to be more susceptible to showing vision fatigue when working with a video display terminal (5,6,8).

Presbyopia is more common in women from the control group (24.1% against 13.7% p 0.039) although no difference is established between the mean ages of the women from group I (41.07 ±0.8 years) against those from the control group (42.4 ±1.5 years, p>0.05).

The female sex is also the one more frequently affected by hypermetropia in the control group. It is 22.8% of women and only 6.9% of men not straining their vision during work that show long-sightedness (p<0.001).

**CONCLUSIONS**

Prolonged and continuous (without a physiological regime of work and rest) work with a video display terminal affects the vision sharpness.

The evaluation of the risk with reference to visual abnormalities when working with a video display terminal along with the length of the exposition should also include the subjective factors like sex and age of the exposed individuals.

A special approach is needed for the risk groups. Additional research needs to done to establish the target groups as well as the dynamics in the refraction in persons working with a video display terminal. Workers with refraction anomalies should be given appropriate working conditions for the use of a monitor: enough lighting, ergonomic work place, exact correction of the vision.

**REFERENCES**

ANXIETY LEVEL AND CARDIOVASCULAR RISK IN THE SPHERE OF TOURISM

Dimitrova T.¹, M. Atanasova², E. Karaslavova³

¹Department of Medico-biological sciences, MU-Varna, ²Regional inspection for public health protecting and control, ³Department of Social Medicine, MU-Plovdiv

Reviewed by: Assoc. Prof. St. Popova

ABSTRACT

Objective: to do research on the influence of the work environment on the situational and personal anxiety with people working in the sphere of tourism and their effect on the cardiovascular risk through physiological, laboratory and behavioural changes in the style of life. The cardiovascular risk has been studied through a questionnaire in relation to sex, age, family diseases and type of task with 173 people of average age 41.25 ±0.9 years old, who work in the sphere of tourism (84 (48.6%) of them: women and 89 (51.4%) men). A standardized methodology has been applied for evaluating anxiety according to the situational scale of Spielberger: 134 people, personality scale -173 people. Laboratory results also establish different correlations on the level of personality anxiety. High situational anxiety is established 2.345 (95%CI 1.160-4.737) times more frequently with people who work in an environment with a lot of noise. The physical activity and sports reliably improve anxiety indications and increase the abilities for positive perception of stress in the work environment. OP for a moderate and high situational anxiety is 2.306 (95%CI 1.143-4.653) for those who do not go in for sports. The high levels of personal anxiety are connected with the higher incidence of hypertension and hypertriglyceridemia in men. Reliable correlational dependencies of anxiety have been found out in relation to laboratory indications for overall cholesterol and blood sugar.

Key words: anxiety level, cardiovascular risk

The spread of socially significant diseases related to stress and their effect on the working population necessitates research to be done in the sphere of psychosocial cardiovascular epidemiology. The work-related psychological investigations are aimed at the individual differences in people’s vulnerability to stress. Alongside the concepts that have already been formulated such as “Type A behaviour” and lack of social support, scientists report a potentially cardiotoxic effect and emotional reactions such as anxiety, anger and depression. Factors such as control of the work process and the negative affect at the work place and their relation to components of the overall psychological and physical health (psychosomatic diseases such as arterial hypertension, hypercholesterolemia and obesity) as influenced by the unfavourable factors of the professional environment have not yet been made sufficiently popular in the practice of the medicine of the work place. These factors have high priority when assessing the risk for the health of the people who are engaged in the service sector because of their constant contact with their clients.

MATERIALS AND METHODS

The cardiovascular risk has been studied through a questionnaire in relation to sex, age, family diseases and type of task with 173 people of average age 41.25 ±0.9 years old, who work in the sphere of tourism. 84 (48.6%) of them: women and 89 (51.4%) men. Arterial pressure and ECG have been registered after 10 min rest while they were lying in bed. Laboratory examinations have been carried out of the biochemical indicators in serum for overall cholesterol, triglycerides, and blood sugar. A standardized methodology has been applied for evaluating anxiety according to the situational scale of Spielberger: 134 people, personality scale -173 people. The statistical analysis for assessment and prediction of risk a standardized methodology has been used by logistic regression, as well as correlational and nonparametric analysis.
RESULTS

Besides the psychosocial factors of the work environment and the task as well as the lack of control, negative emotions because of immediate contact with clients, work in a situation when people are pressed for time, the rest of the factors related to the environment: of physical, chemical, biological, etc. nature also have influences on the psychological health. Subjectively perceived as a threat these factors also increase the level of anxiety as an indicator of impossibility to cope with the given situation.

From those exposed to noise comparatively bigger is the group of people with high situational anxiety 39.1% related to those who showed low or moderate anxiety - 21.5% (p<0.05). The stressogenic character of the noise at work has been confirmed by our results and has been demonstrated by Finnish and Norwegian workers as well (2).

The people who work in conditions with psycho-emotional pressure show a significantly higher level of instant stress 40.10 ±0.92 in relation to 35.97 ±0.9 (p<0.05). The relative share of those who have demonstrated moderate or high anxiety has been reliably higher 53.9% in comparison to those who worked in a stressful environment, in relation to their colleagues working in the same conditions who demonstrate low anxiety - 30.6% (p<0.01). Stress at the workplace and the imbalance between work and family (personal) life is part of the etiology of anxiety related illnesses among workers (13).

Based on the subjective assessment of the people who did the questionnaire on the level of stress at the workplace according to the scale from 1 to 10, our results show evidence of positive correlative dependence on the instant anxiety with a coefficient of Sperman 0.315 (p<0.01). Overwork and lack of sufficient time at work prove to be the major sources of stress during work according to the people who did the questionnaire. Hyperstress has been established (p<0.001) with 28 (53.8%) of the people who pointed it out and 35 (27.3%) of those who did not mention insufficient time at work. This characteristic of the work task has been quoted as a risk factor for general anxieties and disturbances according to scientific resources with ratio of chances (RRs) 1.90 [95% confidence interval (CI) 1.22-2.98] with women, and 2.00 (95% CI 1.13-3.56) for men (7).

The work in shifts and during the night although available in 61.3% and respectively 45.7% of the people investigated, does not lead to a change in the subjective assessment of stress at the workplace. 46 (41.4%) of the workers experience the so called eustress and (29) 40% of the ones who do not work in shifts (p>0.05), as well as 39 (42.4%) from the nightshift workers and 36 (40.0%) from the non nightshift workers that have been researched (p>0.05). And what is more, the relative share of the workers who work regular hours 33 (46.5%) is higher than the relative share of those who work in shifts 30 (27.0%) in a state of hyperstress (p<0.05). This is the state of 33 (55.0%) of the workers who have a direct contact with their clients compared with 30 (24.8%) from those who are not exposed to direct contact or conflict with their clients (p<0.001).

The level of the situational anxiety is demonstrated in a correlative dependence on the personality 0.723 p<0.001. Both scales of anxiety correlate directly with age (0.234 respectively for the situational and 0.254 for the personality anxiety at p<0.001) and those with special work experience (0.273 for the situational and 0.266 for the personality anxiety respectively at p<0.001). In the hospitality industry as part of the sphere of social services with the increase of professional experience, the work does not become less stressogenic as our previous studies show, for example in transport (1). The existing studies predict about 50% increase of risk of ischemic heart disease among workers in conditions of stress (6).

Anxiety is a psychological condition which warns of the danger and so increases the probability for it to be avoided. The inadequate level of anxiety in relation to the danger of the given situation and/or the chronic high anxiety, despite the relatively safe situation, however, can seriously hinder the ability for work, interpersonal relations, sleep and health. Problems with anxiety are self-supportive mainly due to cognitive distortions and overuse of flight strategies.

The mean value of the personality anxiety among the men who did the questionnaire from 37.33 ±0.9 is statistically reliably lower than the one of women 41.6 ±0.9 at p<0.001. The relative share of the women who have demonstrated high levels of personality anxiety 34.5% (29 women) is reliably higher than the one of men with risk values of anxiety 20% (18 men) at p<0.05. Sex differences in the symptoms of anxiety with people working in the same conditions have been found out by other authors (13,14).

Figure 1. Incidence of the people exposed to professional physicochemical factors

Situations in the work environment related to overestimating the critical situations and underestimating the capabilities to exercise control over it, which happen to be quite frequent, quite strong and/or quite continuous they localize more clearly the place of the personality anxiety. Anxiety as a personal characteristic feature reflects a relatively stable disposition to experiencing a state of anxiety. The individual differences in this personality disposition are reflected namely in the cognitive mechanisms for assessment,
The personality anxiety influences the spread of deviations in the cardiological status. It highlights the individual reactions of the working people and indirectly leads to the cardiovascular effect in the given working conditions. It emphasizes the individual reaction of the workers and indirectly influences the cardiovascular effect of the conditions at the work place. Hypertension in men is diagnosed in 38.9% of those with high level of anxiety as compared to people with low or moderate level of anxiety (p<0.05). 33.3% of the people with high and 6.9% of those with low and moderate personality anxiety (p<0.05) show excessive indications of systolic arterial pressure. Investigations of the French population demonstrate similar results (8).

**Laboratory results** also establish different correlations on the level of personality anxiety. Reliable correlative dependence has been established with men on the level of personality anxiety with the laboratory indications of overall cholesterol (0.236 p<0.05) and blood sugar (0.245, p<0.05), and there exist scientific data on these interrelations (3.9-11.15).

Excessive indications of triglycerides have been registered with 9.9% of the people with low and moderate anxiety and 25.0% with those of high (p<0.05). The risk for such a laboratory deviation among those who demonstrated high level of anxiety has been calculated as 3.028 (1.224-7.493) and increases to 3.585 (1.280-10.037) after becoming equal in age, general and specific experience.

The personal anxiety is related to changes in the style of life. 12.7% of people with low and moderate level of anxiety complain of insomnia 38.3% of those with high level of anxiety (p<0.001).

Our results show a preventive influence of the regular physical activity in the free time in relation to anxiety although few people answered this question (203 people, 13 of which go in for sports on a daily basis). The people who go in for sports every week demonstrate statistically lower indications of situational anxiety 35.27 ±1.24 in relation to those who are actively engaged in sports 38.75 ±0.7 (p<0.05). 36.0% of those who showed low situational anxiety do some sport at least twice a week and barely 19.6% of those with moderate and high level of anxiety (p<0.05).

The facts have been confirmed by other authors who have found out that physical activity of the kind of 30 minutes moderately intensive activities almost every day decreases the number of symptoms of anxiety and depression (4,5,12).

96.6% of the women with high level of anxiety do not do any sport and 80.0% of the women with low and moderate level of personality anxiety (p<0.05).

**CONCLUSION**

The factors of the working environment that unlock a high level of situational anxiety in people who are engaged in the hotelier business are excessive noise and psycho-emotional stress.

High situational anxiety is established 2.345 (95%CI 1.160-4.737) times more frequently with people who work in an environment with a lot of noise.

The physical activity and sports reliably improve anxiety indications and increase the abilities for positive perception of stress in the work environment. OP for a moderate and high situational anxiety is 2.306 (95%CI 1.143-4.653) for those who do not go in for sports.

The high levels of personality anxiety are connected with the higher incidence of hypertension and hypertriglyceridemia in men. Reliable correlational dependencies of anxiety have been found out in relation to laboratory indications for overall cholesterol and blood sugar.

The investigation of the level of anxiety among work teams is a reliable method for establishing the risk groups among those exposed to excessive noise and neuro-psychological stress. The self-evaluation test for establishing the level of anxiety is appropriate for identifying target groups for health promotion at the workplace.

**REFERENCES**

1. Димитрова Т, Атанасова М, Скрининг на сърдечно-съдовазаболяемост и степен на тревожност при работещи в морски транспорт, Сборник доклади Юбил. научна конференция Медицински Факултет, Тракийски университет.
2. МОТ, Стресът е болестта на новото време, Безопасност и здраве при работа, 2001,3, 46-55
5. Hamer M, Stamatakis E, Steptoe A., Dose response relationship between physical activity and
Dimitrova T., M. Atanasova, E. Karaslavova

10. Pitsavos C, Panagiotakos DB, Papageorgiou C, Anxiety in relation to inflammation and coagula-
The Department of Forensic medicine and deontology by Medical University of Varna “Prof. dr. P. Stoyanov” celebrated its 45-years anniversary in August 2008, not as a Department, but as an educational - scientific unit in the Department of General and Clinical Pathology. Because of increasing social importance of our area and on the other side, the presence of many problems, we mention our anniversary with truly desire to attract attention and to provoke deserved interest in the concerned institutions. It’s good to turn back for balance and to plan forward in future.

Let me make a brief historical review of the past years. The Department of Forensic Medicine in High Medical Institute – Varna established on August the 21st 1963 year with a first assistant professor Dr I. Jovchev (who had worked as a chief of the study in forensic medicine expertise in Shumen), a chemist - Ivan Krachmarov, two clinical and one chemical laboratory assistant, one hospital attendant and one morgue attendant. Before foundation of the Department, only Dr. Jordan Varbanov worked as a chief of the forensic medicine study in former Regional Hospital “Dr. Racho Angelov”. This study thoroughly united with the Department with the same equipment. The temporary guidance of the Department was assigned of Prof. Dr. Kiril Popov – at that time he was a chief of the Department of Pathology. The lectures delivered from Prof. Ruja Vasileva from the Department of Forensic medicine in Sofia and later from senior assistant Prof. dr. Stefan Neykov (Sofia) until the election of regular Assoc. Professor.

In 1966 dr. Pavel Pavlov was appointed as an intern who had worked before for a short time in bureau of health instructions. He became second Assistant Professor in 1967. Dr. Alexander Varro was accepted as intern (from 1967 to 1972) who was assistant professor between 1972-1977. He left the department, moved in Budapest, Hungary, where he continues to work in the Institute of Forensic medicine.

Prof. Dr. Ivan Popvasev was a first chief of the Department in Medical University in Varna between 1967 and 1972. He had worked before as an assistant professor in the Department of Forensic medicine in Sofia and after that he was elected as a professor in the same department in the capital. Prof. Popvasev worked out electric excitement of the skeletal muscles in the relation with the time of death, set the base of forensic serology, worked in discovery of new antigens and phytoaglutinins. The laboratory of forensic serology was helped with materials and specialists from Forensic medicine Institute in Berlin.

For some time the department has been without a chief, after that, from 1972 to 1977, the chief is Prof. Stoicho Radanov (1932-2008), who is a lecturer in the Department of Forensic Medicine in High Medical Institute in Sofia. In 1974 year he was elected as a professor. He was many years in the Ministry in Health as primary national specialist in forensic medicine, participant and organizer of many scientific Conferences and Congresses of Forensic Medicine and Criminalistics with international participation, author and co-author of many articles in Bulgaria and abroad, editor of many textbooks and handbooks in Forensic medicine for students and specialists in Medicine, Dentistry and Law.

In 1977-1990 and 1992-1994 Prof. dr. Ivan Lazarov is a third chief of the Department (professor since 1989), who was graduated also in low in 1952 in the University of Sofia. He took part in the scientific conferences in the country and abroad, congresses of Forensic Medicine and Criminalistics, also he published articles in Bulgaria and abroad and he was coauthor in textbook in Forensic medicine (1992). In Varna he worked out PhD dissertation “Investigation for establishment of character during lifetime and the duration of lacerations and incised wounds” and defended the thesis in 1985.

In this period there were 4 scientific-technical laboratories: histological and histochemical, forensic serology, laboratory for material evidences and forensic toxicology laboratory. The fourth chief between 1990-92 and 1994-2005 was assoc. Prof. Pavel Pavlov. He graduated in Romania – Institute of Medicine and pharmacy in Bucharest. In 1979 he became Master of Science. He is author of more than 60 articles in Bulgaria and abroad and coauthor of 2 textbooks in Forensic Medicine (1992 and 1998) and 2 handbooks for practical exercises in forensic medicine(1990 and 1999), also one rationalization.

Dr. Dobrinka Radoinova became an assistant professor in 1977, she was assistant professor in the Department of General and Clinical Pathology previous year. Dr. Ivan Stankulov, who was the chief of the ward, in 1978 became also an assistant professor and later chief assistant profes-
sor. He died suddenly in August 2007, only a month after his retiring.

In 1980 with the opening of the Branch of the Medical University in Dobrich, assoc. Prof. Ivan Jovechev was elected as a chief and Dr. Blagovesta Panajotova as a first assistant professor, who moved in 1982 in the Department in Varna. Dr. William Dokov occupied her place. After the closing of the Forensic medicine unit in Dobrich (in Sept. 1992), he moved in the basic department.

From 1989 year dr. Irina Burulianova was appointed as a senior assistant professor. She had graduated and worked in the department of Forensic Medicine in Sofia. Except for dipl. eng. Krachmarov in the forensic toxicology unit worked dipl. eng. Lilyana Ivanova, and at the moment works dipl. eng. Iliana Hadjidicheva.

From 2005 to 2007 the chief of the Department is assoc. Prof. Dobrinka Radoinova, who later became a chief of the educational-scientific unit.

In 1970 a student’s circle of Forensic medicine was established. Many students were taught there and 3 of them are later elected as assistant-professors (dr. D. Radoinova, dr. B. Panajotova and dr. V. Dokov) and others became famous specialists in different areas of medicine (dr. St. Skauch, dr. P. Drumeva, assoc. Prof. V. Goranova, assoc. Prof. P. Petev).

Except for educational and scientific work, there is done in the Department versatile and considerable by amount practical work. All the forensic medicine expertise in Varna and the district of Varna concentrates here - autopsies, medical examinations, toxicological analyses, material evidences, forensic serology and written evidences. The Department is a methodological leader for the north-east Bulgaria and take part in the solution of all difficult cases.

The basis of Forensic medicine from the beginning was in the main building of Higher Medical Institute - Varna and included 2 teaching rooms, assistant’s rooms, histological and serological laboratories, laboratory of material evidences, toxicology unit and laboratory, autopsy room with a basement for a storage of bodies, chancery and study for medical examinations of living persons.

In 1986 the Department moved in the area of the Therapy and part of the students’ rooms, doctors studies, laboratories and medical examination rooms are located on the 3rd floor in the building of the psychodispensary. The autopsy room with subsidiary premises, laboratories and 2 educational rooms are in the Morphological unit of the University hospital.

From 1999 the Department included the Central laboratory of electron microscopy with her chief assoc. Prof. Dr. Georgi Chaldakov. In this unit in January 2004 dr. Anton Tonchev was appointed as an assistant professor, who moved in February 2008 in the Department of Anatomy and histology. Assoc. Prof. Chaldakov retired.

With the opening of “St. Marina” Hospital in 2000 year a Centre of Forensic Medicine and Deontology revealed with the personnel of the department who shared 50% with the Medical University of Varna. There are the following units:

1. Morphological unit with the autopsy room, histological and histochemical laboratories.
2. Examination room for living person – forensic medicine dispensary.
3. Unit for examination of material evidences with laboratories for identification of the personality by means of the biological secretions, a laboratory of expertises of disputable parent’s origin.
4. Forensic toxicology unit.

This Centre is also the basic location place of the Department.

The basic educational priority is the teaching of Forensic Medicine and Medical low. In the 80th years there were 30 hours lectures and 45 hours practical exercises (one hour in the winter and 2 hours in the summer). Now the teaching by unified state requirements includes the lecture course of 45 hours yearly - 15 hours in the first and 30 hours in the second term, also 30 hours practical exercises (in the summer term). The educational program includes Forensic pathology, traumatology, toxicology, identification, clinical Forensic medicine (examination of the living person - physical and sexual assault, disputable parent’s origin) and examination of material evidences, medical ethics and medical law. The practical exercises visualized with all current autopsies, drafts and schemes in all subjects and with the limited museum samples, including forensic osteological collection, which is the only collection in Bulgaria. In this year a teaching in forensic dentistry is beginning (8th term). Educational-scientifically unit of Forensic Medicine is teaching Medical Ethics and Low for 7 specialties in the Medical College by the University, where the hours vary from 15 to 30 for every specialty. The same discipline is teaching to nurses and maternity nurses - bachelor degree, health management (bachelor and masters degree), health care - bachelor degree in Medical University.

In our unit of Forensic Medicine can be teach trainers for 45 days and postgraduation qualification for residents by government order and postgraduation paid teaching and by separate themes. Up till now the individual specialization in forensic medicine and medical low finished 18 forensic doctors and 9 trainers in clinical and general pathology passed 3-months courses. There are delivered lectures for trainers in general practitioners, Prof. I. Lazarov and assoc. Prof. P. Pavlov were visiting lecturers in Forensic medicine in the Faculty of Low by the Technical University in Varna and Free University in Varna. The doctors from the Department delivered lectures for coroners and examining magistrates.

Forensic Medicine has a multipurpose profile and scientific-research work has different directions. In the beginning Dr. St. Neikov, Prof. Radanov and Prof. Lazarov worked in the area of medical low in medical practice. Prof. Popvaelev in collaboration with dr. Pavlov and dr. Varro settled the beginning of the detailed isoserological investigations for the purpose of the expertise in contested parental origin. Assoc. Prof. Pavlov initiates hematological and cytological examinations of the material evidences and the contested parental origin. There were worked out the problems of Forensic determination of the time of death, Forensic Traumatology, Forensic Pathology and Toxicology (Prof. St. Radanov, assoc. Prof. I. Jovechev, Prof. I. Lazarov,
assoc. Prof. P. Pavlov). Mechanical asphyxias were examined by assoc. Prof. I. Jovchev. Up till now there were defended 5 dissertations for PhD in the department:

1. Assoc. Prof. I. Jovchev: “Morphological changes and laboratory diagnostics by drowning in sea water” (1975)
2. Assoc. Prof. P. Pavlov: “Genetical and forensic medicine investigations of the serum system posttransferines (Pt)” (1979)
3. Assoc. Prof. I. Burulianova: Morphology of the conduction system of the human heart in sudden death from acute and chronic ischemic heart disease” (1992)

Dr. Anton Tonchev as a free postgraduate student, defend the theses (2003): “Quantity and fenotyp of the proliferating cells in the post ischemic brain in adult monkeys (2003). Two theses for PhD degree were defended: Prof. I. Lazarov (1985) and Dr. A. Tonchev “A long term fate and molecular control of the endogenec progenitor cells in telencephalon in adult primates (2007). From the foundation of the Department up till now the collaborators of the Department took part separately and in co-authorship in more than 450 articles and scientific reports in magazines and books here and abroad.

Assoc. Prof. I. Burulianova, who was elected as an assoc. Prof. in 2007, is an author of the book “Heart rhythmus disturbances as a cause of sudden cardiac death” (2001), Assoc. Prof. D. Radoinova - Forensic medicine and osteology expertise (2003) in co-authorship with Prof. Y. Yordanov and “Crime scene investigation of the vehicle accident” with Prof. Serafinov (2006).

In the last 10 years began the establishment and confirmation of the unit of Forensic anthropology (with the active participation of dr. Dokov), where there are collected, restored and investigated the bones and bones remains. This collection is unique and the only one in the country. The doctors from the department perform not only an educational and scientific work, but huge expert and diagnostic work of the whole northeast part of Bulgaria, sometimes in the other parts of the country. Educational-scientific unit of Forensic Medicine is the methodological leader for a north-east Bulgaria and a district of Bourgas.

Unfortunately, the problems of Forensic medicine in our country become much more serious. From 2006 year the health care is financed basically by National health insurance pay-desk and this affected the forensic medicine units. There aren’t clinical pathways in the area of Forensic Medicine. In spite of many written reports for help to Ministry of Health concerning our statement, we haven’t received a competent answer. This led to close the Center of Forensic Medicine in the structure of the University Hospital “St Marina” in August 2007 (Order Nr P-184/21.06.07) and the Center is transferred in the Diagnostic-consulting Center on the full self-support. This had the negative effect on the practical work and the searching for forensic medicine help. Because of the reduced number autopsies in the educational year 2007/2008 the practical exercises aren’t enough illustrated with the autopsies. The students in the Medical University can watch the autopsies only in our department. It’s very important to restore them.

We hope to draw the attention of all that have relation to Forensic Medicine in order to assist us in formation of the statement that can be confirmed the fact we are the part of the state system organization of the country. Educational-scientific unit of Forensic medicine and medical law has the following members: Assoc. Prof. D. Radoinova – a chief, Assoc. Prof. I. Burulianova, dr. B. Panajotova and dr. W. Dokov – senior assistant professors, dr. E. Kaisheva – assistant professor. In our staff works dr. D. Gospodinova, who is on the pay-roll in Diagnostic-Consulting centre, also and Dipl. Eng. I. Hadjidecheva.

In spite if the economical restrictions in the last years, the doctors from the Forensic Medicine manage to answer to the high inquiries in jurisprotection and jurisdiction.
OCCUPATIONAL DISEASES: GENERAL CHARACTERISTICS, PECULIARITIES AND CHARACTER OF THE SYSTEM OF HEALTH SERVICE AND FINANCIAL COVER OF THE ACTIVITY IN OCCUPATIONAL DISEASES MEDICAL AREA IN BULGARIA AND IN SOME CENTRAL EUROPEAN COUNTRIES

Petrova E.

Centre on Occupational Diseases, Medical University, Clinic on Occupational Diseases, Medical University Saint Ivan Rilski, Sofia, Bulgaria

Reviewed by: Assoc. Prof. St. Popova

ABSTRACT

The Objects of the study were different systems of service and financial cover for the diagnostics, prophylactic activities and expertise of occupational diseases (ODs) in Bulgaria as well as in some Central European countries. The Aim of the study was to investigate different systems of a service and a financial cover for the medical activities on ODs in Bulgaria and in some Central European countries, and to find a decision for the existing problems in Bulgaria. Materials: The information from the existing legislative acts on ODs in Bulgaria, as well as the information from the Central European countries acts in Internet Web pages of the WHO collaborating centers on occupational, centers of public health as well as clinics on ODS was studied. Discussion: There is well organized and structured system on ODs in Bulgaria, but there are some problems as well. With regard to this it is necessary to ensure a different financial cover for medical activity concern diagnostics and treatment on ODs. It is compulsory to be improved the qualification on occupational diseases of specialists on "ODs", specialists on "occupational medicine", as well as general practitioners and other clinicians in our country.

Key words: occupational diseases, management, diagnostics, expertise, prophylaxis, treatment, financial cover

INTRODUCTION

The diseases, related to people work activities are divided in two groups: occupational injuries and occupational diseases (ODs). The occupational injuries (OIs) are acute incidents of the human organism, appeared during the work time, on way to work or during back to home. OIs appear in extreme situations (trauma, acute poisoning etc). The causes and the cause/effects relationship in cases with OIs are clear and sometimes they are followed by temporary disability to work. It is possible to appear a permanent disability in part of the cases with OI. Each new case with OI in Bulgaria has recognized by issuing of a specific document, so called "occupational injury act". I contrast to the occupational injuries (OIs). The ODs are chronic damages with unknown cause/effect relationship, so it has to be proven. The definition of ODs according to legislative acts in Bulgaria is: The ODs are a group of diseases which appear fully or predominantly due to the harmful factors of work environmental factors and due to working process. The occupational diseases are an important part of the public and social health in each country. The ODs are multi-profile and depending to the peculiarity and the origin of the etiological factors, and they influence different organs and systems in the human organism. There are a lot of papers and decrees on ODs service and about financial cover in this field in different European countries, including in Bulgaria (1-9), but the problems were not solved. The Aim of the study was to investigate different systems of service and a financial cover for the medical activities on ODs in Bulgaria and in some Central European countries, and to find a decision for the existing problems in Bulgaria. Materials The information from the existing legislative acts on ODs in Bulgaria, as well as the information from the Central European countries acts in Internet Web pages of the WHO collaborating centers on occupational, centers of public health as well as clinics on ODs was studied.

Address for correspondence: E. Petrova, DSC, Centre on Occupational Diseases; University Hospital Saint Ivan Rilski 15 Bul. Academic Ivan Geshov 1431 Sofia
e-mail: mdepetrova@yahoo.com


RESULTS

Analysis of system and the service activities on occupational diseases in Bulgaria

The activities on ODs are narrowly related to existing Lists of ODs that are specific for each country. The Lists on occupational diseases (LODS) are related to the peculiarities and technological levels of the industrial branches in each country and to the quality of preventive measures. Bulgaria dispose its own LODS. In 2005 year according to the Project of Fund "Work Conditions" in Ministry of Labour and Social Politic in Bulgaria was created LODS according to etiological principle, conformed to EC recommendations 2003. Bulgarian LODS corresponds to lists on ODs of EC countries. We expect publication of LODS and it's using as an official legislative act in Bulgaria.

There are several levels and service structures on ODs in Bulgaria:

1. First level - prophylaxis and measurement of risk factors and risk/effect relationship on ODs served by Occupational medicine service units (OMSU), and by special laboratories for measurement of workplace risk factors (LWPRF)
2. Second level - diagnostics and treatment of ODs, performed in the clinics on ODs in five university hospitals in Bulgaria
3. Third level - assessment of risk factors and risk for ODs before expertise on ODs, which is performed in Department on OIs and ODs in the National Insurance Institute in Bulgaria
4. Fourth level - expertise of ODs and for work ability is performed in five Regional Expert Commissions on ODs
5. Fifth level - registration, statistics every year account of the incidence on ODs, performed in National Register on occupational diseases, performed till now in National Centre on Public Health Safety. The procedures for announcement, registration, confirmation, acceptance and appeal of ODs are arranged by special Decree No 33, published in Official State Newspaper on 4 April 2001 yr.

A financial cover of medical service on ODs in Bulgaria is different at different levels:

1. The medical activities of Occupational medicine service units (OMSU) in Bulgaria are covered directly by the employers.
2. The medical activities of the Expert commissions on occupational diseases are financially covered by the budget of the Ministry of Health.
3. The diagnostics and the treatment on occupational diseases are covered occasionally by existing clinical pathways of the National Health Insurance Fund.
4. There is a new Decree No8/2007 arranging special financial cover for diagnostics on ODs, which will be leaved to the clinics on occupational diseases by Fund "Work Conditions" in Ministry of Labour and Social Politic in Bulgaria.

Systems of services on ODs in some Central European countries

There are several institutes with clinics on ODs in Poland.

There is WHO collaborating Centre with Nofer Institute on Occupational Medicine with Clinic on ODs in Lodz. Nofer Institute on Occupational Medicine performs a diagnostics, an expertise and a scientific activity in ODs area. Nofer Institute performs a typical for the region wide range scientific activity by projects in chemical and textile industry (occupational poisonings and allergies). There is Institute of dust ODs (a.m. coal workers' pneumoconiosis, asbestosis, chronic obstructive pulmonary disease (COPD) etc in Sosnowets, Poland.

There is Institute on Occupational Medicine in Medical Academy in Latvia. At the territory of institute works:

1. department on occupational and radiation medicine
2. outpatient clinic
3. Latvian Register on ODs
4. laboratory on heavy metals investigation.

The hospital structure of the Institute on Occupational and Environmental Health is situated in "Stradina Hospital" in Riga, where are performed a diagnostics of the ODs, as well as clinical investigations, and studies of the risk factors at the work places. The Commission of ODs in Latvia is based in the Institute on Occupational and Environmental Health, and the specialists on ODs are licensed and included in special List of experts on ODs. The Commission on ODs serves all Latvia. Expertise is performed in the next order:

1. In case of observation for ODs the GP sends a notification.
2. A control of the risk factors is performed by labour inspectors.
3. The expertise on ODs is performed by the commission which included different specialists: head - occupational physician included in national List of the experts) + neurologist + specialist on allergy + specialist on occupational hygiene.
4. In case of accepted ODs the patient has to be directed to commission for work ability expertise.
5. Recently the expertise of occupational character of the diseases is assessed parallel with an expertise of work ability.

There are 37 specialists on occupational medicine, who work in different structures and areas of Lithuania WHO Collaborating Center on Occupational Medicine. They work in the next areas and structures:

1. Occupational health and it's service as well as occupational hygiene, occupational medicine, studies, standard network, programs, in occupational health area, harmonizing of the Lithuania legislation with the European directives, education, work with National Register on ODs, distribution of information, ODs expertise.
2. The Research Department creates criteria for expertise, as well as for laboratory activities, incl. investigations of chemical factors, physical factors, and the activity of National Register on ODs.
Occupational diseases: general characteristics, peculiarities and character ...
2. invention a new administrative document base for investigation, registration, and notification on ODs in Bulgaria
3. publish of new Decree for investigation, registration, and notification on ODs in Bulgaria, prepared by expert in Clinic on occupational diseases in Sofia parallel with experts in National Insurance Institute in Bulgaria
4. invention a new effective mechanisms for control under the activity of the OMSU and laboratories measuring the harmful risk factors at different work places in Bulgarian
5. improvement of the collaborations between OMSU, clinics on occupational diseases, GP and Regional Expert Commissions on ODs
6. improvement of the diagnostics on ODs by adequate apply special financing cover for the diagnostics on ODs existing in Legislative act published in December 2007
7. a concentration of the expertise activity in one-two specialized expert commissions on ODS in Bulgaria
8. invention of new models of education of medical specialists in field on ODs
9. attraction of young specialists toward ODs area by including parts of the ODs in the different courses of specialization.

REFERENCES

3. Decree No80/29.03.2001 for the List on Occupational diseases.
The acute pesticide intoxications have a small relative part but quite often cause severe poisonings and death. A retrospective analysis of the epidemiology of acute pesticide intoxications /API/ in Varna region during the period 1991-2005 has been done. It was established that 384 patients with pesticide poisoning have been admitted for treatment which is 3.06% from all the patients with acute intoxications. API were more frequent in men. The proportion between male and female patients with API was 1.69:1. The prevailing part of the intoxicated was young and active people but a tendency was observed toward increasing of the average age. The main cause of API was suicidal attempt - 264 cases /64.06%/ followed by household poisonings - 34.38% and single professional intoxications - 1.56%. The oral ingestion dominated as way of entry in the organism - 77.61%. Respiratory and/or percutaneous intoxications were significantly less frequent. 53% of all the pesticide poisonings were caused by organophosphate pesticides /OPP/. The lethality from pesticide poisonings is 11.72% and is significantly higher than the total lethality from acute exogenous intoxications in Varna region - 1.3%.

Key words: pesticides, acute intoxications

INTRODUCTION

The pesticides are a big group of chemical compounds with various structure and toxicity (9) used for struggle with plant pests and diseases. A contact with pesticides can cause acute and chronic intoxications and long term disorders (7,17). The acute intoxications have a different severity - from local irritative disorders to grave systemic disorders and death (16). The acute pesticide poisonings are a well known cause of morbidity and lethality all over the world, especially in the developing countries (7,18,22,23). In some countries more than a half of the poisonings are due to pesticides (21). During the last years the main reasons for API were suicidal attempts (6,10,14,15,21,26), which determine a high lethality especially from poisonings with dipyridines and organophosphates (2,4,13,14,17,19,25,26). The major part of the intoxications involve people in active age (15,17,19,26). At the same time significant differences in API have been observed in different countries and regions of the world.

In this relation we have put ourselves a task to study the epidemiology of those pesticide intoxications in Varna region, which succeed to reach hospital treatment, to establish the frequency of the acute pesticide exogenous intoxications, the relative share of the different pesticide groups, the distribution according to age, sex, reasons for intoxication and entry.
pesticide poisonings is reduced as a consequence of the forbiddance of a lot of highly toxic preparations (Parathion, Intrathion, DDT, Lindane, Paraquat, etc.). The tendency is to use highly effective towards the pests pesticides which at the same time are less toxic to people. The acute pesticide intoxications in men were 241 /62.76%/ and in women - 143 /37.24%/.

The proportion between men with API to women with API was 1.69:1. The higher frequency of pesticide poisonings in men can be explained by the fact that usually men deal with pesticides and therefore have easier access to them. The age of the observed patients was between 14 and 92 years. The age distribution is presented on table 1.

Table 1. Age distribution of patients with API

<table>
<thead>
<tr>
<th>Age / years</th>
<th>Number of patients</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>14-24</td>
<td>61</td>
<td>15.89 %</td>
</tr>
<tr>
<td>25-44</td>
<td>96</td>
<td>25.0 %</td>
</tr>
<tr>
<td>45-60</td>
<td>122</td>
<td>31.77 %</td>
</tr>
<tr>
<td>Over 60</td>
<td>105</td>
<td>27.34 %</td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>100 %</td>
</tr>
</tbody>
</table>

The prevailing part of the intoxications was of young people and people in active age. This coincides with the data about API in the specialized literature (15,17,19,26). At the same time in our country a tendency was outlined at the end of the last century to an increase of the average age of the intoxicated with pesticides. The poisonings in elder patients suppose more grave clinical picture as a result of the existing serious co morbidity with age progression which undoubtedly influences the clinical course and outcome of the intoxication. The "shift" of the age borders of patients with API is a consequence of the deep changes of cultivating and managing of the land in the new conditions of market economy which led to different pattern of pesticide use. Their use in private farms grew bigger. Mainly elder farmers work with them there. The main reason for API were suicidal attempts - 246 cases /64.06%/, followed by household - 132 cases /34.38%/ and professional intoxications - 6 cases /1.56%/.

Table 2. Reasons for API

<table>
<thead>
<tr>
<th>Reason for intoxication</th>
<th>Number of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suicidal attempts</td>
<td>246</td>
<td>77.61 %</td>
</tr>
<tr>
<td>Household poisonings</td>
<td>132</td>
<td>34.38 %</td>
</tr>
<tr>
<td>Professional poisonings</td>
<td>6</td>
<td>1.56 %</td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>100 %</td>
</tr>
</tbody>
</table>

We establish a very low relative share of professional pesticide intoxications which were leading in the near past. Today the suicidal attempts have the highest relative part, followed by household intoxications. These results are similar to the results of other authors (6,10,14,15,19,26). The high frequency of the suicidal pesticide poisonings supposes that severe forms of API will become more frequent as the ingested pesticide dose in cases of suicidal attempts is much greater than that in household and especially in professional intoxication. The oral entry of pesticides in the organism dominates - 298 cases - 77.61% /Table 3/.

Table 3. Distribution of the patients with API according to the entry

<table>
<thead>
<tr>
<th>Entry / route of entrance</th>
<th>Number of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral ingestion</td>
<td>298</td>
<td>77.61 %</td>
</tr>
<tr>
<td>Inhalation</td>
<td>72</td>
<td>18.75 %</td>
</tr>
<tr>
<td>Per cutaneous</td>
<td>9</td>
<td>2.34 %</td>
</tr>
<tr>
<td>Combined</td>
<td>5</td>
<td>1.30 %</td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>100 %</td>
</tr>
</tbody>
</table>

On the second place but with considerably lower frequency is the inhalation route of entrance- 18.72% followed by cutaneous and combined routes of entrance. The most frequent entry is through the digestive system because the prevailing part of the poisonings is either suicidal or accidental, when the pesticides are kept improperly. The professional intoxications which had the major part in the near past now are rare. As in professional intoxications the pesticides enter the organism by inhalation and/or through the skin this explains why respiratory pesticide intoxications are rarer and dermal and combined intoxications are very rare. We have grouped the pesticides that have caused acute intoxications during the observed period in 6 groups. Table 4 presents the relative part of these groups.

Table 4. Distribution of API according to the type of the intoxicating pesticide

<table>
<thead>
<tr>
<th>Pesticides</th>
<th>Number of cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organophosphates</td>
<td>207</td>
<td>53.9 %</td>
</tr>
<tr>
<td>Synthetic pyrethroids</td>
<td>86</td>
<td>22.4 %</td>
</tr>
<tr>
<td>Carbamates</td>
<td>4</td>
<td>1.04 %</td>
</tr>
<tr>
<td>Copper sulphate</td>
<td>24</td>
<td>6.25 %</td>
</tr>
<tr>
<td>Organic rodenticides</td>
<td>38</td>
<td>9.9 %</td>
</tr>
<tr>
<td>Zinc phosphide</td>
<td>25</td>
<td>6.51 %</td>
</tr>
<tr>
<td>Total</td>
<td>384</td>
<td>100 %</td>
</tr>
</tbody>
</table>
The acute intoxications are caused most often by organophosphate pesticides - in 207 cases /53.9%/ These are the most frequently used pesticides in our country. Similar data is reported from other countries (3,5,6, 14,17,18,23). This high relative share in our study is due to the widespread use of OP pesticides in the region, a lot of which are significantly toxic to man as well as to the strongly restricted use of other highly toxic pesticides like dipyridilides, chlororganic pesticides and other groups. Pyrethroid pesticides are on the second place according to the frequency of API - 86 cases /22.4%. Their use is increasing constantly because of their high effectiveness against the pests and lower toxicity to people. Pyrethroid intoxications are generally lighter and milder. Organic rodenticide poisonings are also lighter. In our study their frequency is on the third place - 38 cases /9.9%. In some reports the organic rodenticide intoxications take the first place among other pesticide intoxications and deserve special attention (12,25). The poisonings with zinc phosphate and copper sulphate are not quite frequent but these compounds are among the pesticides that lead to lethal intoxication. Lethal outcome was registered in 45 patients with API from all 384 cases of API. The lethality from pesticide intoxication was 11.72%. This lethality is significantly higher than the total lethality from acute exogenous intoxications in Varna region during the described period 1.3 %. The reported death rate from pesticide poisonings coincides or is similar to the reported lethality in other investigations (3,6,17,25,26). At the same time much greater lethality was shown in some reports but they refer to some concrete highly toxic pesticides as paraquat - up to 70% (14) or organophosphates - up to 50% (13). Lethal cases from pesticide intoxication have the major relative share of all the causes of death from acute exogenous intoxications. They are the cause of death for 27.61% of the total lethality from acute intoxications. The results are similar to those reported about a neighbor country - Turkey (15).

CONCLUSION

The frequency of the acute pesticide intoxications in Varna region during the period 1991-2005 was 3.06%. API were more frequent in male patients. The proportion between male and female patients was 1.69:1. The prevailing part of the intoxications was of patients in young and active age. Oral ingestion dominates as a route of entry of the pesticides into the organism. The main reason about the poisonings was suicidal attempt /64.06%. More than a half of all the pesticide intoxications were caused by organophosphate pesticides. Lethality from pesticide intoxications was 11.07% and was nine times higher than the total lethality from acute exogenous intoxications in the region during the same period.

REFERENCES

1. Събева Ю., В.Славова, С.Маркова. Хромато-массспектретричен метод за химикотоксикологична диагностика на остри отравяния с пестициди. Годишен сборник ИМАБ, т.5, 1, 1999, 55-56.


EDUCATION SATISFACTION OF MEDICAL AESTHETICS STUDENTS AT MEDICAL COLLEGE OF VARNA

Georgieva L.¹, L. Tzvetkov²

¹Department of Social Medicine and Healthcare Organization, Medical University Prof. Dr. Paraskev Stoyanov, Varna, ²Medical College, Varna

Reviewed by: Assoc. Prof. St. Popova

ABSTRACT

Research results on the satisfaction of students graduating with Medical Aesthetics, Wellness and Spa specialty from Medical College of Varna are presented. The complete assessment of the conducted training is “good”. The theoretical training and the additional medical knowledge acquirement are assessed higher compared to the practical training. Insufficient satisfaction has been expressed from the time arrangement of the program, the lack of equipment for conducting practical training, and the scarcity of suitable handbooks. The detailed assessments and recommendations will serve for optimizing the program according to the expectations of the students.

Key words: satisfaction, students, education, medical aesthetics, medical college

INTRODUCTION

The perception of cosmetics is evolving through the ages from a beautifying tool to a tool for health improvement of the skin and its appendices (hair, nails), which gradually gets cosmetics close to medicine and results in differentiation of its two directions: decorative and medical cosmetics. Decorative cosmetics aims to achieve appearance attractiveness, making the defects of skin and its appendices less noticeable by the use of makeup tools. Based on the understanding that the appearance depends on the health status of the whole organism, cosmetics development requires to be put on a broad medical basis (4). Medical cosmetics aims to improve hygiene and appearance of skin and its appendices by the use of hygienic, protective and aesthetic tools (1). In contemporary society appearance care is not only a hygienic requirement, but also a necessity. Trends in customer demand show an increasing interest at cosmetic products and procedures. Cosmetic industry offers continuously new products, while dermatology prefers cosmetic minimalism. Recommending the so called “cosmetic diet” (simplified care - hygiene, sun protection, products and procedures according to the specific needs of particular skin), medicine attempts to protect the natural human aspiration to beauty from subordination to the beautiful packages of the cosmetic products and to the aggressive cosmetic advertisement. Medical cosmetics sets the problem to achieve a harmony between health and beauty from the viewpoint of the commonly accepted criteria of aesthetics.

Based on the increasing necessity for putting cosmetics on a medical basis and the needs for education in medical cosmetics at academic level, a modular paid education in Medical Aesthetics has started at the Medical College of Varna for those graduated as: Nurse, Midwife, Doctor’s Assistant, Assistant Pharmacist, Rehabilitation Therapist, Medical-Lab Worker, X-ray Lab-Worker, Health Inspector. In order to harmonize the specialty with the international theory, practice and terminology, the name has been changed to Medical Aesthetics, Wellness and Spa.

The term “wellness” has no exact Bulgarian translation which expresses its meaning in one word. The World Health Organisation defined health as “a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity” (5). Mental health refers to an individual’s emotional and psychological well-being. “Mental health” and “mental illness” are not opposites - the absence of a recognized mental disorder is not necessarily an indicator of sound mental health. One way to think about mental health is by looking at how effectively and successfully a person functions. Feeling capable and competent, being able to handle normal levels of stress, lead an independent life, and recover from difficult situations, are signs of mental health. A combination of physical, social and most importantly mental well-being is necessary to achieve overall health. Wellness is a view of health that emphasizes the state of the entire being and its ongoing development. There have been many terms used to define and describe wellness. According to the Medical Wellness Association these include optimal health, health promotion and total

Address for correspondence:
L. Georgieva, Dept. of Social Medicine and Healthcare Organization, Medical University Prof. Dr. Paraskev Stoyanov
55 Marin Drinov Str., 9002 Varna, Bulgaria
e-mail: lorahg@abv.bg
health. Optimal well-being requires the balancing of lifestyle and various dimensions of the whole person. These dimensions of health include physical, mental, emotional, environmental, spiritual and social components (3).

Wellness is generally used to mean a healthy balance of the mind, body and spirit that results in an overall feeling of well-being. All wellness strategies aim to achieving a state of physical and spiritual balance - strong body and positive psychological attitude through the right management of everyday activity. Wellness is a choice of lifestyle, subordinated to the holistic health approach.

Table 1. Curriculum in Medical Aesthetics, Wellness and Spa.

<table>
<thead>
<tr>
<th>First module</th>
<th>Second module</th>
<th>Third module</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Discipline</strong></td>
<td><strong>Discipline</strong></td>
<td><strong>Discipline</strong></td>
</tr>
<tr>
<td>Dermatovenerology</td>
<td>Dermatovenerology</td>
<td>Dermatoallergology</td>
</tr>
<tr>
<td>60 hours</td>
<td>30 hours</td>
<td>20 hours</td>
</tr>
<tr>
<td>Physiology and Biochemistry of Skin</td>
<td>Physical Therapy</td>
<td>Endocrinology</td>
</tr>
<tr>
<td>30 hours</td>
<td>30 hours</td>
<td>30 hours</td>
</tr>
<tr>
<td>Introduction to Medical Aesthetics</td>
<td>Plastic and Aesthetic surgery</td>
<td>Nutrition and Dietetics</td>
</tr>
<tr>
<td>20 hours</td>
<td>30 hours</td>
<td>15 hours</td>
</tr>
<tr>
<td>Aesthetics and Health</td>
<td>Cosmetic Massage</td>
<td>Face Gymnastics</td>
</tr>
<tr>
<td>30 hours</td>
<td>40 hours</td>
<td>20 hours</td>
</tr>
<tr>
<td>Introduction to Medical Cosmetic Products</td>
<td>Reflective Massage</td>
<td>Medical Ecology</td>
</tr>
<tr>
<td>15 hours</td>
<td>40 hours</td>
<td>15 hours</td>
</tr>
<tr>
<td>Information Systems and Technologies</td>
<td>Face Gymnastics</td>
<td>Basics of Entrepreneurship</td>
</tr>
<tr>
<td>30 hours</td>
<td>20 hours</td>
<td>15 hours</td>
</tr>
<tr>
<td>Medical Informatics</td>
<td>Technology of Medical Cosmetic Products</td>
<td>Marketing, Promotion and Advertise</td>
</tr>
<tr>
<td>30 hours</td>
<td>60 hours</td>
<td>15 hours</td>
</tr>
<tr>
<td>Communications in Healthcare</td>
<td>Customer Care and Individual Approach</td>
<td>Management and Organizational Behavior</td>
</tr>
<tr>
<td>30 hours</td>
<td>10 hours</td>
<td>15 hours</td>
</tr>
<tr>
<td>Psychology of Care</td>
<td>Application of Nature Factors</td>
<td>Accounting and Taxation Aspects</td>
</tr>
<tr>
<td>30 hours</td>
<td>10 hours</td>
<td>15 hours</td>
</tr>
<tr>
<td>Wellness, Spa, Balneotherapy and Thalassotherapy Center</td>
<td>Chinese Medicine and Ayurveda</td>
<td>Responsibilities of Wellness &amp; Spa managers</td>
</tr>
<tr>
<td>15 hours</td>
<td>10 hours</td>
<td>5 hours</td>
</tr>
<tr>
<td>50 hours</td>
<td>10 hours</td>
<td>15 hours</td>
</tr>
<tr>
<td>Consultations</td>
<td>Consultations</td>
<td>Individual work and self-preparation</td>
</tr>
<tr>
<td>60 hours</td>
<td>10 hours</td>
<td>30 hours</td>
</tr>
<tr>
<td>Practice</td>
<td>Practice</td>
<td>Practice</td>
</tr>
<tr>
<td>300 hours</td>
<td>300 hours</td>
<td>360 hours</td>
</tr>
<tr>
<td>Total number of hours</td>
<td>Total number of hours</td>
<td>Total number of hours</td>
</tr>
<tr>
<td>700 hours</td>
<td>600 hours</td>
<td>600 hours</td>
</tr>
</tbody>
</table>

“Wellness center” is defined as a center that offers procedures with beneficial action on the physical and psychical state (water, cosmetic, motional, relaxing therapy, etc.). There are some versions about the origin of the term “spa”. The most popular explanation is that the word is an acronym of a Latin phrase “sanus per aquam” meaning “health through water”. Another explanation is that the term may be derived from the Latin word “spagere” meaning “to scatter, sprinkle or moisten”. It is also suggested that the term is derived from the name of the Belgian town of Spa, where since medieval times illnesses caused by iron deficiency were treated by drinking chalybeate (iron bearing) spring water.

In a narrow sense a “Spa center” should be considered only that one which offers healing procedures with water. However, everywhere water procedures are combined with additional ones and are conditionally partitioned into four zones: heat procedures, water procedures, massages and cosmetics, active relaxation.

Today’s spa is a center for healing mind, body and spirit. Spa centers offer a wide variety of techniques for improving health, stress management, peace of mind and wellness. The International Spa Association (ISPA) has defined the “ten domains of spa”: waters; food, diet and nutrition; movement, exercise and fitness; touch, massage and bodywork; mind/body/spirit; aesthetics, skin care, natural beauty agents; physical space, climatology, global ecology; social/cultural arts and values; management, marketing and operations; time, rhythm and cycles. Founded in 1991, ISPA is the professional organization of the spa industry, representing more than 3200 health and wellness facilities.
in 83 countries. ISPA advances the spa industry by providing educational and networking opportunities, promoting the value of the spa experience and speaking to foster professionalism and growth (2).

The settling name of such kind of centers is “Wellness and Spa”. Despite of the popular perception of Wellness and Spa centers as offering modern procedures for active relaxation, most of them are essentially rehabilitation centers and have particular direction towards physiological functions of human organism.

The first education in the specialty of Medical Aesthetics, Wellness and Spa was conducted at the Medical College of Varna from 01.03.2007 to 31.07.2008. The disciplines included in the curriculum are presented in Table 1.

In the hours distribution has been considered the principle of theory and practice alternating and interdisciplinary connection realization. The major practical education form is work in small groups - up to three trained. Object of grading in the curricular practice are: professional skills, ability to assess customer needs, ability to make independent decisions, communication abilities.

AIM

The aim of the present study is to determine the satisfaction of the students graduating from the Medical Aesthetics, Wellness and Spa specialty at the Medical College of Varna.

MATERIAL AND METHODS

In the study are included all ten students gone through education in Medical Aesthetics, Wellness and Spa at the Medical College of Varna. A study tool is a specially developed inquiry card with 32 questions, directed towards the opinion of the students about the different elements of the conducted education. The satisfaction is studied according to the three-grade scale (fully satisfied, partially satisfied, unsatisfied) and as a grade (excellent, very good, good, satisfactory, poor). Suggestions have been asked for optimizing the organization and the contents of the curriculum, to serve for future changes, corresponding to the expectations of the students.

RESULTS AND DISCUSSION

The students gone through the education (females) have the following preliminary education structure: Nurse - 6, Doctor’s Assistant - 1, Midwife - 1, Assistant Pharmacist - 1 and Medical Lab-Worker - 1. The work experience in the medical specialty is: from 1 to 10 years - 6, from 11 to 15 years - 2, over 30 years - 1, without work experience in the medical specialty - 1 student.

Motives for education in the Medical Aesthetics specialty are (the asked have given more than one answer): professional qualification improvement - 9, willingness for more medical knowledge - 8, willingness to develop own business - 7, curiosity - 3, more knowledge about medical equipment - 2, unwillingness to practice the medical specialty - 1, job as a cosmetic products representative - 1.

Fully satisfied of the education as a whole are 6, partially satisfied are 4 students. Fully satisfied of the theoretical preparation are 6, partially satisfied - 4 students. As reasons for insufficient satisfaction are pointed out: some non-modernized lectures, not good sequence in the lecture material, impossibility for lecture copying. Expected but not received knowledge is: cosmetic face treatment, permanent makeup and pedicure. As most beneficial theoretical disciplines are pointed out (the asked have given more than one answer): Dermatology (10), Physical Therapy (7), Communications in Healthcare (6), Marketing, Promotion and Advertisement (4), Technology of Medical Cosmetic Products (4), Wellness, Spa, Balneotherapy and Thalassotherapy Center (4), Medical Ecology (1) and Plastic Surgery (1). According to the aim of the developed program for extending the volume of medical knowledge of the practicing cosmeticians, the students’ opinion has been asked for the expected and the presented medical information. Fully satisfied of the received medical information are 6, partially satisfied are 4 who have expected to receive more medical knowledge.

Full satisfaction of the acquired knowledge of cosmetic equipment is expressed by 5 students, partial - by the rest ones. The question about the expected knowledge, as well as about the correspondence between expected and received knowledge, has not been answered by 9 students, which illustrates the insufficient knowledge and use of modern cosmetic equipment. One student has pointed out as unsatisfactory the insufficient work with demonstration equipment.

Fully satisfied of the practical preparation are 4, partially satisfied - 6 students. As reasons for insufficient satisfaction are pointed out the lack of equipment in the college and insufficient engagement of the teachers of individual practical training of the students. The following practical disciplines are pointed out as most useful: all (4), face cosmetics (2) and massage (1); 3 students have not answered this question. Desired but not available practical disciplines are: spa-etiquette (2), mud- and wax-treatment (1), reflex therapy (1), manicure, pedicure and permanent makeup (1). Expectations of all students have been for more practical disciplines during education.

Of the whole educational organization fully satisfied are 3 students, partially - 6, one student is unsatisfied. The directed recommendation is for curricular program preparation without classes during the weekends.

The total grade for the educational course is: very good - given by 3 students, good - by 6, satisfactory - by 1 student. The grade for the theoretical preparation is: very good - 4, good - 6. The practical preparation is graded as: excellent - 1, very good - 2, good - 5, satisfactory - 2. The grade for the organization of classes is: very good - 4, good - 4, satisfactory - 1, poor - 1. The equipment for the practical exercises
is graded as very good by 3 students, as good by 6 and as satisfactory by 1.

The theoretical materials used by the students for their independent preparation are (the asked have given more than one answer): lectures (10), materials from seminar classes (5), textbooks (5), other information - from Internet and journals. Literature at the Medical University library has been searched by one student only. The general opinion of the students is about the lack of suitable handbooks for theoretical preparations in medical cosmetics.

The question “With what has the education contributed to your development as a professional?” has been answered by all students similarly: improved qualification and increased professional self-confidence.

The students would recommend the Medical Aesthetics education to their colleagues. The only negative answer is motivated by the lack of validated duty characteristic for medical cosmician.

The students recommend: better organization of lectures and practical training; provision of equipment for practical training at Medical College; expressed is a willingness to get a higher educational degree which to separate the graduated from the other cosmeticians.

CONCLUSIONS

- The major motives for education in Medical Aesthetics are: to increase the professional qualification as a cosmetician, to get more medical knowledge, and willingness to develop own business. The motivation, associated with improving the professional competence and expanding its medical explanation, shows the rightness of the introduction of the education at Medical College. The motivation, associated with the intention to develop own cosmetic business, directs towards the need for a deeper presentation of managerial and economic disciplines in the education.
- The satisfaction of the received practical preparation is weaker compared to that of the theoretical one, which shows a need for individual practical training.
- Considering the lacking knowledge of the students about cosmetic equipment, it is necessary to deliver more time for teaching the structure and rules of operation with modern equipment and consumptives.
- The prevailing “good” grades for the conducted education show that the optimal organization of the curriculum has not been achieved, and major problems are: class time distribution and lack of own equipment for practical training.
- The theoretical preparation of students has been achieved mainly through the delivered lecture material. The lack of literature in medical cosmetics at the Medical University library, as well as the impossibility to get the lectures on a hard copy or electronic format, impede the students and put a need of developing proper educational materials.
- The students wish to get a higher educational degree upon finishing their education, which to distinguish them from the rest of the practicing cosmeticians and thus to give them a greater chance for a professional establishment.
- The analysis of the results in the present study shows that the education at the Medical College is considered a good opportunity to get a professional qualification in medical cosmetics, and the detailed grades and the recommendations will serve for optimizing the program according to the expectations of the educated.

REFERENCES

IMMIGRANTS AND HEALTHCARE IN BULGARIA: 
THE RESPONSES BY POLICY AND LEGISLATION

Popova S., A. Kerekovska

Department of Social Medicine and Health Care Organisation, Prof. Paraskev Stoyanov Medical University of Varna

Reviewed by: Assoc. Prof. T. Kostadinova

ABSTRACT

The global scale of international migration flows has pushed migrants’ health issues high up the policy agendas worldwide. Bulgaria as a new EU member-state is increasingly affected by immigration pressure. The health of migrants is acknowledged as an issue of major public health importance and a challenge for policy responses. The study aims to explore the existence of specific legislative regulations and policies developed in response to migrants’ health and healthcare services in Bulgaria, to identify the main problems and to highlight the challenges to both law and related policies. The methods involve comprehensive review and documentary analysis of international and national migrants’ health literature; analysis of regulatory norms, specific policies and practices to assess the situation of immigrants’ healthcare legislation and policy responses in the new context of Bulgaria’s EU membership. The results reveal that legislative and multi-sectoral policy initiatives have been undertaken in Bulgaria to assure the protection of immigrants’ health, nevertheless, there are problems emerging in practice, related to: deteriorated immigrants’ health status; absence of consistent migration-management policy; lack of systematic reliable data, health information and rigorous research; insufficient interagency and international cooperation; lack of publicity and information about health insurance rights and obligations of immigrants and existing services; insufficient sensitivity and training of health professionals and relevant stakeholders. Promoting migrant-sensitive health policies; sensitizing and training health service providers and relevant policy-makers and stakeholders; encouraging research and information dissemination; increasing multi-sectoral involvement and expanding international cooperation on migrants’ health are actions of recognized importance to better deal with immigrants’ health problems in Bulgaria.

Key words: immigrants’ health, legislation, policy, Bulgaria

INTRODUCTION

In recent years, the global scale of international migration flows has pushed migration issues high up the political agendas of governments worldwide. With the accession of 10 new member states to the EU in 2004 and two more in 2007, migration has posed particular challenges to the enlarged European Union. The membership in the Union’s political processes makes accession countries safer, the flow of capital and the development of the economic markets increase the demand for labour, and the social welfare system is becoming friendlier. It is expected, the changes will drive migration flows towards these countries, and this is the perspective to be kept in mind when designing migration policy and aligning to the Migration Acquis (1). Recently, the new member states of the EU are increasingly becoming target countries of migration. For their societies, this means a rapid change from countries almost without migration via strong emigration to more immigration in the future (11). This scenario requires preparation and careful planning and is a serious challenge for migration legislation and policy.

A major policy and legislation challenge of migration in Europe is immigrants’ health. It is more than just a focus on disease entities; rather it includes wider determinants of health such as environmental, behavioural, socioeconomic and genetic-biological factors. It is also very much determined by the availability, accessibility and affordability of national health and social services, including services that facilitate integration to the host community (9). Migrants in Europe experience threats to their physical, mental, and social health and pose challenges to those seeking to protect their health as a human right (16).

Bulgaria, a new EU member state, is increasingly affected by immigration flows. The democratic changes and the
processes of globalization have completely changed the migration situation in the country. Before 1989 Bulgaria, like the other former Soviet-bloc countries, was a country with limited migration. After 1989 the country became part of the European and the world migration system with intensive emigration flows (11). Now, after the accession to the European Union, the country is under increasing immigration pressure - becoming more attractive as both a transit and a final destination for immigrants.

The immigration phenomenon in Bulgaria is new and dynamic. Neither the institutionalisation nor the related studies measure up to its full scope and complexity. The registered number of immigrants in Bulgaria varies between 60 000 and 108 000 for permanent foreign residents and between 30 000 and 50 000 for seasonal and irregular immigrants (12). The number of the foreigners seeking asylum in Bulgaria in the period 1993 - 2006 has been 15391, whereas refugee status has been granted to 1412 and humanitarian status to 3497 foreigners (12,15). With regard to illegal migrants, it is estimated that their number varies between 30 000 and 50 000 persons (2,14). An increase in the scope of immigration is expected in the following years with a view to the EU membership of the country.

The present paper sets out to review international and national documents, publications and relevant literature on immigrants’ health legislation and policy, both in the EU and national contexts. It aims to explore the existence of specific legislative regulations and policies developed in response to immigrants’ health and healthcare services in Bulgaria. The study also seeks to identify the main problems of immigrants’ health in Bulgaria and to highlight the challenges to both law and related policies.

MATERIAL AND METHODS

The methods involve a comprehensive review and a documentary analysis of recent international and national migrants’ health literature and documentation. An analysis of the regulatory norms and specific policies is applied to assess the situation of immigrants’ healthcare legislation and draw up the picture of relevant policy responses in the new context of Bulgaria’s EU membership.

RESULTS AND DISCUSSION

The EU immigration policy framework

During the last decade, the need for a common, comprehensive immigration policy has been increasingly recognised and encouraged by the European Commission and the EU Member States. The Commission has been therefore proposing concrete principles and measures - accompanied by a new strategy on immigration governance on which to base the further development of the common immigration policy over the coming years (4,10). The European Union and its member-states have gradually established the foundations of a common legal framework on immigration and asylum. The complex and multifaceted nature of immigration has been acknowledged, requiring a mixture of policy actions covering a wide range of issues and fields: demographic constraints, economic needs, social expectations, health impacts, trade commitments, development needs, education opportunities, security dimension, etc. Prevention and access to healthcare by migrants has been seen as a prerequisite for public health of the EU, with significant positive impacts on its social, economic and political development, as well as on the promotion of human rights. Addressing the health of migrants has been also seen not only as a humanitarian cause, but moreover as a need for attainment of the best level of health and well-being for everybody living in the EU (4).

Therefore, numerous legislative and policy instruments have been developed at the European level recognizing the right to health as a fundamental human right for nationals and non-nationals alike with a goal to ensure protection of health and equitable access to health services of appropriate quality for all. Nevertheless, health inequalities between host populations and migrants, asylum seekers, refugees, victims of trafficking in persons and others in need of international protection and assistance continue to persist in the region, both in terms of health status as well as in access to healthcare services of equal quality (10).

Immigrants’ health legislation framework in Bulgaria

The new migration policy of Bulgaria is aimed at achieving an optimal balance between the freedom of movement of people and the control of illegal immigration while respecting the human rights and freedoms as guaranteed in international treaties and EU standards. The right to health and healthcare has been recognized as a fundamental right of immigrants. Specific legislative norms have been developed to regulate all strategies and actions adopted at national and regional level referring to migrants’ health and healthcare services. The legislation regarding health insurance and medical services for foreigners who seek or have been granted protection in Bulgaria is regulated with details and is in line with the international and European practice in this area (2). The main legislative documents concerning immigrants’ health are the: Constitution of the Republic of Bulgaria (3); 1951 Convention Relating to the Status of Refugees; Law on Asylum and Refugees (8); Foreigners in the Republic of Bulgaria Act; Law on Health (7); Law on Health Insurance (6); National Framework Contract (between the National Health Insurance Fund and the Union of Bulgarian Physicians); Ordinance on the access of health-insured persons to medical institutions for out-patient and in-patient medical assistance; Ordinance No40 of 24 Nov. 2004 laying down the basic package of healthcare activities guaranteed with the budget of the National Health Insurance Fund; Ordinance No2 of 27 April 2000 regarding the types of immunizations in Bulgaria and the terms for their delivery; Instructive Letter No91-01-242 of 15 October 2003 regarding the activity of NSSI’s territorial units in relation to clarifying and proving the current health in-
As from the date of opening the status determination procedure. Where necessary, medicines for the treatment of urination wards for persons with contagious diseases and asylums at the Registration-and-Reception centres, with isolation wards for persons with contagious diseases and asylums-seekers who need everyday medical care and observation. Where necessary, medicines for the treatment of urgent cases are secured. Foreigners accommodated in these centres receive mandatory medical examination by a doctor working for the respective Regional Directorate of Interior. As from the date of opening the status determination procedure, the SAR makes the monthly compulsory health insurance contributions for asylum-seekers by using resources from the state budget. After receiving the temporary refugee certificate, asylum-seekers are referred to choosing a GP. Pursuant to the Law on Asylum and Refugees and the Law on Health Insurance, pending the status determination procedure, the asylum-seekers have the same rights and access to medical assistance and free-of-charge medical services under the procedure applicable to Bulgarian nationals.

**Aliens who have been granted protection in the Republic of Bulgaria**

Aliens who have been granted refugee or humanitarian status have the same rights and obligations as Bulgarian nationals in the area of health insurance and access to medical assistance. The State Agency for Refugees terminates the payment of monthly health insurance contributions as from the date of submission of the decision granting the status. The aliens who have been granted protection are obliged to pay health insurance contributions under the procedure regulated in the Law on Health Insurance. The health-insured aliens who have been granted refugee or humanitarian status are entitled to medical assistance within the basic package of health activities guaranteed with the budget of the National Health Insurance Fund. In cases, when additional payment for medical services has to be made outside the basic package guaranteed with the budget of the National Health Insurance Fund, the State Agency for Refugees seeks the support of various sponsors. For instance, the Refugee-and-Migration Service of the Bulgarian Red Cross ensures out-patient and in-patient treatment, training on family planning and prevention of STDs, psychiatric aid, etc. on the basis of contracts with medical centres.

**Programmes and policies related to immigrants’ health**

A great number of initiatives have been undertaken in Bulgaria to assess the major health problems of migrants and refugees as well as to assure high level of protection of their health. These actions are based on the recommended good practices of the EU Member States for delivering health services to foreigners looking for protection as well as to refugees and asylum-seekers referring to a broad range of political areas like employment, health, work safety and protection, education, social protection and delivery of health care. Such are: development and enforcement of legal framework regulating migrants’ rights and access to health care; ensuring equal and complete access to health care; provision of medical check-up exams and investigation to the new immigrants; raising health service providers’ and professionals’ cultural sensitivity to migrants’ health issues; training health professionals on refugees’ specific health issues and needs; training and inclusion of experienced refugees as mediators in the process migrants’ healthcare provision; development and dissemination of information materials regarding refugees’ rights in the area of health insurance and healthcare; enhancing capacity of
Despite all relative initiatives, there are some problems emerging in practice - related to the medical services for immigrants and their specific needs. Such are:

- **Absence of consistent migration-management policy** - A well-formulated and consistently implemented migration management policy is lacking in Bulgaria. The changes of the Bulgarian legal framework so far have been prompted solely by the EU accession process and although legislative harmonization has undoubtedly been a positive development, it cannot be hailed as a substitute for a national migration management policy tailored to the specific economic and social context in which such legislation is to be implemented. This apparent policy gap has lead to the unproductive casting of migration into a predominantly law-enforcement framework, which seeks to prevent and restrict migration flows into the country, rather than to manage and facilitate them to its advantage (2).

- **Deteriorated immigrants’ health status** - Many foreigners who seek or have been granted protection have a deteriorated health status as a result of malnutrition, unsatisfactory medical care in their countries of origin, the difficult transition conditions in Bulgaria, chronic diseases, stress, etc. Asylum-seekers come from countries with region-specific diseases, which require diagnosis and treatment (16).

  - **Lack of migrant-sensitive health services and insufficient sensitivity and training of health professionals and relevant stakeholders** - There is a need to reach out to migrants and address their special vulnerabilities and health-care needs. A major problem in this process is the insufficient sensitivity and training of health professionals and the linguistic barrier between the medical staff and the aliens who seek or have been granted protection. Apart from sensitizing and training health service providers and relevant policy-makers and stakeholders, the response also entails targeting interventions to reduce migrants’ health risks and launching “migrant-sensitive” programmes and services, which include care that takes cultural, religious and linguistic needs into consideration.

  - **Lack of publicity and information about health insurance rights and obligations of immigrants and existing services**. The immigrants are not familiar with their health insurance rights and obligations, which does not allow them to make use of the basic package of health activities guaranteed with the budget of the NHIF (2). A great part of the medical specialists are also not well familiar with the healthcare rights of refugees and asylum seekers in Bulgaria.

  - **Lack of systematic reliable data, health information and rigorous research.** Systematic and rigorous research on short- and long-term resident foreigners is lacking in Bulgaria. Health information on migrants’ health and on their access to health services is scarce. Due to a lack of precise unified methodology for analysing migration movements and co-ordination between institutions observing these movements the official data is not completely reliable. The data available in the public domain through various unofficial channels is scarce and controversial (2). Accurate research and reliable statistics are vital to the formulation of a coherent migration policy. Moreover, such data is essential in order to ensure that government bodies dealing with immigration receive adequate budgetary allocation to implement the policies and measures envisaged by it.

  - **Insufficient interagency and international cooperation and lack of adequate institutional structure for meeting immigrants’ needs.** A paradoxical level of institutionalisation is obvious for the Bulgarian situation, characterized by a small number of refugees but a developed set of governmental and non-governmental, national and international, organisations; and on the other hand - a growing number of immigrants but just the first slow steps in creating an adequate institutional structure for meeting their needs (10). There is a clear necessity for strengthening interagency, interregional and international cooperation on migrants’ health emphasizing on developing partnerships with other organizations such as UNHCR and the International
Immigrants and Healthcare in Bulgaria: The responses by policy and legislation

Organization for Migration and promoting cooperation for health policies among central and local governments as well as among representatives of civil society.

- **Insufficient multi-sectoral action and policies for solving migrants’ health problems.** Interventions that address the social determinants of health are needed through intersectoral actions that target the causes at societal level. The economic, political, social and environmental determinants of migrants’ health underline the importance of developing intersectoral policies.

**CONCLUSION**

There are visible signs of the growing attractiveness of Bulgaria as a final destination country for immigrants with its accession to the EU. The number of non-nationals coming to Bulgaria for permanent and long-term residence has been gradually increasing. European policies and legislation in the field of migration have been developing very dynamically with the expansion of the Union, and Bulgaria is making a serious effort to follow these developments. The issues related to immigrants’ health are increasingly acknowledged as a national public health problem of substantial significance. In this aspect, a great number of initiatives have been undertaken in Bulgaria to assure the protection of immigrants’ health, nevertheless, there are problems emerging in practice that represent a challenge for future policy responses.

A well-formulated and consistently implemented migration management policy is need that encompasses a coordinated, comprehensive, multi-sectoral policy approach for improving migrants’ health. As migration has linkages with various policy areas - social, economic, political, trade, labour, public health and security ones - a successful migration management policy should adopt a holistic approach, which takes into account all cross-cutting issues and areas. Advocating migrants’ health rights and equitable access to health protection and care; promoting migrant-sensitive health policies; initiating or reinforcing migrant-friendly public health services and health care delivery methods for migrants with special needs; sensitizing and training health professionals in addressing the health aspects associated with population movements; strengthening health promotion and disease prevention initiatives to reach out to migrants in the community; establishing minimum standards of health care for all vulnerable migrant groups; encouraging research and information dissemination and health and migration knowledge production; establishing and maintaining adequate institutional structure for meeting migrants’ needs; increasing multi-sectoral involvement and expanding interagency and international cooperation on migrants’ health are among the actions of recognized importance to better deal with immigrants’ health problems in Bulgaria.

**REFERENCES**

CONTENT OF HEAVY METALS, URANIUM, RADIUM AND RADON IN DRINKING WATER FROM UNDERGROUND WATER SOURCES IN PROXIMITY TO OLD MINES

Yanakieva T.¹, T. Turnovska², P. Nedeva³, R. Totzeva⁴, R. Karaivanova⁴, St. Mladenova¹

¹Regional Inspectorate of Protection and Control of Public Health - Haskovo, ²Medical University - Plovdiv, ³Regional Inspectorate of Protection and Control of Public Health - Plovdiv, ⁴National Center of Radiobiology and Radiation Protection - Sofia

Reviewed by: Assoc. Prof. D. Paskalev

ABSTRACT

In the Haskovo Province polymetal deposit fields have operated for many years. Some of them are the lead-zinc deposits near the villages of Sarnitza, Boyan Botevo, and Spahievo. Besides these, uranium deposits were mined in the past: The ‘Fountain’ Plot is part of the ‘Haskovo’ uranium-ore deposit and is situated 6 km to the west of the ‘Bolyarovo’ District. Taking into consideration that in the past, a number of mines operated on the territory of the city of Haskovo and the Mineral bath Municipality, and also the absence of research into possible contamination of subterranean waters from them, we set a goal to investigate whether there is a Pb, Cd, As, Cu, Zn, U-234, U-235, U-238, Ra-226 and Rn-222 contamination of drinking water from the central water sources located in close proximity to the old mines in the Haskovo and Mineral bath Municipalities. In the month of November 2007 we collected 6 water samples from the above-mentioned water sources to investigate presence of Pb, Cd, Zn, Cu and As and to determining of the radiological indicators and taking and test of drinking water from 9 pumping stations for establishing the level of Rn-222. Content of heavy metals in drinking water from the studied pumping stations are: Pb: of 0 to < 0.004 mg/dm³, Cd: of 0 to < 0.004 mg/dm³, Zn: of <0.013 to 0.402 ±0.005 mg/dm³, Cu: of 0 to <0.018 mg/dm³, As: of 0.00095 ±0.00002 mg/dm³ to 0.0130 ± 0.0002 mg/dm³. Content of uranium, radium-226 and total α-activity in drinking water from studied 6 pumping station are: U-238: of 0.0025 ±20% to <0.0250 mg/l, Ra-226: of 0.0481 ±25% Bq/l to 0.1315 ±25% Bq/l and Rn-222 in 9 central water source in the Haskovo town and Mineral bath Municipality are: of 3.5 ±0.6 Bq/l to 185.5 ±10.4 Bq/l. The total b-activity vary of 0.11 ±10%Bq/l to 1.12 ±10% Bq/l. Conclusion: 1. The content of heavy metals in the studied water sources is within the permissible hygiene standard levels. 2. The studied drinking water is not hazardous to the health of the consumers. The radiation analysis shows that the overall indicative dose is below 0.10 mSv/year, which corresponds to the ordinance documents. 3. The established levels of radon in the studied drinking water are probably due to contamination from the exploited uranium fields in the past.

Key words: heavy metals, radiological indexes, drinking waters, health risk, health impact assessment

In the Haskovo Province polymetal deposit fields have operated for many years. Some of them are the lead-zinc deposits near the villages of Sarnitza, Boyan Botevo, and Spahievo (fig.1). Besides these, uranium deposits were mined in the past: The ‘Fountain’ Plot is part of the ‘Haskovo’ uranium-ore deposit and is situated 6 km to the west of the ‘Bolyarovo’ District. The ‘Fountain’ exploitation plot borders the villages: Garvanovo, Vaglarovo, and Tatarevo, Mineral Bath Municipality (fig.2). It includes the plots: ‘Bolyarovo’ and ‘Kenana’. The experimental-test work for the extraction of uranium from the ‘Fountain’ plot began in 1977 - geotechnological plan-drilling method. Its production activities were terminated in 1990.

Of the ore-deposits described above, only the ‘Chala’ Mine continues to be in operation nowadays, the mine is situated to the southwest of the village of Mineral bath. Gold ore is extracted from the last-mentioned mine. In the Haskovo Municipality, up until 1992-1993, a uranium-extraction field was in operation between the village of Mineral bath and the ‘Bolyarovo’ district, city of Haskovo. It is located 2 km to the east of the fork in the road to the village of Tatarevo (fig.2). Up until 1998-1999 the ‘Saje’ mine operated near the villages of Sarnitza and Boyan Botevo (fig.1), Mineral bath
Municipality, Haskovo Province which was used to extract lead-zinc ores - raw material for the production of the Lead-Zinc Metallurgical Works in the city of Kardjali. Initially, uranium ore was extracted too.

Figure 1

Also, until 1990 uranium ore was extracted from the ‘Fountain’ exploitation plot, between the ‘Bolyarovo’ District and the village of Mineral bath. For that reason, a real danger exists of heavy-metal and uranium pollution of drinking water in the neighboring villages. Especially sensitive to environmental pollution with heavy metals, including Pb as well, are children and pregnant women. Lead damages the central and peripheral nervous system, haemopoiesis, the metabolism of vitamin D and calcium, and also the reproductive function (15,11).

Figure 2

Exposure of people to As is usually caused by the contamination of subterranean water. Use of such water for irrigation raises the possibility of an increase in the arsenic content in crops. (8). Since a great portion of the drinking water in the studied regions is used for irrigation purposes, the pollution may encompass the irrigated fruit and vegetables, and thus, interfere with the food chain. Cadmium also is highly cumulative, it builds up in the soil and bottom sediments along the course of the food chain (2). The content of copper and zinc in drinking water affects organoleptics and induces an astringent-metal taste in the mouth (2). The population consuming drinking water from water sources situated in proximity to the old mines is approximately 19 419, from the Haskovo and Mineral bath municipalities. Transfer of heavy metals from drinking water to the human organs and their impact on diseases of the liver and kidneys reflects the existing link between ecosystems and human health (11). For instance, heavy metals accumulation in fish is correlated with etiology of many diseases (11). Another group of pollutants of subterranean drinking water, from the operation of the described mines, are radioactive elements: uranium and radium and their decay product: radon. The content of uranium and Ra-226 in soils depends on the type of the soil, on its physicochemical composition, on the type of rocks which it is made of. Permeation of natural radionuclides from the soil into the water depends on the water spring location, on the route of the water to the point of its intake, as well as on the level of dissolution of uranium and radium, on the physico-mineral composition of the compounds in which they are bonded, on the duration of contact with the water and the soil horizon, on the temperature, pH, on the level of subterranean waters, and on numerous other factors. According to the published specialized literature, of the internal sources of natural radiation, the significance of radon, thoron, 40K è 87Rb is the greatest. They enter an organism mainly through breathing (Rn-222 and Rn-220), or through food and drinking water and cause internal radiation of the organism by building up in some organs. The mentioned Rn-222 and Rn-220 predominantly accumulate in the lungs. Radon is considered the most hazardous because of its quick decay to a-particles. It is the second major cause of lung cancer after smoking (16,18) and it accounts for 21 000 lung cancer deaths per year (18). Naturally-occurring radon gas comprises approximately 55% of the annual background radiation dose (19).

Taking into consideration that in the past, a number of mines operated on the territory of the city of Haskovo and the Mineral bath Municipality, and also the absence of research into possible contamination of subterranean waters from them, we set a goal to investigate whether there is a Pb, Cd, As, Cu, Zn, U-234, U-235, U-238, Ra-226 and Rn-222 contamination of drinking water from the central water sources located in close proximity to the old mines in the Haskovo and Mineral bath Municipalities.

MATERIALS AND METHODS

The pumping stations which could be affected by contamination are the following:

1. Bolyarovo (Haskovo 1 - supplies water to the ‘Bolyarovo’ District and the low part of the city of Haskovo, ‘Grancharski’ District, ‘Bryagovi’ (total population - 8 719), Mineral bath Municipality, and ‘Kamenitza’ Joint- Stock Company - for beer production; The pumping station includes 6 piped wells, it has a capacity of 10 l/s and a water volume of 860 m³.

Yanakieva T., T. Turnovska, P. Nedeva
2. village of Tatarevo - supplies water to the village of Tatarevo, population of 362, village of Bryastovo - population of 209, and the eastern part of the village of Mineral bath, for the whole municipality - total population of 6 561. The output of the water source is 2.3 l/s, and the water volume is 198 m³ per day.

3. ‘Shtarkelite’ - used for backup water supply to the village of Mineralni bani, with a total population of 6 561; situated between the villages of Tatarevo and Mineralni bani.

4. village of Samitza (0.8 l/s and water volume of 69 m³ (per day) - supplies water to the village of Samitza, population of 699;

5. village of Boyan Botevo supplies water to the villages of Boyan Botevo, Karamantzi, and Angel voivoda, with a total population of 2 295. Its capacity is 2 l/s, and the water volume is 172 m³ per day.

6. village of Sirakovo is used for water supply of the village of Sirakovo and for backup water supply to the village of Spahievo, with a total population of 574. In the month of November 2007 we collected 6 water samples from the above-mentioned water sources to investigate presence of Pb, Cd, Zn, Cu and As, complying with all the rules and regulations for sample collecting and transportation. The samples were tested at the accredited by the Executive Environmental Agency test laboratory - regional laboratory for the city of Haskovo. The tests were carried out in accordance with ISO standard 8288(3); BDS EN ISO 11969(1), employing the methods of atomic-absorption spectrophotometry.

The determination of the radiological indicators, included in Ordinance 9/16.03.2001 was carried out at Regional Inspection of Protection and Control-Plovdiv. The sample-collecting was performed in compliance with all regulations for sample taking and transportation of samples for a radiological test.

The sample taking and test of drinking water from 9 pumping stations for establishing the level of Rn-222 was carried on location by experts from the National Center of Radiobiology and Radiation Protection (NCRRP) - city of Sofia.

**RESULTS AND DISCUSSION**

The results about the content of heavy metals and arsenic in the tested water are presented in table 1.

As it can be seen, the content of Pb, Cd, Cu and Zn in all studied water sources is within the top permissible hygiene standard levels. This presupposes absence of health risk to the population consuming the respective drinking water. Arsenic at the pumping station - Tatarevo has a borderline level of the indicator, and at pumping station - Shtarkelite it is slightly above the permissible concentration of 0.010mg/dm³. The As level (carcinogen from Group 1) is hazardous to the health, at pumping station - Shtarkelite, and at pumping station - village of Tatarevo. Chronic exposure to numerous types of cancer, with a life exposure of 6x 10-4, for levels of 10 mg/l there is an established risk of developing skin cancer (2), diabetes, heart diseases, and diseases of the reproductive system, damage to the endocrine system (10).

In small, non-toxic doses As usually alters the gene expression of RAR-response element-luciferase construct and the endogenous TR-regulated type I of deiodinase (D101), gene in a similar manner in GH3 cells. ‘RAR’ and ‘TR’ mediators of gene regulation in these examined steroid receptors are critical for the normal development and growth function, and disruption of their regulation is related to the development of numerous diseases (10).

**Table 1. Content of heavy metals in drinking water from the studied pumping stations**

<table>
<thead>
<tr>
<th>Pumping Station</th>
<th>Pb (mg/dm³)</th>
<th>Cd (mg/dm³)</th>
<th>Zn (mg/dm³)</th>
<th>Cu (mg/dm³)</th>
<th>As (mg/dm³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haskovo-1</td>
<td>&lt;0.004</td>
<td>&lt;0.004</td>
<td>&lt;0.013</td>
<td>&lt;0.018</td>
<td>0.00190 ±0.0002</td>
</tr>
<tr>
<td>Tatarevo</td>
<td>&lt;0.004</td>
<td>&lt;0.004</td>
<td>0.120 ±0.007</td>
<td>&lt;0.018</td>
<td>0.0108 ±0.0002</td>
</tr>
<tr>
<td>Shtarkelite</td>
<td>&lt;0.004</td>
<td>&lt;0.004</td>
<td>0.016 ±0.001</td>
<td>&lt;0.018</td>
<td>0.0130 ±0.0002</td>
</tr>
<tr>
<td>Samitza</td>
<td>&lt;0.004</td>
<td>&lt;0.004</td>
<td>0.402 ±0.005</td>
<td>&lt;0.018</td>
<td>0.00107 ±0.00002</td>
</tr>
<tr>
<td>Boyan Botevo</td>
<td>&lt;0.004</td>
<td>&lt;0.004</td>
<td>0.026 ±0.002</td>
<td>&lt;0.018</td>
<td>0.00095 ±0.00002</td>
</tr>
<tr>
<td>Sirakovo</td>
<td>&lt;0.004</td>
<td>&lt;0.004</td>
<td>0.266 ±0.003</td>
<td>&lt;0.018</td>
<td>0.00649 ±0.00009</td>
</tr>
</tbody>
</table>

With lower As concentrations in drinking water, a harmful respiratory effect is observed (12). The established borderline value of As in this case cannot be accepted as hazardous, but further investigation of contamination in order to explain its dynamics is required. Although the Shtarkelite -
pumping station is used only for backup water supply to the village of Mineral bath, it should comply with health regulations. In the other pumping stations the As concentration is within the permissible limits, and it does not constitute a health risk to the consumers of this drinking water. The results from the tests on radioactive elements in drinking water are presented in table 2. The presented results show that all studied pollutants are within the permissible hygiene standard levels (Appendix 1 Table D - Radiological indicators) (5). The common indicative dose is below 0.10 mSv/year, which means that there is no health risk to the consumers of this drinking water.

Table 3. Content of uranium, radium-226 and total \(^{\beta}\)-activity in drinking water from the investigated pumping stations from previous years

<table>
<thead>
<tr>
<th>Pumping Station</th>
<th>Natural Uranium (U-234, U-235, U-238) (mg/l)</th>
<th>Ra-226 (Bq/l)</th>
<th>Total- (^{\beta})-activity (Bq/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haskovo-1</td>
<td>&lt;0.0025</td>
<td>0.0555</td>
<td>0.40</td>
</tr>
<tr>
<td>Tatarevo</td>
<td>0.00025</td>
<td>0.0444</td>
<td>0.25</td>
</tr>
<tr>
<td>Shtarkelite</td>
<td>0.001</td>
<td>0.0296 ±25%</td>
<td>0.14 ±10%</td>
</tr>
<tr>
<td>Samitza</td>
<td>0.001</td>
<td>0.0296</td>
<td>0.12</td>
</tr>
<tr>
<td>Boyan Botevo</td>
<td>&lt;0.001</td>
<td>0.0259</td>
<td>0.07</td>
</tr>
<tr>
<td>Sirakovo</td>
<td>0.0001</td>
<td>0.0370</td>
<td>0.34</td>
</tr>
</tbody>
</table>

If the obtained results for U-234, U-235, U-238, Ra-226 and total \(^{\beta}\)-activity are compared with the study of drinking water for these indicators from previous years, it can be established that there is a slight increase in the values of natural uranium and radium-226 in 2007, while the general \(^{\beta}\)-activity maintains stable values for the last years of the study. A more considerable increase in the level of Ra-226 in 2007, in comparison with previous studies, was found in the Tatarevo pumping station and Shtarkelite pumping station, but - within the permissible hygiene standard levels. In the past, extraction of uranium from rocks was performed by using sulfates which afterwards drain away into the subterranean horizons and into subterranean waters, and from there - into wells used for drinking and household needs. This fact can significantly increase the content of sulfates in drinking water. That is why we traced their values for the studied 6 pumping stations (table 4).

No regularity in the values of sulfates in the studied water sources was found through the course of investigation. They maintain comparatively stable values, with small increases in some of the examined years which is probably due to negligible drainage of fertilizers into subterranean waters when using fertilizers on agricultural crops. Despite this fact, sulfates in all studied pumping stations are within the permissible hygiene standard levels, while their values are more significant in the drinking water from “Shtarkelite” and “Tatarevo” but they correspond to the regulations of the operative ordinance on the quality of drinking water (5). The pH levels in the studied 9 water sources vary between 6.9 - 7.8, i.e. in the neutral zone, or corresponding to the permissible ones. The obtained results are within the permissible values, according to a Decision of the European Commission, article 35/Rapport La Hague F-05/6, which gives the boundary values for all radionuclides to be 200 Bq/l (13). We compared the data with the approved recommended values of radon in public water sources in the Republic of Slovakia which vary between 50 to 500 Bq/l. The annual boundary dose for drinking water is 1 mSv/year (14). For Ireland the referential level of radon in drinking water is 500 Bq/l. In conformity with a recommendation by the EC on radon in drinking water 2001/928 (17), for levels below 100 Bq/l no measures need to be taken, and for concentrations over 1000 Bq/l - taking particular measures is justified, in point

Table 4. Content of sulfates in the studied 6 pumping stations over the course of the last 3 years

<table>
<thead>
<tr>
<th>Pumping Station</th>
<th>2005 year</th>
<th>2006 year</th>
<th>2007 year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haskovo-1</td>
<td>No data</td>
<td>No data</td>
<td>No data</td>
</tr>
<tr>
<td>Tatarevo</td>
<td>119.3 mg/l</td>
<td>140 mg/l</td>
<td>127.55 mg/l</td>
</tr>
<tr>
<td>&quot;Shtarkelite&quot;</td>
<td>234.0 mg/l</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Samitza</td>
<td>9.24 mg/l</td>
<td>8.0 mg/l</td>
<td>7.1 mg/l</td>
</tr>
<tr>
<td>Boyan Botevo</td>
<td>38.94 mg/l</td>
<td>34.0 mg/l</td>
<td>28.79 mg/l</td>
</tr>
<tr>
<td>Sirakovo</td>
<td>44.55 mg/l</td>
<td>41.0 mg/l</td>
<td>72.6 mg/l</td>
</tr>
</tbody>
</table>

Table 5. Content of radon in drinking water from subterranean water sources in the municipalities of Haskovo and Mineral bath

<table>
<thead>
<tr>
<th>Pumping Station/or Central Drinking Water source</th>
<th>Contents of Rn-222 (Bq/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haskovo-1</td>
<td>185.5 ±10.4</td>
</tr>
<tr>
<td>Tatarevo</td>
<td>138.3 ±8.0</td>
</tr>
<tr>
<td>Shtarkelite</td>
<td>3.5 ±0.6</td>
</tr>
<tr>
<td>Samitza</td>
<td>47.4 ±3.1</td>
</tr>
<tr>
<td>Boyan Botevo</td>
<td>16.9 ± 1.9</td>
</tr>
<tr>
<td>Sirakovo</td>
<td>35.4 ±2.9</td>
</tr>
<tr>
<td>Mineral bath village, Central Water Sourse</td>
<td>6.0 ±1.0</td>
</tr>
<tr>
<td>Susam village, Mineral bath Municipality, Central Water Sourse Str.&quot;Saedinenie&quot; N32</td>
<td>34.2 ±2.5</td>
</tr>
<tr>
<td>Fountain in the City Park of Haskovo</td>
<td>144.3 ±8.5</td>
</tr>
</tbody>
</table>
of view of radiation protection since such water is not fit for use, while concentrations over 100 Bq/l are needed for the development of public water plants (20). Nevertheless, the European Commission recommends discussing activities and particular programs for human health protection at radon levels over 100 Bq/l. For concentrations of radon in water at the level of 1000 Bq/l the annual effective dose varies between 0.2 mSv and 1.8 mSv, depending on the annual water consumption (17).

According to the operative standard orders in Bulgaria, Ordinance 1/15.11.1999, the general β-activity in the surface and subterranean waters should not exceed 500 Bq/m³ (4).

We determined that in the drinking water from 3 central water sources: Bolyarovo district-pumping station - Haskovo 1 and Tatarevo pumping station and a fountain faucet in the City Park of Haskovo, the concentrations of radon are higher than 100 Bq/l. This, we believe, can be explained with contamination from the existing uranium-extracting field, part of the exploitation plot ‘Fountain’, located near the villages of Garvanovo, Vlagarovo, and Tatarevo (fig.1). A similar finding was determined in the town of Aldama, Chihuahua - Mexico. The high activity of U-238 in soils was due to the processing or uranium 20 years before that, in these regions (9).

Radon in drinking water is not a significant factor for the radiation of humans, with small exceptions. People take in a large amount of the needed water through food and hot drinks, and cooking and heating of water eliminate radon.

So that, the more substantial intake of radon in the organism comes from drinking water. Furthermore, the main part of the received radon in this manner, is quickly taken away by the lungs, while the highest radiation received is that of the stomach. The annual boundary of the average radiation on a world level, due to drinking water, containing radon is estimated at 0.002 mSv/y (7). In general, the radiation of humans, when drinking water containing radon, is smaller than the radiation from the inhalation of radon which is released from water when it flows down the tap (7).

In order to draw conclusions on the overall radioactivity in the studied region we should take into consideration the level of radioactivity of soils as well. We cannot bypass the fact that as a result of the Chernobyl Atomic Power Station failure in 1986 the pollution of the soils in Southern Bulgaria with technogenic radionuclides is higher than the pollution in Northern Bulgaria. From a performed study in Bulgaria it was established that for Southern Bulgaria the content of Cs137, including that for Haskovo, Harmanli, Slavyanovo, Ivanovo, Yabalkovo, Varbitsa, is below 60 Bq/kg (6). In comparison with the year 1986 the content of Cs137 and Sr 90 has considerably decreased.

CONCLUSION

1. The content of heavy metals in the studied water sources is within the permissible hygiene standard levels.

2. The studied drinking water is not hazardous to the health of the consumers. The radiation analysis shows that the overall indicative dose is below 0.10 mSv/year, which corresponds to the ordinance documents.

3. The established levels of radon in the studied drinking water are probably due to contamination from the exploited uranium fields in the past.

REFERENCES

1. БДС EN ISO 11969
2. Гопина Г. “Токсични химични вещества в питейни води”, 2005 г.; презентация на Националния Център по опазване на общественото здраве (НЦОЗЗ), гр. София, Лаборатория “Хигиена на водите”.
3. ISO standard 8288
4. Наредба № 1/15.11.1999 г. За норми за целите на радиационната защита и безопасност при ликивидиране на последствията от урановата промишленост в Република България, Приложение № 5 към чл. 12
5. Наредба № 9 за качеството на водата, предназначена за питейно-битови цели /ДВ бр. 30/ 16.03.2001
6. Недева П. Доклад “20 години след аварията в Чернобил”; отдел “Радиационен контрол”, Дирекция "Здравен контрол", РИОКОЗ-Пловдив
7. Недева П. Доклад "Проблемът радон"; отдел "Радиационен контрол", Дирекция "Здравен контрол", РИОКОЗ-Пловдив
11. Moiseenko TI., Voinov AA., Megorsky VV., Gashkina NA., Kudriavtseva LP., Vandish OL., Sharov AN., Sharova Y., Koroleva: Eco-system and human health assessment to define envi...


CHARACTERISTICS OF RESPIRATORY FUNCTIONS AND PHYSICAL CAPACITY IN CHILDREN LIVING UNDER CONDITIONS OF LOW-DEGREE AIR POLLUTION

Turnovska T.1, Bl. Marinov2, St. Mandadjieva2

1Department of Hygiene and Ecomedicine, 2Department of Pathological Physiology, Medical University of Plovdiv

Reviewed by: Assoc. Prof. M. Peneva

ABSTRACT

Introduction: Air pollution has considerably decreased in many of the urbanized territories in Europe in the last 10 to 15 years, as compared to its levels in the middle of the previous century. This is the reason why nowadays the indicators morbidity and mortality, widely used at the time to assess health, are not effective enough. Under the contemporary conditions of lower concentrations of air pollutants, much more precise methods are required to characterize the consequences of air pollution for the health. The aim of the present study was to analyze respiratory functions and physical capacity in children living under conditions of low degree air pollution. Methods: In 2004 we carried out a complete functional study of respiration and a cardiopulmonary exercise testing among 93 children (50 boys/43 girls) aged 13.36 ±0.53 (X ±SD) years. According to data of the Regional Inspectorate of Environment and Water Resources, the latter live at air pollutant levels which are under or a little above the maximum admissible concentrations. Results: The mean annual concentrations of controlled pollutants were: (X ±SE): TSPM (mg/m³) - 0.13 ±0.035, SO2 (mg/m³) - 29.70 ±7.757, NO2 (mg/m³) - 10.76 ±0.791, H2S (mg/m³) - 0.05 ±0.020, Pb (mg/m³) - 0.06 ±0.009, NH3 (mg/m³) - 0.02 ±0.010. Results: No deviations were observed in the mean values of the functional indices analyzed, which were over 40 in number, with regard to the referent levels for the respective age and sex (X ±SD): VC - 3.50 ±0.62 L, FVC - 3.43 ±0.63 L, FEV1 - 3.14 ±0.56 L, Tiffneau - 89.79 ±5.18%, etc. The individual assessment showed lower values for some indices (predominantly in the boys) - TLCpred under 90% (81.6±89.8%), MEF50pred under 70% (58.1±65.6%), MHF5pred under 60% (34.7±53.4), TLCOpred under 80% (62.6±79.9), etc. Conclusions: No pathologic changes were observed in the external breathing and physical capacity of the majority of the children studied, although in the more susceptible ones low degree air pollution caused reduction in some indices. The study of external breathing and physical capacity are adequate methods for health assessment of the influence of low degree pollution.

Key words: air pollution, pulmonary functions, physical capacity, treadmill exercise test

The transition to market economy in Bulgaria was characterized by a significant drop in industrial production, particularly of the big state enterprises, a considerable portion of which were major sources of air pollutants in the course of decades. This led to an improvement in the ecological situation after 1989 (1). The levels of concentrations of the main controlled pollutants in the most polluted regions in the country were significantly reduced (2,3,9,11). A similar situation, although not so markedly expressed, was described in other countries in Central and Eastern Europe as well (6,10). At the same time, reports were published, according to which a number of air pollutants (dust, sulfur dioxide, nitrogen oxides, ozone, ammonia, etc.) with concentrations approximately at or below the top-admissible levels, such as the ones recorded in Bulgaria after 1989, have a harmful effect on the health (11,5). Careful examination of the problem of the effects on the health of low-level atmospheric pollution is extremely important because it is directly related to the substantiation of the boundary levels of air pollutants in the urban environment. One of the most precise indicators for the evaluation of health effects from the impact of air pollution is the level of respiratory functions (12); the best approach to determine the pre-pathological changes in the cardiopulmonary system such as the ones that can be expected in the presence of concentrations below or near the admissible boundary, is the analysis of its functions in the case of the physical loading of the organism (4); one of the most sensitive periods in human development with regard to environmental factors is early puberty (13,14). For that reason, we set as a goal to analyze the respiratory functions and physical capacity in adolescents born and having lived under conditions of low-degree air pollution.
One of the most industrialized and highly polluted regions in Bulgaria was the town of Dimitrovgrad. After 1989 the production of phosphorus fertilizers, phosphorus and sulfuric acids, sodium silicofluoride, dimethyl sulfate, phenylamine, heating energy, asbestos-cement products, etc. was fully discontinued and the volume of output of the other productions in Dimitrovgrad was greatly reduced. This led to an abrupt decrease in the air-pollutant levels.

MATERIALS AND METHODS

The primary information about air pollution was collected from the three permanent stations with manual sample-taking of the Regional Inspection of Environment and Waters and the Sanitation and Epidemiology Inspection in the city. The results were calculated as mean year levels for the town in total.

In 2004 we carried out a functional study with assessment of spirometric and cardiopulmonary exercise parameters in 93 clinically healthy children (50 boys/43 girls) aged 13.36 ±0.53 (X ±SD) years from the town of Dimitrovgrad living under or a little above the maximum admissible concentrations. The study was conducted in testing laboratory of Medical University of Plovdiv. Complete anthropometric measurements were performed before the actual test procedures. Pulmonary function testing was carried out with a diagnostic system Masterscreen Diffusion™ (E. Jaeger, Wuerzburg, Germany) in a seated position with a nose clip in the following order: 1. Slow spirometry; 2. Measurement of diffusion capacity; 3. Forced expiration; 4. Maximal inspiratory and expiratory pressures. Predicted values were calculated automatically according to the reference equations of European Respiratory Society (ERS). Diffusing capacity (transfer factor - TL,co) was calculated as mean of two Single-Breath measurements. TL,co values are given unadjusted for hemoglobin.

To elaborate on the possible differences in the reserves of the cardio-pulmonary system, the children performed an incremental treadmill test. It was carried out on a motor driven, electronically controlled treadmill (TrackMaster™, JAS Fitness Systems, Pensacola, FL, USA).

Throughout the test gas exchange variables were determined with an on-line computerized system CardiO2™. Subjects breathed through a mouthpiece and a pneumotachometer was used for recording of tidal volume (Vt; mL.min⁻¹, BTPS) and minute ventilation (VE; L.min⁻¹, BTPS). Data were averaged every 30 sec. and used to calculate oxygen uptake (VO₂; mL.min⁻¹, STPD), carbon dioxide output (VCO₂; mL.min⁻¹, STPD) and respiratory exchange ratio (RER). Heart rate was monitored electrocardiographically (Hellige, Germany) and the oxygen saturation was traced with pulse oxymeter Pulseox DP-8 (Minolta, Japan). All analyses were performed using the Statistical Package in SPSS 16.0.1. for Windows.

RESULTS AND DISCUSSIONS

The mean year levels of pollutants by comparison with the corresponding limits are presented in a fig. 1.

The results have shown that the mean year concentrations of all pollutants are below the Bulgarian limits. This means that we should not expect a harmful effect on the health of the exposed population, in this particular case- of the studied students. In table 2 the results from the study of external breathing are presented as a percentage of the expected value.

Table 1.

<table>
<thead>
<tr>
<th>Respiratory Indices</th>
<th>Indices</th>
<th>Boys (X ±SD)</th>
<th>Girls (X ±SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y)</td>
<td>13.3 ±0.5</td>
<td>13.3 ±0.6</td>
<td></td>
</tr>
<tr>
<td>Height (cm)</td>
<td>163.1 ±8.6</td>
<td>158.1 ±7.0</td>
<td></td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>54.1 ±15.1</td>
<td>49.3 ±7.5</td>
<td></td>
</tr>
<tr>
<td>VC%pred</td>
<td>97.6 ±11.0</td>
<td>104.4 ±12.9</td>
<td></td>
</tr>
<tr>
<td>IC%pred</td>
<td>92.5 ±13.6</td>
<td>98.5 ±19.6</td>
<td></td>
</tr>
<tr>
<td>FVC%pred</td>
<td>96.5 ±11.2</td>
<td>103.6 ±14.1</td>
<td></td>
</tr>
<tr>
<td>FEV1%pred</td>
<td>104.4 ±12.2</td>
<td>113.8 ±13.9</td>
<td></td>
</tr>
<tr>
<td>Tiffneau (%)</td>
<td>88.4 ±5.6</td>
<td>91.3 ±4.2</td>
<td></td>
</tr>
<tr>
<td>MEF50%pred</td>
<td>100.9 ±20.7</td>
<td>108.4 ±19.9</td>
<td></td>
</tr>
<tr>
<td>MEF%25pred</td>
<td>96.3 ±30.1</td>
<td>107.4 ±27.9</td>
<td></td>
</tr>
<tr>
<td>TLCO%pred</td>
<td>92.3 ±12.5</td>
<td>85.8 ±12.4</td>
<td></td>
</tr>
<tr>
<td>TLC%pred</td>
<td>98.8 ±9.0</td>
<td>103.2 ±9.5</td>
<td></td>
</tr>
<tr>
<td>FRC%pred</td>
<td>116.0 ±27.1</td>
<td>110.3 ±26.7</td>
<td></td>
</tr>
<tr>
<td>VCin%pred</td>
<td>95.0 ±10.7</td>
<td>102.3 ±13.3</td>
<td></td>
</tr>
</tbody>
</table>

The presented data reveal that the average levels of all indicators correspond to the referential values, both for boys...
and girls. Furthermore, the levels of the main pulmonary indicators - vital capacity (VC%pred) and forced expiratory volume in one second (FEV1%pred) are close and over 100 percent - the median of the reference values. Special attention has to be paid to the maximal expiratory flow for 50% of the forced vital capacity (MEF50%pred) because it has shown high sensitivity to airflow obstruction, but it is over 100% in this case. Another very important index is diffusion capacity (TLCO%pred), which is used as a means of choice when studying the respiratory functions in harmful productions and highly polluted regions (8). As it can be seen, this indicator also is over 80% for both sexes. These results, in our opinion, mean that the submitted average annual concentrations of the studied pollutants have not led to negative changes in the external breathing of the studied contingent.

From the individual analysis of the results, however, some deviations from the referential values were found (table 2).

**Table 2.**

<table>
<thead>
<tr>
<th>Indices</th>
<th>Boys (% of all)</th>
<th>Girls (% of all)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEF50%pred (under 70%)</td>
<td>6.12</td>
<td>2.33</td>
</tr>
<tr>
<td>MHF25%pred (under 60%)</td>
<td>6.12</td>
<td>2.33</td>
</tr>
<tr>
<td>TLCO%pred (under 80%)</td>
<td>8.16</td>
<td>27.91</td>
</tr>
<tr>
<td>TLC%pred (under 90%)</td>
<td>20.41</td>
<td>11.62</td>
</tr>
</tbody>
</table>

The results have shown differences between indices of boys and girls owing to their different anthropometric characteristics, but data about pre-pathological status are missing.

**CONCLUSION**

No pathologic changes were observed in the external breathing and physical capacity of the majority of the children studied, although in the more susceptible ones low degree air pollution caused reduction in some indices. The study of external breathing and physical capacity are adequate methods for health assessment of the influence of low degree pollution.

**REFERENCES**

2. Търновска Т., Н. Дянкова, Д. Кацарова, Н. Русева. Характеристика на атмосферното замърсяване при спад на промишленото производство във високо индустрализиран район. Халцина и здравеопазване, XXXVIII, 1995, 24-27.


ANALYSIS OF SOME HEALTH INDICATORS WITH FORMER MINERS

Yanakieva T.1, T. Turnovska2, M. Panova3, D. Terzieva3

1Regional Inspectorate of Protection and Control of Public Health - Haskovo, 2Medical University - Plovdiv, 3St. George University Multifunctional Hospital for Active Healthcare - Plovdiv

Reviewed by: Assoc. Prof. B. Kavaldjieva

ABSTRACT

Up to 1998-1999 the Saje Mine operated in the village of Sarnitzha (extraction of lead-zinc ores) and the wastewaters from it were draining away in the Trakietz Dam Lake. This reservoir was used, as recently as three years ago, for drinking-water supply to the city of Haskovo. The population which has consumed water for drinking and household needs from the nearby Trakietz Dam Lake is nearly 26 000 people. Because of the significant effect of heavy metals and ionizing radiation on human health we set as our goal to study the concentration of some of them in biological material collected from former miners and people living in close proximity to old mines. An active survey was done of all studied people. The average concentrations in blood of miners: Pb - 66.50 mg/l, Cd - 1.12mg/l, Cu in blood serum - 15.68, Zn-in blood serum - 18.58mg/l, As - in urine test-13.84 mg/l. The average concentrations in people: Pb -149.13 mg/l, Cd -3.37mg/l, Cu serum-15.69 mg/l, Zn -16.22 mg/l, As - 18.72 mg/l. Conclusion: 1. Increased levels of Pb are found in 4.34% and boundary values in 21.7% of the former miners which may be the reason for the larger percentage of miners with high blood pressure, as well as the big share of diseases of the nervous system (8.69%). 2. Higher values of Cd were found in 43.48% of the miners, which correlates with the increased percentage of kidney diseases in the exposed group, and could be due to professional exposure in the past. 3. There is no evidence of Cd contamination of drinking water. 4. The content of Cu and Zn in the serum of all tested individuals is within the referential boundaries. 5. The concentration of As in the urine samples of all tested individuals is within the referential values.

Key words: exposure, heavy metals, health risk, health assessment

Inhalation of toxic substances may considerably increase the health risk of the emergence of various diseases or disorders in the reproductive function (15). Lead impairs haematopoiesis, damages the central and peripheral nervous systems, has neurotoxic effect, passes the placental barrier, and may harm the foetus before the 12th gestational week. Cadmium and lead are classified as potential carcinogens for a human being in Gr. 2 B (1); cadmium is confirmed to have a teratogenic, carcinogenic, and a potential mutagenic effect (20). Millions of people are exposed to increased concentrations of As, mainly in drinking water, but also in the industrial emissions as a result of the inhalation of arsenic aerosols (13). Inorganic As is a potential human carcinogen, Group 1(3) and a primary toxicant (13). Early exposure to these pollutants in the environment results in subsequent neurotoxicity in children (10). Arsenic is metabolized into methylarsenic acid and dimethylarsenic acid which are excreted in the urine (13). A number of experimental studies of animals confirm the subsequent effect from intrauterine exposure to arsenic, namely - various forms of cancer. Besides these, endocrine effects, immune suppression, neurotoxicity, etc. are also possible (13).

There are considerable negative effects on the health from exposure to ionizing rays as well. In the specialized literature there are numerous reports about an increased carcinogenic, mutagenic risk, about damage to the nervous, cardiovascular system, immune, digestive, etc. systems. Small-dose irradiation for a prolonged period of time induces the emergence of cancerogenesis, leukemia, cataract, premature ageing (2,5,16,17).

A number of deposit fields for the extraction of uranium and polymetal ores have operated in the city of Haskovo and in the Mineral Bath Municipality. Up to 1998-1999 the Saje Mine operated in the village of Sarnitzha (extraction of lead-zinc ores) and the wastewaters from it were draining away in the Trakietz Dam Lake. This reservoir was used, as recently as three years ago, for drinking-water supply to the city of Haskovo. The population which has consumed water for drinking and household needs from the nearby Trakietz Dam Lake is nearly 26000 people. Metals dredged in lakes retain their bioactivity 25 years after precipitation. These sediments are contaminated with Cd, Zn and other elements (12). Pb content is increased in ultrabasic and basic to acid magmatic rocks (4). Because of the significant effect of heavy metals and ionizing radiation on human health risk, heavy metals, health assessment...
health we set as our goal to study the concentration of some of them in biological material collected from former miners and people living in close proximity to old mines.

**SETTING AND METHODS**

Exposition tests were run on 23 people who had worked in the mining and extracting industry and on 10 people from the population living in close proximity to the mines. The samples were tested in the Central Clinical Laboratory of the St. George University Multifunctional Hospital for Active Healthcare in the city of Plovdiv. The heavy metals were examined using atomic absorption spectrophotometry with a Zeeman 5 100 PC, Perkin-Elmer, USA atomic absorption spectrophotometer.

A segment study was carried out with the aim to clarify the current exposition of the population at the particular moment, 10 years after the closing-down of the mines. An active survey was done of all studied people. A total number of 33 people were surveyed, of these - 23 people (69.7%) who had worked in the mining and extracting industry and 10 people (30.3%) who had been living for 31 years on average in the studied towns and villages situated in proximity to the mines.

**FINDINGS AND CONSIDERATIONS**

The conducted toxicological tests on the 10 people living in the vicinity of the mines gave the following results (table 1):

Table 1. Content of the Pb, Cd, Cu, Zn in blood and As in urine of the unexposed population

<table>
<thead>
<tr>
<th>Examination indices</th>
<th>Admissible value</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pb µg/l</td>
<td>0-254 µg/l</td>
<td>10</td>
<td>7.6</td>
<td>23</td>
<td>9.102</td>
</tr>
<tr>
<td>Cd µg/l</td>
<td>Non-smokers: 0-1.2 µg/l, Smokers: 7.6 µg/l</td>
<td>10</td>
<td>3.3696</td>
<td>1.12027</td>
<td></td>
</tr>
<tr>
<td>Cu µmol/l</td>
<td>12.3-22.4 µg/l</td>
<td>23</td>
<td>15.6913</td>
<td>0.59097</td>
<td></td>
</tr>
<tr>
<td>Zn µmol/l</td>
<td>12.3-22.4 µg/l</td>
<td>23</td>
<td>16.2243</td>
<td>0.56900</td>
<td></td>
</tr>
<tr>
<td>As in urine/24 hours diuresis µg/l</td>
<td>to 100 µg/l</td>
<td>10</td>
<td>13.84</td>
<td>2.791</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. Content of the Pb, Cd, Cu, Zn in blood and As in urine of the exposed population

<table>
<thead>
<tr>
<th>Examination indices</th>
<th>Admissible value</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pb µg/l</td>
<td>0-254 µg/l</td>
<td>10</td>
<td>149.1304</td>
<td>72.63064</td>
<td>15.14453</td>
</tr>
<tr>
<td>Cd µg/l</td>
<td>Non-smokers: 0-1.2 µg/l, Smokers: 7.6 µg/l</td>
<td>23</td>
<td>3.3696</td>
<td>5.37261</td>
<td>1.12027</td>
</tr>
<tr>
<td>Cu µmol/l</td>
<td>12.3-22.4 µg/l</td>
<td>23</td>
<td>15.6913</td>
<td>2.83419</td>
<td>0.59097</td>
</tr>
<tr>
<td>Zn µmol/l</td>
<td>12.3-22.4 µg/l</td>
<td>23</td>
<td>16.2243</td>
<td>2.72883</td>
<td>0.56900</td>
</tr>
</tbody>
</table>

Pb has a level above the admissible values in 4.34% of the miners, and in 21.7% has values close to the referential ones. In population, exposed for a long time to low concentrations of lead aerosols there are reports of disorders, first and foremost, in the hemoglobin synthesis, the erythropoiesis, the nervous system, the reproductive system, the immune system, the cardio-vascular system, including higher arterial tension. The latter can account for the increased percentage of cardio-vascular diseases in the exposed individuals. The increased levels of Pb in the blood predispose to the emergence of cardio-vascular diseases, blood diseases and disorders, diseases of the nervous system, the reproductive system, etc. (6,8,20). The latest studies with rats demonstrate that exposure to Pb during the time of development of the brain pre-determines the expression and regulation of the amyloid precursor protein APP and is an amyloidogenic α-amyloid product in senior age (9). Exposure to Pb during the time of development changes lead levels and the intracellular distribution of amyloid plates in the frontal lobe of the cerebral cortex. Lead is a cumulative poison with an extended period of release; ranging from a few days to 25 years (11,6,12,14). Adolescents and children are extremely sensitive to low concentrations of Pb which may cause behavior problems, learning problems, and decline in intellect (11,14).

The published data show that the values of the toxic indicators in the people living in the villages situated in the vicinity of old mines are within the referential limits. A slight excess, compared to the admissible levels, is found in 50% of the studied subjects only for the Cd indicator in blood. The conducted toxicological tests on the people who had worked in the mining and extracting industry - 23 people, gave the following results (Table 2):
Amongst cardio-vascular diseases, arterial hypertension is the most frequent; 13.04% of the exposed individuals report about having suffered a heart attack or a stroke. There is also an increase in the percentage of professional diseases, diseases of the kidneys and the nervous system, which correlates with the chronic exposure to Pb and Cd of the exposed individuals, determined through the expositional tests (3,6).

**Table 3. Results from the survey**

<table>
<thead>
<tr>
<th>Group of diseases (ICD-10)</th>
<th>Frequency occur with exposure group (%)</th>
<th>Frequency occur with non-exposure group (%)</th>
<th>Diseases in the past (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IX.(J00-J99). Diseases of the circulatory system</td>
<td>26.09</td>
<td>50</td>
<td>21.12</td>
</tr>
<tr>
<td>XIII.(M00-M99) Diseases of the musculoskeletal system and connective tissue</td>
<td>13.04</td>
<td>10</td>
<td>8.69</td>
</tr>
<tr>
<td>X.(J00-J99) Diseases of the respiratory system</td>
<td>13.04</td>
<td>10</td>
<td>6.06</td>
</tr>
<tr>
<td>XX.(X40-X49) Accidental poisoning by and exposure to noxious substances</td>
<td>13.04</td>
<td>0</td>
<td>9.09</td>
</tr>
<tr>
<td>XIV.(N00-N99) Diseases of the genitourinary system</td>
<td>4.35</td>
<td>10</td>
<td>3.03</td>
</tr>
<tr>
<td>V.(GO0-G99) Diseases of the nervous system</td>
<td>8.7</td>
<td>0</td>
<td>6.06</td>
</tr>
<tr>
<td>IV. (E10-E14): Diabetes mellitus</td>
<td>8.7</td>
<td>0</td>
<td>3.03</td>
</tr>
<tr>
<td>XII.(L00-L99) Diseases of the skin and subcutaneous tissue</td>
<td>8.7</td>
<td>0</td>
<td>3.03</td>
</tr>
<tr>
<td>VII.(H00-H59) Diseases of the eye and adnexa</td>
<td>0</td>
<td>10</td>
<td>3.03</td>
</tr>
<tr>
<td>XI. (K20-K31) Diseases of oesophagus, stomach and duodenum</td>
<td>4.35</td>
<td>10</td>
<td>3.03</td>
</tr>
</tbody>
</table>

The carcinogenic and mutagenic effect of radiation on a human organism has been confirmed (5). Specialized literature points out the possibility of an increased frequency of chrono-

higher in 43.48% of the studied miners, 8.7% of whom are smokers, and 34.8% - non-smokers. This explains the high percentage of diseases of the respiratory system, in the exposed group. The latter increases the risk in non-smokers of developing chronic lung diseases, as well as oncological diseases, which are more common with smokers. There is a heightened risk of damage to the kidneys, liver, and bones of the studied individuals (6, 20). The risk to the exposed people for this indicator is 1.25% higher, compared to the same one for the unexposed group. This risk is doubled in the studied smokers, who comprise 33.3% of the exposed individuals. Smoking presents a great risk in terms of a rational impact, since, with smoke, radioactive elements enter the organism, and those are mostly radium and polonium (18,19). With chronic exposure Cd is accumulated in the kidney proximal tubules (1). The latter may explain the increased percentage of kidney diseases in the exposed group. Because of the higher concentration of Cd in the blood samples of both the exposed, and unexposed group, while most of the studied individuals are non-smokers, we assume its higher content in the surrounding environment, namely, in minerals, from which the particular ore for the area is extracted (4).

Since we do not find an increased content of Cd in drinking water, we suppose that the main way of Cd entering the organism is the respiratory tract, through inhalation of cadmium dust and cadmium oxide (3), although there are no massive industrial sources of pollution in the area.

The Cu values in the blood serum, in the exposed group, vary from 11.3 to 20.5 µg/l. In 8.7%, the levels of Cu and Zn are below the referential ones. The values of Zn in the blood serum, in the exposed group vary from 12.08 to 21.86 µg/l. The Cu and Zn levels in the rest of the studied individuals are within the referential limits.

The concentrations of As in the urine samples of the studied exposed and unexposed group are within the referential values. The arsenic in the urine samples of the exposed individuals varies from 2.24 µg/l to 58.9 µg/l, which is within the boundaries of the referential values - up to 100 mg/l for 24 hours. Arsenic is highly cumulative, it builds up in the skin and skin appendages, in the bones and muscles, it causes dermal lesions, peripheral neuropathy, peripheral vessel disease, but such changes were not found in the participants in the study (1).

The results from the survey show that 51.5% of the studied individuals have secondary education, 21.2% - elementary, 18.2% - basic school education, and 9.1% - higher education. The length of the work day - 8 hours on average, with 2 days off. Vacation - 20 work days a year, on average. Smokers comprise 33.3% of all studied individuals; the remaining 66.7% are non-smokers. 54.5% of the participants in the study consume alcohol, 39.4% do not consume alcohol. The smokers have been smoking for approximately 20 years, 6 cigarettes per day on average. The alcohol consumers have been drinking 1-2 times, a single dose of roughly 60g.

It is evident that the highest percentage is of cardio-vascular diseases, articular, respiratory, and professional diseases. Amongst cardio-vascular diseases, arterial hypertension is...
mosome mutations in the peripheral lymphocytes, proportionate to the received dose, as well as of a greater frequency of cases of leukemia and malignant tumors in the irradiated individuals, in comparison with the average ones for the respective countries (16). In order to establish whether professional exposure had any repercussions on the miners’ offspring, we analyzed the data on congenital and hereditary diseases amongst the children of the studied people.

The survey results showed that the miners’ children did not yield data pointing to carcinogenesis and mutagenesis. Three of the studied individuals’ children have high blood pressure, and one has chronic bronchitis (17.4%). None of the rest report on having chronic diseases. The submitted survey data do not indicate any hereditary predispositions, but rather - a hazardous lifestyle and existing factors of the environment which predispose to diseases.

**Table 4. Comparison of the survey data on smokers and non-smokers**

<table>
<thead>
<tr>
<th>Group</th>
<th>Do you smoke cigarette?</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Exposure people/number</td>
<td>13</td>
<td>10</td>
</tr>
<tr>
<td>% of group</td>
<td>56.5%</td>
<td>43.5%</td>
</tr>
<tr>
<td>% of smokers</td>
<td>59.1%</td>
<td>90.9%</td>
</tr>
<tr>
<td>% of total count examine people</td>
<td>39.4%</td>
<td>30.3%</td>
</tr>
<tr>
<td>Nonexposure people/number</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>% of group</td>
<td>90.0%</td>
<td>10.0%</td>
</tr>
<tr>
<td>% of smokers</td>
<td>40.9%</td>
<td>9.1%</td>
</tr>
<tr>
<td>% of total count examine people</td>
<td>27.3%</td>
<td>3.0%</td>
</tr>
<tr>
<td><strong>TOTAL:</strong></td>
<td>22</td>
<td>11</td>
</tr>
<tr>
<td>% of group</td>
<td>66.7%</td>
<td>33.3%</td>
</tr>
<tr>
<td>% of smokers</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>% of total count examine people</td>
<td>66.7%</td>
<td>33.3%</td>
</tr>
</tbody>
</table>

The comparison of these data with the anamnestic data on bad habits shows that these individuals are smokers which, according to us, explains the obtained result.

**CONCLUSION**

1. Increased levels of Pb are found in 4.34% and boundary values in 21.7% of the former miners which may be the reason for the larger percentage of miners with high blood pressure, as well as the big share of diseases of the nervous system (8.69%).

2. Higher values of Cd were found in 43.48% of the miners, which correlates with the increased percentage

**Table 5. Comparison of the survey data on alcohol consumption**

<table>
<thead>
<tr>
<th>GROUP</th>
<th>Do you use alcohol?</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Number of exposure people</td>
<td>5</td>
<td>17</td>
</tr>
<tr>
<td>% of group</td>
<td>21.7%</td>
<td>73.9%</td>
</tr>
<tr>
<td>% of using alcohol</td>
<td>38.5%</td>
<td>94.4%</td>
</tr>
<tr>
<td>% of total count examine people</td>
<td>15.2%</td>
<td>51.5%</td>
</tr>
<tr>
<td>Number of non-exposure people</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>% of group</td>
<td>80%</td>
<td>10%</td>
</tr>
<tr>
<td>% of using alcohol</td>
<td>61.5%</td>
<td>5.6%</td>
</tr>
<tr>
<td>% of total examine people</td>
<td>24.2%</td>
<td>3.0%</td>
</tr>
<tr>
<td>Total/Count</td>
<td>13</td>
<td>18</td>
</tr>
<tr>
<td>% of group</td>
<td>39.4%</td>
<td>54.5%</td>
</tr>
<tr>
<td>% of using alcohol</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>% of total examine people</td>
<td>39.4%</td>
<td>54.5%</td>
</tr>
</tbody>
</table>

of kidney diseases in the exposed group, and could be due to professional exposure in the past.

3. There is no evidence of Cd contamination of drinking water.

4. The content of Cu and Zn in the serum of all tested individuals is within the referential boundaries.

5. The concentration of As in the urine samples of all tested individuals is within the referential values.

**REFERENCES**

1. Гопина Г.; “Токсични химични вещества в питейни води” - презентация, Национален Център по опазване на общественото здраве НЦООЗ-гр. София, Лаборатория “Хигиена на водите “, 2005 г.

2. Дряновски П.: Радиобиология, изд. “Земиздат”, София 1986 ,стр. 30


88
Analysis of some health indicators with former miners


SERUM NEOPTERIN IN SILICOSIS PATIENTS AND WORKERS EXPOSED TO INORGANIC DUST

Prakova G.¹, P. Gidikova², E. Slavov³, G. Sandeva², R. Deliradeva²

¹First Internal Clinic, University Hospital, Stara Zagora, Bulgaria, ²Department of Hygiene and Medical Ecology, ³Department of Mol. Biology, Immunology and Med. Genetics, Medical Faculty, Trakia University, Stara Zagora

ABSTRACT

After stimulation with interferon-γ, human macrophages produce neopterin which serves as a marker of activated cell-mediated immune response. Aim: Assessment of serum neopterin levels in silicosis patients, workers exposed to inorganic dust, and a control group. Methods: Serum neopterin levels were measured using ELISA in 60 patients with silicosis, according to conventional X-ray observation (ILO, 2002), 92 male workers exposed to dust containing free crystalline silica, and 43 controls. Results: Serum neopterin levels in silicosis patients (2.74 ng/ml) and in exposed workers (3.22 ng/ml) were significantly higher (p<0.0005) compared to the control group (1.6 ng/ml). Significant difference was also found between silicosis patients and exposed workers (p<0.005). Conclusions: Increased serum neopterin levels could be used as a marker for effect of exposure to inorganic dust containing more than 2% of free crystalline silica.

Key words: silicosis, neopterin

INTRODUCTION

The term silicosis was introduced by Visconti in 1883 and is derived from the Latin word silex, meaning silicon. Silicosis is the most common pneumoconiosis. The relatively high count of cases, chronic and progressive development as well as the severe disability determines the disease as the most significant professional pulmonary disease in Bulgaria (1,2). Branches of the economy linked with high risk of developing silicosis are underground ore and coal mining, metallurgy, machine building, glass and ceramics industry and many others. According to P. Cherneva, R. Lukanova and Z. Mecheva from the years 1998, 2000 and 2003, dust analysis in the working environment shows high levels of total dust in underground mines for extracting brown (Bobov dol), anthracite (Antra - Svoge) and black coal (Balkan - Tvarditsa). exists An actual risk for developing of occupational dust induced pulmonary diseases exists in all underground, as well as ground coal mining facilities.

The causes of the fibrogenic effect of the free crystalline silica are not fully clarified (3,4,11). The inhaled respirable dust particles in the alveoles are subject to phagocytosis; a lysis of the protein membrane by the proteolytic enzymes in the damaged phagosomes occurs and the dust particles are released, only to be taken up by other phagocytes. The activated macrophages release superoxide radicals, cytokines (IL-1, TNF-α, leukotriens and INF-γ) and profibrotic factors (PDGF and IGF-1) (5,8,9,15).

Neopterine is regarded as an early biomarker of the cellular immune response. It is a low-molecular-mass compound belonging to the class of pteridines and is produced by the activated macrophages after stimulation with γ-interferon (12,13,14). G. Gulumian et al., 2001 acknowledge serum neopterin as a possible marker of the effect of exposition to silica (6).

The purpose of this study is to determine the levels of neopterin in silicosis patients and in workers exposed to inorganic dust aerosols containing different amount of free crystalline silica.

MATERIALS AND METHODS

The study was conducted among 60 silicosis patients aged 38 to 76 years (63.90 ±9.57), 92 male workers aged 25 to 55 years (43.48 ±6.63), exposed to inorganic dust containing different amount of free crystalline SiO₂, and 43 healthy workers - controls (55.62 ±10.65 years), without exposure to dust aerosols or history for autoimmune diseases.

The workers exposed to inorganic dust were divided into two groups depending on workplace (group A and B) and the measured levels of inorganic dust in the working environment.

The subjects’ presence of pulmonary and autoimmune diseases, smoking habits and their duration, etc. was determined by method of inquiry.
RESULTS AND DISCUSSION

Figure 1. shows the levels of serum neopterin in the examined subject groups. Serum neopterin is significantly higher in the silicosis patients (p<0.0005) as well as the workers exposed to inorganic dust (p<0.0005) compared to the control group. These results show activation of the cellular immunity during the time of exposure, as well as after variously long latency period and development of silicosis.

A significant difference was found between neopterin levels of silicosis patients and of those exposed to inorganic dust (p<0.005). This fact could be explained with the present exposure to dust, containing over 2% of free crystalline silica, and activation of the cell mediated immune responses. The important role of macrophages in those reactions, demonstrated in publications by other authors, is also confirmed in our results. This outlines the possible use of macrophage-released neopterin as biomarker of effect for exposure to inorganic dust, containing over 2% of FCS in the respirable fraction.

The following facts present special interest for the present study. The studied workers are from the coal mining industry (ground coal mines). According to the Regulation for protecting the workers from risks connected to exposure to occupational chemical agents, no special effects are given for coal dust containing over 2% of FCS. Meanwhile irritating and fibrogenic effects are cited for mixed dust, containing over 2% of FCS in the respirable fraction. The results of our study on patients with silicosis and on workers exposed to inorganic dust show that the possible effects of coal dust containing over 2% of FCS are similar to those of mixed inorganic dust. The average group level of neopterin in all three groups of silicosis patients was significantly higher than in the control group, but there was no significant difference in neopterin levels between the groups with different X-ray and morphological characteristics of silicosis (Table 1). This indicates that at this point neopterin cannot be used for diagnostics and determining the stage of silicosis.

Significantly higher neopterin levels are found in workers exposed to dust, compared to the control group (3.22 ng/ml and 1.60 ng/ml respectively), p<0.05. Neopterin levels in workers from group A and B are 3.24 ng/ml and 3.21 ng/ml respectively and also are significantly higher than the controls, p<0.05. No significant difference in the serum neopterin levels were found in the analyzed samples from both of the exposed workers’ groups (Fig. 2). Correlation analysis between neopterin levels and length of service (duration of exposure) shows linear correlation with coefficient r=0.423; p<0.05.

Table 1. Serum neopterin in silicosis patients with different radiomorphological stage of the disease.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Age (years)</th>
<th>Exposition (years)</th>
<th>Latent period (years)</th>
<th>Serum neopterin ng/mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-st group</td>
<td>59.19 ±10.05</td>
<td>16.5 ±8.68</td>
<td>9.17 ±4.82</td>
<td>2.53 ±0.99 *(p&lt;0.001)</td>
</tr>
<tr>
<td>n=21</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II-nd group</td>
<td>61.91 ±8.42</td>
<td>16.86 ±7.47</td>
<td>8.62 ±7.76</td>
<td>2.66 ±1.42 *(p&lt;0.006)</td>
</tr>
<tr>
<td>n=23</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III-rd group</td>
<td>72.25 ±3.83</td>
<td>12.31 ±7.67</td>
<td>8.50 ±6.40</td>
<td>3.07 ±1.08 *(p&lt;0.001)</td>
</tr>
<tr>
<td>n=16</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control group</td>
<td>55.62 ±10.65</td>
<td>-</td>
<td>-</td>
<td>1.60 ±0.41</td>
</tr>
<tr>
<td>n=43</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* - statistically significant difference to the control group (p<0.05)
** - statistically significant difference to other groups (p<0.05)

We believe that the lack of significant difference in the mean neopterin levels in both groups is related to the almost equal amount of FCS in the respirable fraction. Free crystalline silica varies from 4.6 to 7.7 % for group A and from 3.7 to 7.9 % for group B.

Fig. 1. Serum neopterin levels in silicosis patients, workers exposed to inorganic dust and control group.

Fig. 2. Neopterin levels in workers exposed to inorganic dust and in control group.

These results offer the possible explanation that activation of the cellular immune response in the pulmonary tissue de-
Serum neopterin in silicosis patients and workers exposed to inorganic dust

The high serum neopterin levels in silicosis patients and in workers exposed to inorganic dust confirm activation of the cell-mediated immune response. The significantly higher neopterin levels in the exposed workers indicate higher immune activity during continuous exposure to the dust.

The current study shows activation of macrophages under the effect of dust containing over 2% of FCS in the respirable fraction. This confirms the necessity for a quality analysis of inorganic dust during health hazard evaluation.

Future studies could confirm or reject the possible use of serum neopterin as an additional method for prognosis in the development of pulmonary fibrosis.

CONCLUSIONS

The lack of significant correlation coefficients between neopterin and age is linear ($r=0.679$ and $p>0.05$). Similar results were reported by S. Harald et al., 2002 (7).

No significant differences were found in neopterin levels in smokers and non-smokers, as well as in the groups divided according to duration of smoking in packet years (Fig. 4).

**Fig. 3. Neopterin levels in workers exposed to inorganic dust depending on age.**

No significant difference is found in neopterin levels for workers of different age gaps (Fig. 3). Correlation coefficient between neopterin and age is linear ($r=0.679$ and $p>0.05$). Similar results were reported by S. Harald et al., 2002 (7).

No significant differences were found in neopterin levels in smokers and non-smokers, as well as in the groups divided according to duration of smoking in packet years (Fig. 4).

**Fig. 4. Neopterin levels in workers exposed to inorganic dust with different duration of smoking in packet years.**

The close values of serum neopterin levels in silicosis patients and in exposed workers, as well as the absence of significant differences between the groups with different stages of silicosis and between the groups with different workplaces supports the possible use of serum neopterin as a biomarker for effect. This effect is revealed through exposure to dust with FCS above 2% in the respirable fraction.

The lack of significant correlation coefficients between age, length of exposure and risk factors like smoking on one hand and serum neopterin on the other, shows that neopterin levels in both examined groups (silicosis patients and workers exposed to dust) are not influenced by individual factors but mainly by exposure to FCS. This further confirms the fact that neopterin can be used as a biomarker during exposure to inorganic dust aerosols containing over 2% of FCS in the respirable fraction.

REFERENCES

2. Петрова, Е. Ръководство за прахово-асоциирани професионални белодробни заболявания, Фонд условия на труд, София, 2004, 186.


SCHOOL MATURITY AND READINESS FOR EDUCATION OF BILINGUAL CHILDREN FROM THE PREPARATORY CLASSES FROM VARNA

Porojanova S., M. Atanasova¹, K. Petrova, K. Yaneva¹

Department of Hygiene and Disaster Medicine, Prof. Paraskev Stoyanov Medical University of Varna, ¹Regional Inspection for Protection and Control of Public Health of Varna

Reviewed by: Assoc. Prof. V. Iotova

ABSTRACT

We carried out an observation of the school maturity and readiness for education of 24 bilingual children of gipsy origin and 36 children with mother language - Bulgarian (a control group) from the preparatory classes from Varna. The methods of Bratanova for complex assessment of the school maturity were used. The observation of the school maturity was held at the beginning and at the end of the school year. The complex assessment of the school maturity shows that at the beginning of the school year 95,83% of the bilingual children are immature and only 4,16% are with moderate maturity, as in the control group even at the beginning of the year there is a high percentage of mature and moderate mature children - 44,44%. At the end of the school year more significant is the improvement in the physical development, while the indexes of neuro-psychical development, so important for education, stay unsatisfactory.

Key words: bilingual children, preparatory classes, school maturity

Children with asymmetric bilingualism, whose mother language is different from the official, often have difficulties in education. The low level of command of the Bulgarian language worsens the communication abilities of the children and can lead to negative attitude to school.

In Bulgaria there is an obligatory pre-school training of children before they start first class. It prepares the children for education, and for the new school requirements. The studies for the pre-school training of the bilingual children in our country are insufficient and incomplete. According to this our aim was to observe and follow in yearly dynamics the school maturity of children whose mother tongue is different from Bulgarian.

FORMULATION AND METHODS

We carried out an observation of the school maturity and readiness for education of 24 bilingual children of gipsy origin and 36 children with mother language - Bulgarian - a control group from the preparatory classes from Varna. The methods of Bratanova (3) for complex assessment of the school maturity were used, according to them children are divided into school mature, moderate mature and immature. They include a complex of indexes for assessment of the physical and neuro-psychical development of the children. For assessment of the physical development of children are used the indexes - height, body mass and proportions of the body.

The indexes for the neuro-psychical development are - mother language, mathematics, painting abilities, auditory and motor memory and stability of attention. The observation of the school maturity was held at the beginning and at the end of the school year. The results are worked up by variation analysis.

RESULTS AND ANALYSIS

At the beginning of the school year the average height of the bilingual children is 112,7cm, and for the control group it is 199cm. With mark "immature" for this index are 33,33% of the bilingual children towards 8,33% of the control group. The growth for both groups for the observed period is 3,1cm.

At the end of the school year the average height is respectively 115,8 and 122,1cm. Immature at the end of the year for this index are 41,66% for the bilingual towards 8,33% for the control group. The differences for both of the groups are statistically reliable (p<0,001) at the beginning and at the end of the year (Fig. 1).

The body mass of the children is according to the achieved height. Bigger variations are found in the control group, where one child is with obesity, and two children are with overweight body mass. There is no information for obesity between the bilingual children.

The proportions of the body are assessed with the Filipine test of Ziller. At the beginning of the school year immature
according to this index are 91,66% of the bilinguals and 75% of the control group. The improvement of this index is significant at the end of the year - only 29% of the bilinguals and 8,33% of the control group do not have proportions of the body near those of adults. The differences in the percentages between the beginning and the end of the school year for both groups are statistically significant (p<0,001).

The complex assessment of the physical development shows that between the bilinguals at the beginning of the school year the percentage of children with delayed development is bigger in comparison to the control group (p<0,001) and this difference stays till the end of the year. Important role for the successful education has the neuro-psychical development. Nowadays school education is pointed towards development of the intellectual qualities of the person.

The command of the Bulgarian language is basic for the successful accepting of the school material. By the index "mother language" (Fig. 2) is received the information for the abilities of the bilingual children to use it for communication. At the beginning of the school year 91,65% of the children with mother language different from Bulgarian are immature according to this index. They answer with difficulty to the given question, usually with single words and improper sentences. 87,5% of the children stay also immature according to this index at the end of the school year.

The improvement is statistically non significant (p>0,1). Despite the efforts of the teachers the language abilities in Bulgarian do not improve. This disturbs the learning of the material and leads to negative attitude to education. The mathematics abilities of the bigger part of the bilingual children are insufficient at the beginning of the school year - with the test cope just 8,33% of the children, 54,16% of the children can not count. In the control group even at the beginning of the year the mathematic abilities are good (47,22% of the children cope with the test) and only 25% can not count (Fig.3.1).

---

**Fig. 1. Physical development**

The complex assessment of the physical development shows that between the bilinguals at the beginning of the school year the percentage of children with delayed development is bigger in comparison to the control group (p<0,001) and this difference stays till the end of the year. Important role for the successful education has the neuro-psychical development. Nowadays school education is pointed towards development of the intellectual qualities of the person.

**Fig. 2. Index “mother language”**

The command of the Bulgarian language is basic for the successful accepting of the school material. By the index "mother language" (Fig. 2) is received the information for the abilities of the bilingual children to use it for communication. At the beginning of the school year 91,65% of the children with mother language different from Bulgarian are immature according to this index. They answer with difficulty to the given question, usually with single words and improper sentences. 87,5% of the children stay also immature according to this index at the end of the school year.

**Fig. 3.1. Matematic abilities at the beginning of the school year**

---

**Fig. 3.2. Matematik abilities at the end of the school year**

---
At the end of the school year the improvement of the bilingual children of their mathematic abilities is insufficient. Still 41, 65% of the children can not count. In the control group just one child can not count (2,77%) at the end of the year (Fig.3.2).

The painting abilities are not directly connected with speech, but they depend on the social conditions and the pedagogic stimuli. The painting of a human figure is difficult for the bilingual children. 100% of the children at the beginning of the year and 92% of them at the end of the year are immature for this index.

The auditory memory is very important for the education of children. It shows their abilities to remember and reproduce numbers in Bulgarian. At the beginning of the school year 95, 86% of the bilingual children are with insufficient auditory memory, at the end of the year 91,66%. The difference is not statistically reliable (p>0,1).

The motor memory is important for the developing of writing. For 73, 83% of the children with mother tongue different from the Bulgarian it is insufficient at the beginning of the school year; in the control group this percentage is 30,55%. At the end of the year immature for this index are 66,66% of the bilinguals and 8,33% of the control group.

The attention of the child in the pre-school ages is a necessity for the development of writing. For 73, 83% of the children with mother tongue different from the Bulgarian it is insufficient at the beginning of the school year; in the control group this percentage is 30,55%. At the end of the year immature for this index are 66,66% of the bilinguals and 8,33% of the control group.

The attention of the child in the pre-school ages is a necessity for the developing of knowledge. It has no dynamic features and reflexes the agitative and inhibition processes in the brain cortex. It is being tested with the test of Burdon, with modification of Batoeva.

In the bilingual group at the beginning of the year the percentage of immature children according to this index is high (70,83%). They show distraction and decrease of the concentration of attention as they make a lot of mistakes and misses. At the end of the year the percentage of the immature children decreases (45,83%) at the expense of the moderate maturity. The percentage of the mature bilinguals stays unchanged. In the control group even at the beginning of the year children show good stability of attention, only 1/3 are with assessment "immature" (33,33). At the end of the year because of the pedagogical stimuli they improve their concentration and with assessment "mature" are 75%. Only one child stays immature (2,77%). The differences between both groups are statistically reliable (p<0,0001) at the beginning of the year and at the end. The difficulties in understanding the given task lower the motivation of the bilingual children for the fulfillment of it and from this come most of the mistakes (Fig. 4).

The complex assessment of the school maturity shows that at the beginning of the school year 95,83% of the bilingual children are immature and only 4,16% are with moderate maturity, as in the control group even at the beginning of the year there is a high percentage of mature and moderate maturity children - 44,44%. At the end of the school year more significant is the improvement in the physical development, while the indexes of neuro-psychical development, so important for education, stay unsatisfactory (Fig. 5).

**CONCLUSIONS**

1. Children with asymmetric bilingualism start their education in the preparatory classes with low level of school maturity and only 1/4 of them reach school maturity at the end of the year.
2. At the end of the school year improves the physical development of the bilinguals, but their neuro-psychical development stays insufficient.
3. There is a need of specific program for education which must be suitable to the specific needs of these children and lead to improvement of the knowledge of Bulgarian language and development of the psycho-nervous qualities of the person - speech, attention, memory, etc.
REFERENCES

1. Ангелова Т. "Ролята на обучението по български език за интегрирането на ученици в двуезична среда" 2003 г.
2. Батоева Д. "Адаптация на децата към обучение" 1983 г.
3. Батоева Д. Колева И. "Диагностика и подготовка за ограмотяване" 1997 г.
4. Батоева Д. "Диагностика на развитието на детето преди постъпването му в училище" 2004 г.
5. Здравкова Ст. "Ограмотяване на децата в условията на билингвизм" 2004 г.
6. Кючуков Х. "Лингводидактични проблеми на обучението при ранен билингвизм" 2001 г.
7. Кючуков Х. "Ранна езикова социализация в условията на билингвизм" 2002 г.
8. Самоилова М. "Децата от малцинствен произход в условията на билингвизм" 2002 г.
9. Сотиров П. "Двуезичните деца проблеми ли са за обучението" 2003 г.
SCHOOL POLICY IN RELATION TO SMOKING AND POSSIBILITIES FOR PREVENTION

Yustiniyanova B., M. Koleva

Department of medical and biological sciences, Medical University - Varna, Bulgaria

Reviewed by: Assoc. Prof. S. Popova

ABSTRACT

Smoking is a prevalent health risk behaviour factor for the adolescents. Two hundred and sixty students were interviewed - 50.6% boys and 49.4% girls, aged 13-15 years. The survey was conducted in 2007 with a self-administered anonymous questionnaire that was used by the Global Youth Tobacco Survey (GYTS). The actual school policy in relation to smoking is ineffective according to the students interviewed. On account of the early age of initiation of smoking - 52.1% of the students have started smoking at the age of 12-13 years - the prevention in primary school age is one of the most significant factors for the limitation of smoking and its injurious to health consequences. The authors have proposed a modulus exemplary programme for prevention of smoking at schools.

Key words: smoking, adolescents, school policy, prevention programme

INTRODUCTION

According to the data of the national Statistical Institute, Bulgaria continues to be in the third place in the world in use of cigarettes per person as the age of initiation of smoking decreases and the prevalence of smoking among adolescents increases. The frequency of smoking among boys and girls in Bulgaria aged 15 years is one of the highest in Europe according to the international survey ESPAD (1). The results of the Global Youth Tobacco Survey (GYTS, 2002), conducted in 142 countries under the surveillance of the World Health Organization (WHO), the Centers for Disease Control and Prevention in Atlanta and UNICEF, show that the Bulgarian students are among the first in the world in early tries of smoking cigarettes and intensity of smoking. The prevalence of smoking among girls aged 13-15 years is the highest in 76 countries where GYTS was performed as national surveys until 2003. The data is an evidence that smoking in Bulgaria is a prevalent health risk behaviour factor (2,3). The school has a significant role as an environment for endorsement of healthy behaviour not only by active informing and education of the students about the advantages of a healthy lifestyle but also as an environment for the formation of values, attitudes, abilities and behaviour competence of healthy choice, including decision-making about initiation of smoking. The school environment, in this regard, is one of the main determinants of smoking among students (4).

MATERIAL AND METHODS

Two hundred and sixty students aged 13-15 years were interviewed (50.6% boys and 49.4% girls) in three schools in Ruse. This age group is defined by the experts of the World Health Organization as a risk group because smoking usually starts at the age of 12 or 13 years. This is the period of transition from primary to secondary education when the students must overcome new educational, psychological and social challenges. The survey was conducted in 2007 with a self-administered anonymous questionnaire which consists of 60 questions concerning various aspects of the problem of smoking. The self-administered questionnaire that was used gives unique information because smoking among adolescents was studied in a different way and what is especially current now; the questionnaire gives possibility for comparison of the received results with those of the countries that participated in GYTS. The alternative analysis was used for the data processing.

RESULTS AND DISCUSSION

Evaluating the health and social significance as well as the immediacy of the problem, we set our aim: to study the school policy concerning smoking among students with a view to its prevention at school.

Address for correspondence:
B. Yustiniyanova, Dept. of medical and biological sciences, Medical University, 55 Marin Drinov str., 9002 Varna, Bulgaria
e-mail: bisera_25@abv.bg
school. For 23.3% of the students interviewed there had been no discussion of this problem at school.

One in three students was not sure that an actual policy against smoking was pursued in their school. An alarming fact is that according to 61% of the students interviewed the medical specialist at school had not explained why smoking cigarettes is injurious to health. Only 37.7% of the students reported that they had discussed the topic “why young people smoke” in the class teacher period.

To the question: “When was the last time that the problems concerning smoking and its harmful consequences were discussed during a lesson at school?”, the students had answered the following:

- Never - 39.4%
- This term - 14.8%
- Last term - 21.3%
- Two terms ago - 7.1%
- Three terms ago - 2.6%
- More than a year ago - 14.8%

According to an inquiry survey for the spread of active smoking among the school personnel, 53.7% of the principals and 44.5% of the teachers smoke at school, as 1/3 of them are ever smokers. Seventy two percent of the principals and fifty eight percent of the teachers who smoke are not inclined to give advice on prevention of smoking.

Our results correspond with those of other authors that participated in the Global School Personnel Survey (GYPS) (7). The received results show that the school policy in relation to prevention of smoking and its injurious to health effect on the adolescents is not effective enough. An evidence of this are our data for prevalence and intensity of smoking according to which 52.1% of the students interviewed had started smoking at the age of 12-13 years (Fig.2).

Ever smokers are 46.2% of the boys and 35.3% of the girls as 1 in 4 students interviewed reported that they smoked most intensively at school which presumes that there is not enough control of the principals, teachers and medical specialists.

CONCLUSION

1. The actual school policy in relation to smoking is ineffective.
2. On account of the early age of initiation of smoking among the students which is 12-13 years, prevention in primary school age is one of the most significant factors for limitation of smoking and its injurious to health consequences.
3. On the basis of the results of the complete survey we worked out an Exemplary programme for prevention and control of smoking at school.

Exemplary programme for prevention and control of smoking at school

The programme that I propose is based on the health promotion models of Poland and Green (2000) who examine four kinds of health promotion models in primary and secondary school age:

- **models, based on knowledge** - basic level in the prevention of smoking which gives the basis for development of the next models
- **effective training models** - they deal mainly with the development of the students’ personality. These include training methods for building up self-confidence, development of personal skills, making decisions and skills for coping with the problem of smoking.

- **behavioural models** - they include mainly training methods and tactics for students’ resistance to the pressure of the social environment (friends who smoke, advertisements, etc.) for involvement in hazardous to health behaviour such as smoking.

- **model for students’ authorization** - the main principle used in this model is that the students should be responsible to identify and define the problem alone and to determine what action to take in relation to prevention of smoking.

In the exemplary programme that is worked out, particular measures for prevention of smoking have been proposed to every one of the presented models, conformed to the age of the students from primary and secondary school.

---

**REFERENCES**

1. Колева, М. Здравно-социални аспекти и възможности за превенция на тютюнопушенето в училищна възраст. Дипломна работа, 2007, Варна.
2. Попов, Г. Дроги и превенция. Стено, 2000, Варна.
OCCUPATIONAL DISEASES. EPIDEMIOLOGICAL TRENDS OF THE OCCUPATIONAL DUST DISEASES, PREVENTION AND EARLY DIAGNOSIS

Petrova E.

Center on Occupational diseases, MU, Clinic on Occupational Diseases, University hospital Saint Ivan Rilski, Sofia

Reviewed by: Assoc. Prof. St. Popova

ABSTRACT

The aim of the study was to present the main groups of occupational diseases in Bulgaria, as well as the epidemiological trends and the prognosis of the benign and malignant occupational dust diseases in workers exposed to non-organic dust up to 1985, and during 1985 - 2003 periods, as well as to propose ideas for adequate medical check up. Material and methods. We investigated the all number of patients with benign and malignant occupational dust diseases in Bulgaria during the period 1985 - 2000y was investigated. The information was obtained by the last regional departments for medical service of pneumoconioses in Bulgaria. Additionally, we investigated dust diseases in 116 miners from brown coal mining in Bobov dol mine, 113p. - from black coal mining in Balkan mine, 53p. - from anthracite coal mining in Antra, 198 - from lead-zinc ore mining in Lucky, Gorubso, and 120 asbestos exposed workers, who have worked since 1985 to 2003y, and 121 non-exposed workers have used as a control group. A clinical (anamnesis, physical examination), radiological (chest ex-ray, accounted by ILO’80) and spirometry was done of dust exposed workers and non-exposed screened individuals were performed. A non-parametric statistical analysis with significance calculation (P) by usage SPSS software was done. Additionally, the all number and the incidence of malignant mesothelioma per 100000 person's population were investigated. Results and discussion. The dust diseases in exposed workers up to 1985y decrease. We detected new diagnosed pneumoconioses and occupational dust bronchitis in patients with 10+years exposure to quartz and asbestos, who have been worked up to 1985y. It has been accounted an increase of the incidence of malignant mesothelioma during the period 1990 - 2000y. Conclusions. We prognosticate a rise in the incidence of silicosis, asbestosis, and mesothelioma in the future 10-20 yrs due to low quality of the preventive measures in the basic dust industries in Bulgaria during the last two decades. We consider it is necessary to perform wide studies in dust exposed workers, and to create a register of the dust, as well as of the exposed workers, and of the dust diseases in Bulgaria.

Key words: pneumoconioses, occupational dust bronchitis, mesothelioma, epidemiology, trends, prognosis, prevention

INTRODUCTION

The main groups of occupational diseases (OD) included in the List on occupational diseases (LOD) in Bulgaria are: 1. OD, caused by non-organic and organic dusts, 2. OD due to physical factors (noise, local and whole body vibrations, variable microclimate, ionizing and non-ionizing factors, electro-magnetic fields, lasers, static and dynamic physical loading, systemic micro-traumas, motive monotony in psycho-sensor tension, loading of vocal organs), 3. OD related to biological agents: micro-organisms (bacteria, viruses, rickettsia, mycotic agents, intracellular micro-organisms), plant and animal products, 4. OD related to industrial dust (pax and 5. OD related to industrial products, non-classified elsewhere.

Up to now the most diagnosed and most widespread in Bulgaria were the OD of the nervous system, as well as the OD of the muscle-skeletal system and the OD lung diseases due to industrial dust. The non-organic dusts kept their morbid effect a long period after discontinuation of the dust risk work. The most important in the practice are the specific and non-specific benign and malignant occupational dust diseases with lung and non-pulmonary localization. The basic dust lung diseases (silicosis, asbestosis, silicatoses, pneumoconioses due to metal containing dusts, chronic obstructive and non-obstructive bronchitis, asbes-
tos related malignant diseases etc) were characterized with progressive development, progressive work disability and an untimely death. The disability due to these diseases leads to serious moral, social and material damages for the patients, employers and the community. It requires to be created a realistic and a correct statistics, an effective prevention, a screening, a dynamic surveillance, a treatment and an expertise on occupational dust diseases. We present the trends of the most significant occupational dust lung diseases in Bulgaria. The problems of occupational and occupational dust diseases are discussed in a number papers of some Bulgarian authors (1-6).

The aim of the study was to present the main groups of occupational diseases In Bulgaria, as well as the epidemiological trends and the prognosis of the benign and malignant occupational dust diseases in workers exposed to non-organic dust up to 1985 y, and during 1985 - 2003 periods, as well as to propose ideas for adequate medical check up.

**MATERIAL AND METHODS**

The all number of patients with benign and malignant occupational dust diseases in Bulgaria during the period 1985 - 2000 y was investigated. The information was obtained by the last regional departments for the benign and malignant pneumoconiosis in Bulgaria. Additionally, we investigated dust diseases in 116 miners from brown coal mining in Bobov dol mine, 113p. - from black coal mining in Balkan mine, 53p. - from anthracite coal mining in Antra, 198 - from lead-zinc ore mining in Lucky, Gorubso, and 120 asbesto related exposed workers, who have worked since 1985 to 2003 y, and 121 non-exposed workers have used as a control group. A clinical (anamnesis, physical examination), radiological (chest ex-ray, accounted by ILO 80) and spirometry was done of dust exposed workers and non-exposed screened individuals were performed. A non-parametric statistical analysis with significance calculation (P) by usage SPSS software was done. Additionally, the all number and the incidence of malignant mesothelioma per 100000 person's population were investigated.

**RESULTS**

Trends in the absolute number of occupational dust lung diseases in workers exposed to quartz containing dust until 1985 year.

The absolute number of occupational dust lung diseases in workers exposed to quartz containing dust until 1985 year is presented. There were a least absolute number of patients with silicosis, and silicosis + silicotuberculosis in 1994 y and 1997 y. The absolute number of patients with silicosis and silicosis + silicotuberculosis was little higher in 1988 y. The curve of the all number of patients has obtained a plateau-like form during the 1988 - 2000 y period. In 2000 y the absolute number of patients with silicosis + silicotuberu-

The curve of the silicicos is about 5000, and only with silicosenos - under 4000.

The study of the trend in the absolute number of patients with asbestosis, asbestos related pleural fibroses and plaques in Bulgaria has showed variations during 1985-2000 period. The absolute number of patients with pulmonary and pleural asbesto related benign diseases was lowest in 1985 y (136 patients). There was a trend of increase in the absolute number of the asbestos related diseases up to 1990 year (201 patients). It has registered a slight decrease in the number of asbestos related parenchymal and pleural diseases (up to 199y) between 1995 y and 2000 year. In study of the dynamics of the absolute number of silicatoses (talcosis + kaolinosis + mixed mineral pneumoconioses) in Bulgaria during 1985 - 2000 period was established a slight increase of the total number of patients with silicatoses in the country (from 79p. - in 1985 up to 99p. - in 1990). There was a trend of harsh increasing of the silicatoses (199p. in 1995y) and following horizontal configuration of the curve during the 1995-2000 period. The established little absolute number of the silicatoses in Bulgaria was related with bad detection of the diseases related to lack of knowledge of the physicians and the other clinicians in this area. It was detected a rise in the absolute number of patients with welders' pneumoconiosis. The registered number of patients varied between 70 and 80 in 1990y. The number of the patients with welders' pneumoconiosis has increased harshly (128p. - in 1995y) during the 1990-2000 y and has occurred light increase up to 145 in 2000y.

There was detected a decrease in the absolute number of the patients with silicosis, asbestosis, asbestos related fibrosis and plaques, as well as talcosis, kaolinosis, mixed mineral pneumoconioses, and pneumoconioses due to metal containing dust during the period 1985-2000 y. These trend was related to a decrease of number of the ex-miners, who have been worked in the dry drilling or dry and wet drilling period in underground mines in Bulgaria in the last 2-4 decades to 1985 y, as well as high latent incidence of pneumoconioses in present dust exposed workers in the country due to insufficient effectiveness of the prophylaxis, bad qualification of GP and other clinicians who take part in the prophylactic screenings of dust exposed workers as well as serious problems in the organization and in financial cover for activities on occupational diseases medical field in Bulgaria.
Epidemiological trends of pneumoconioses in coal and ore miners in Bulgaria in 2003y due to quartz containing occupational dust exposure after 1985 year

Unclear epidemiological situation in the field of occupational dust diseases in quartz and asbestos exposed workers has motivated our study, aimed to detect the dust diseases in some basic coal, ore mines and in groups of asbestos exposed individuals, who worked after 1985 year. The total number of the present coal and ore mines and ex-miner in Bulgaria was about 100000 in 2003y. Last survived and present asbestos exposed workers in Bulgaria were 27000 until 2003y. The studies on the dust levels at the workplace in underground mines in Bulgaria during the 1985-2003 period accounted many time exceeding permissible levels dust concentration in anthracite coal mine "Antra", black coal mine "Balkan 2000", and in brown coal mine "Bobov dol". In 2003y we established a dominating share of initial p1/1 silicoses in miners from "Balkan 2000", followed by miners from "Bobov dol", in quartz and asbestos exposed workers, and the minimal was the share of the miners from "Antra". The borderline p0/1 and p1/0 silicoses has dominated in "Lucky" and "Balkan 2000" (P<0.0001) - Fig. 1.

![Figure 1](image1.png)

(Statistics: Pearson Chi-Square = 762.244; P<0.0001)

Figure 1. Initial and borderline silicoses in different underground mines in Bulgaria in 2003y

Chronic dust occupational; bronchitis in different groups dust exposed workers who have been worked after 1985 year

The chronic bronchitis dominated in dust exposed workers from "Bobov dol", who have been exposed at high concentrations of brown coal dust, containing middle level quartz compound. The next is the share of chronic bronchitis amongst underground ore miners in "Lucky" mine, followed by non-exposed control group, and the lower are the relative shares of the chronic bronchitis in workers from black mining in "Balkan 2000", miners from anthracite mining in "Antra" and the lowest is the share of bronchitis in asbestos exposed workers. In cases of lack of significant contra-criteria, the chronic bronchitis in miners from "Bobov dol" mine can be defined as an occupational dust chronic bronchitis (Fig. 2).

Benign asbestos related diseases in Bulgaria in 2003 year in asbestos exposed workers after 1985 year

We established a dominating share of manifest asbestosis in workers' group from thermo-electric-power-station "Bobov dol", followed by asbestos exposed workers' group in non-ferrous metals' production in Plovdiv, and the last was the share of the workers' group in production of asbestos break linings in Breznik. Similar was the distribution of the boundary forms of asbestosis. Most expressed was the share of benign asbestos related pleural diseases of the workers' group in non-ferrous metals' production in Plovdiv, followed by the workers in thermo-electric-power-station "Bobov dol". We detected asbestos related diseases from unknown risk industries until the screening in 2003 year (Fig. 3).

![Figure 3](image3.png)

Figure 3. Asbestos related diseases in workers' groups exposed to asbestos after 1985 year

Epidemiological trends in malignant mesothelioma during the 1990 - 2000y period

We detected a trend of an increasing of pleural and peritoneal malignant mesothelioma during the eleven years period (1990 - 2000y), and non-clear tendency in the distribution of the rare and difficult diagnosed pericardial mesothelioma (Figure 4). According to Helsinki criteria, 80% of the cases of malignant mesothelioma are related to asbestos exposure, mainly connected with work places. The dominated prevalence of pleural mesothelioma in the age groups after 60ys, 50-59 and 40-49 years was related with 20 - 40 years latent period since initial asbestos exposure till appearance of the disease (Figure 5). The new diagnosed cases of mesothelioma in Bulgaria in the 1990 - 2000years period have been exposed to asbestos during the 70-80 years of the XX Century. These years were known as a
period of most intensive usage of asbestos in Bulgarian industry.

**Figure 4. Epidemiological trends in malignant mesothelioma during the 1990-2000 period**

**Figure 5. Age distribution of malignant mesothelioma in Bulgaria in 1990-2000**

**Prognosis**

Bearing in mind the contingents of dust exposed workers, the high dust levels in the basic Bulgarian mines until 1985 year, workers’ asbestos exposure, dose-effect relationship studies as well as the dynamics of the basic dust diseases in Bulgaria, we prognosticate:

1. Increasing prevalence of silicosis in coal and ore mining during the future 10-20 years period
2. Increasing prevalence of asbestosis and benign asbestosis related pleural diseases during the future 10-15 years
3. Increasing prevalence of malignant mesothelioma during the future 10 years
4. Continuing prevalence of mesothelioma with a gradual drop during the future 20-40 years period
5. Increasing prevalence of occupational dust chronic bronchitis from the brown coal mining in "Bobov dol"
6. Future prevalence of reticular-micronodular pneumoconioses in ex- and present miners from "Balkan 2000" and "Antra" mines
7. Taking in mind the detected initial pneumoconioses in 2003 year, as well as preliminary information for an endangering of silicosis in "Gorubso" ore mine, we propose an actual measurement and an assessment of the dust concentrations at the work places in the mine.

**The prophylaxis of the dust exposed workers requires:**

1. Improvement the working conditions including invention of dust free technologies, and adequate ventilation equipment, 2. Initiation a list of the dust exposed workers in each risk industry branch in Bulgaria, 3. Realization of a systemic monitoring and invention of register for the dust risk factor in each industry branch in the country, 4. Initiation regular and effective preliminary and periodical check-ups for the dust exposed contingents, 5. Initiation a contemporary surveillance system and health monitoring for dust exposed ex-workers, and 6. Initiation a software product for registration and surveillance.

**The achievement a qualitative and early diagnosis in pneumoconiosis is related with:**

1. Using of the ILO International Classification of Pneumoconioses, Geneva, 1980 at all levels of medical service, 2. Wide using of the contemporary diagnostic image methods (chest CT, chest HRCT, etc) and invasive diagnostic methods (FBS with TBLB, TT, TS, TTANB, BALF etc) and realizing mineralogical, histological, cytological and electron microscopic investigations, 3. Improvement the quality of the preliminary and periodical check-ups and reading of the lung radiographies by specialists in this field, 4. Initiation an education of GPs, radiologists and other clinicians, and 5. An adequate financial cover for the diagnostics and treatment of the occupational dust diseases.

**REFERENCES**

<table>
<thead>
<tr>
<th>Author</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alexandrova At.</td>
<td>21</td>
</tr>
<tr>
<td>Atanasova M.</td>
<td>49, 95</td>
</tr>
<tr>
<td>Atanasova V.</td>
<td>21</td>
</tr>
<tr>
<td>Baykova D.</td>
<td>39</td>
</tr>
<tr>
<td>Burulianova I.</td>
<td>53</td>
</tr>
<tr>
<td>Deliradeva R.</td>
<td>91</td>
</tr>
<tr>
<td>Dimitrova T.</td>
<td>45, 49</td>
</tr>
<tr>
<td>Dokova K. G.</td>
<td>35</td>
</tr>
<tr>
<td>Dyankov S.</td>
<td>17</td>
</tr>
<tr>
<td>Galcheva S.</td>
<td>31</td>
</tr>
<tr>
<td>Gatzeva P.</td>
<td>21</td>
</tr>
<tr>
<td>Georgieva L.</td>
<td>65</td>
</tr>
<tr>
<td>Gidikova P.</td>
<td>91</td>
</tr>
<tr>
<td>Haritov D.</td>
<td>17</td>
</tr>
<tr>
<td>Iotova V.</td>
<td>31</td>
</tr>
<tr>
<td>Iovcheva M.</td>
<td>61</td>
</tr>
<tr>
<td>Ivanov D.</td>
<td>7, 11</td>
</tr>
<tr>
<td>Ivanova D.</td>
<td>7, 11</td>
</tr>
<tr>
<td>Kalevski S.</td>
<td>17</td>
</tr>
<tr>
<td>Kalevski S.</td>
<td>25</td>
</tr>
<tr>
<td>Kamburova D.</td>
<td>35</td>
</tr>
<tr>
<td>Karaivanova R.</td>
<td>75</td>
</tr>
<tr>
<td>Karaslavova E.</td>
<td>49</td>
</tr>
<tr>
<td>Kavlakov G.</td>
<td>21</td>
</tr>
<tr>
<td>Kerekovska A.</td>
<td>69</td>
</tr>
<tr>
<td>Kiselova Y.-Kaneva</td>
<td>7</td>
</tr>
<tr>
<td>Koleva M.</td>
<td>99</td>
</tr>
<tr>
<td>Mandadjieva St.</td>
<td>81</td>
</tr>
<tr>
<td>Marinov Bl.</td>
<td>81</td>
</tr>
<tr>
<td>Marinov P.</td>
<td>61</td>
</tr>
<tr>
<td>Mihailova G.</td>
<td>21</td>
</tr>
<tr>
<td>Mladenova St.</td>
<td>75</td>
</tr>
<tr>
<td>Nedeva P.</td>
<td>75</td>
</tr>
<tr>
<td>Panova M.</td>
<td>85</td>
</tr>
<tr>
<td>Peev N.</td>
<td>17</td>
</tr>
<tr>
<td>Petrova E.</td>
<td>57, 103</td>
</tr>
<tr>
<td>Petrova K.</td>
<td>31, 95</td>
</tr>
<tr>
<td>Popova S.</td>
<td>69</td>
</tr>
<tr>
<td>Porojanova S.</td>
<td>95</td>
</tr>
<tr>
<td>Prakova G.</td>
<td>91</td>
</tr>
<tr>
<td>Radoinova D.</td>
<td>53</td>
</tr>
<tr>
<td>Sandeva G.</td>
<td>91</td>
</tr>
<tr>
<td>Slavov E.</td>
<td>91</td>
</tr>
<tr>
<td>Terzieva D.</td>
<td>85</td>
</tr>
<tr>
<td>Totzeva R.</td>
<td>75</td>
</tr>
<tr>
<td>Turnovska T.</td>
<td>21, 75, 81, 85</td>
</tr>
<tr>
<td>Tzvetkov L.</td>
<td>65</td>
</tr>
<tr>
<td>Vasileva R.</td>
<td>21</td>
</tr>
<tr>
<td>Yanakieva T.</td>
<td>75, 85</td>
</tr>
<tr>
<td>Yaneva K.</td>
<td>95</td>
</tr>
<tr>
<td>Yustiniyanova B.</td>
<td>99</td>
</tr>
<tr>
<td>Zlatarova Z.</td>
<td>35, 45</td>
</tr>
</tbody>
</table>
PERMUTERM SUBJECT INDEX

10-14 years, children, intake, nutrients, energy, food consumption, ecologically risky region 39

acute intoxications, pesticides 61
adolescents, smoking, school policy, prevention programme 99

air pollution, pulmonary functions, physical capacity, treadmill exercise test 81
anxiety level, cardiovascular risk 49
aqueous-alcoholic extracts, Bulgarian medicinal plants, antioxidant activity, total polyphenol content 7

basal cell carcinoma, eyelid tumors, incidence, Varna 35
bilingual children, preparatory classes, school maturity 95

Bulgarian medicinal plants, aqueous-alcoholic extracts, antioxidant activity, total polyphenol content 7

cardiovascular risk, anxiety level 49
childhood, obesity, trend of increase, BMI, risk factors 31

children, 10-14 years, intake, nutrients, energy, food consumption, ecologically risky region 39
exclusive breastfeeding, infants 21

exposure, heavy metals, health risk, health assessment 85
eyelid tumors, basal cell carcinoma, incidence, Varna 35

food, lichens, nutritional value, ethnobotanical use 11

head, severe, multisystem, injury, classification, management, outcome 17
heavy metals, exposure, health risk, health assessment 85

heavy metals, radiological indexes, drinking waters, health risk, health impact assessment 75

immigrants' health, legislation, policy, Bulgaria 69
infants, exclusive breastfeeding 21

legislation, immigrants' health, policy, Bulgaria 69

lichens, food, nutritional value, ethnobotanical use 11

management, occupational diseases, diagnostics, expertise, prophylaxis, treatment, financial cover 57

neopterin, silicosis 91

obesity, childhood, trend of increase, BMI, risk factors 31

occupational diseases, management, diagnostics, expertise, prophylaxis, treatment, financial cover 57

occupational dust bronchitis, pneumoconioses, mesothelioma, epidemiology, trends, prognosis, prevention 103
pesticides, acute intoxications 61

pneumoconioses, occupational dust bronchitis, mesothelioma, epidemiology, trends, prognosis, prevention 103
preparatory classes, bilingual children, school maturity 95

pulmonary functions, air pollution, physical capacity, treadmill exercise test 81
radiological indexes, heavy metals, drinking waters, health risk, health impact assessment 75

recurrent lumbar disc herniation, reoperations, Oswestry Disability Index, Visual Analog Scale, lumbar disc surgery, revision surgery, outcome study 25

refraction abnormalities, video display 45
reoperations, recurrent lumbar disc herniation, Oswestry Disability Index, Visual Analog Scale, lumbar disc surgery, revision surgery, outcome study 25

satisfaction, students, education, medical aesthetics, medical college 65
severe, head, multisystem, injury, classification, management, outcome 17

silicosis, neopterin 91

smoking, adolescents, school policy, prevention programme 99

students, satisfaction, education, medical aesthetics, medical college 65
video display, refraction abnormalities 45

109
INSTRUCTIONS TO AUTHORS

Scripta Scientifica Medica is the official publication of Medical University Prof. Dr. Paraskev Stoyanov, Varna, Bulgaria. It is currently disseminated among medical university libraries from all over the world on exchange basis. This peer-reviewed annual accepts for publication original articles, unpublished papers recently presented at national and international congress proceedings, and book reviews from Bulgarian and foreign authors. The contributions should be devoted to actual topics in contemporary biomedicine, clinical medicine and interdisciplinary fields as well. They should not have been submitted or accepted for publication elsewhere. The journal publication is offered to the national and international readership in English only.

The manuscript signed by all the authors has to be submitted in duplicate to the Editor-in-Chief of Scripta Scientifica Medica

Prof. Anelia Klisarova, MD, PhD, DSc
Medical University Prof. Dr. Paraskev Stoyanov, Varna
55 Marin Drinov Street
BG-9002 Varna
Bulgaria
Phone: +359-52- 611 899
Fax: +359-52- 650 019
E-mail: scripta@mu-varna.bg

The contributors are encouraged to submit the files of the text and figures of their revised manuscripts on a 3,5”-diskette in any recent MS Word format.

The authors must strictly follow some main instructions listed below.

The manuscript of an original paper should not exceed 7 double-spaced pages with wide margins. The total volume of the text, tables, and references should not exceed 15000 characters. The structure of the article should include the following sections: Introduction, Material and Methods, Results and Discussion, and Conclusion(s). Additionally, there should be: a structured abstract of 200-250 words; key-words (5 to 6 words or non-verbal phrases); a reference list (up to 20 references); a complete address of the author for correspondence (postal and e-mail address, if available), and, eventually, an appropriate number of tables and figures. The tables and legends to the figures should be provided on separate sheets. Data sheets of diagrams should be obligatorily provided. Location of tables and figures should be indicated in the text and on the left margin of the corresponding page. No data reiteration in the text, tables, and figures is permitted. Photographs and microphotographs have to be sufficiently contrasted and up to 12x18 cm in size. Black-and-white pictures, drawings and diagrams are accepted only. Cited authors are ordered alphabetically in the reference list starting with those in the Cyrillic alphabet. Most commonly, these authors should be identified in the text of the article by Arabic numerals in parentheses. Please, do not make use of CapsLock option at all.

PREPARATION OF REFERENCES

Numbering of all the publications cited in the text should correspond to that in the list of references. Bibliographic citations of articles in journals should contain initials and names of all the authors (or at least the first six ones), article title, abbreviated title of the journal according to the style used in Index Medicus (National Library of Medicine, Bethesda, MD, USA), volume, year of publication, issue number (absolutely obligatory for Bulgarian and Russian journals), and page numbers (from-till). The citations of books should contain initials and names of the authors (up to three), book title, number of edition (if any), editor(s) (if any), location of publishing, publishing house and year of publication. Book chapters should contain initials and names of the authors of the chapter, title of the whole book, editor(s) (if any), location of publishing, publishing house, year of publication and page numbers (from-till). Congress proceedings should contain along with data as for book chapters, location and date of the corresponding meeting, kind of materials (abstracts or full papers), and page numbers. Author’s name of the dissertation, title, location, institution, and year of defence should be indicated. With patents and licences, author’s names (if any), registration number, and year of publication should be shown. Personal communications containing the name of the author cited and the date should be accompanied by his (her) permission in written for the corresponding statement.

Let us give some examples.


The authors will receive 25 reprints of their articles along with a sample copy of the issue free of charge.