Review Article

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RELATIONSHIP BETWEEN TEMPOROMANDIBULAR JOINT DISORDERS AND BODY POSTURE

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ABSTRACT:

Temporomandibular disorders (TMD) are the major disorders of the cranio-cervico-mandibular system. They usually result in alterations of human body posture. Temporomandibular joint disorders (TMD) lead to adaptations in certain body structures that minimizes patient's pain and also reconfigures musculoskeletal stress zones. These adaptations if not corrected may cause deviations in normal body posture. Posture involves activation of various muscles that are controlled by the central nervous system (CNS) which lead to postural adjustments. Complex mechanisms that are controlled by various sensory inputs (viz. vestibular, somatosensory, visual) which are integrated in the central nervous system (CNS) cause postural adjustments. The stomatognathic system has an important role to play in postural control. This article reviews the relationship between temporomandibular disorders and body posture.

Keywords: Temporomandibular joint disorder, body posture, stomatognathic system

INTRODUCTION:

Temporomandibular disorder (TMD) leads to adaptations in certain body structures that minimizes patient's discomfort due to pain, and also reconfigures musculoskeletal stress zones. These adaptations if not corrected, may cause alterations in the normal body posture, mostly in the longitudinal plantar arches.[1] The stomatognathic system is a functional unit of the body comprising of different tissues of various origins and structures. These tissues act harmoniously, carrying out diverse functional tasks.[2] The temporomandibular joint is the most frequently used joint in the human body, in which opening and closing occurs about 1500 to 2000 times a day. This may cause gradual deterioration of its associated structures (viz. muscles, bones and cartilage). It has several important functions such as chewing, breathing and pronunciation.[1]

The stomatognathic system consists of skeletal components (maxilla and mandible), dental arches, soft tissues (salivary glands, nervous and vascular supplies), temporomandibular joint (TMJ) and muscles which are interconnected and related.[2,3] These structures when active, aim at reaching

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maximum efficiency as well as protect all the involved tissues.[2,4] The stomatognathic system and human body posture have a reciprocal effect on each other. Any imbalance in the occlusion may result in a TMJ overload, influencing the musculoskeletal system.[2]

The occluso-postural relationship can be evaluated in terms of a possible reciprocal effect, viz. occlusion affecting posture and vice versa. The available literature reviews suggest that there is an intense requirement to improve the qualitative analysis of the investigations. [5, 6]

Altered vertical dimension of occlusion causes changes of head and neck posture, leading to the postural disturbances. As the body posture is closely associated with the body equilibrium, the occlusion has also been regarded as one of the factors that would affect the body equilibrium. Studies have reported that the patients with temporomandibular disorders show greater fluctuation in the center of body gravity compared with normal subjects. [7]

The human posture represents the body position and the spatial relationships between its various anatomical segments that maintain a proper balance under static and dynamic conditions (i.e. anti-gravity function of the muscles) according to the requirements of the surroundings and the motor goals. The mandible represents a balancing pole that is capable of affecting posture and vice versa. [8]

To identify all of the studies correlated with body posture and the stomatognathic system, a literature survey was carried out through the Medline database (Entrez PubMed, http://www.ncbi.nim.nih.gov). The survey covered the period from 1 January 1966 to 31 May 2014 and used the medical subject heading (MeSH) term: 'body posture', which was crossed with the MeSH terms 'stomatognathic system', 'dental occlusion', 'malocclusion', 'mandibular occlusion / position', 'jaw occlusion / position', 'temporomandibular / craniofacial disorders' and 'orofacial / myofascial pain'. Both experimental and observational study designs are included in this review.

PHYSIOLOGY OF POSTURE:

Human posture involves positioning and orientation of the body and distal extremities in equilibrium with motion and gravitation. Head and neck position, respiration and different mood states can alter posture. Postural adjustments consists of various inputs located in the CNS namely visual, somatosensory and vestibular inputs. A fine balance between craniocervical bones and myofascial structures maintain erect position of the head. The upper cervical spine mediates various functions between the trunk and the head and thus forms anatomically and functionally interrelated system. However, after a

certain span of life, body posture usually shifts from ideal to compromised and inefficient state, producing various symptoms such as headache, TMJ pain etc. Pain, if generated in the cervical spine can be relieved by maintaining proper ideal alignment and upward force generation (spinal elongation). [9]

Trigeminal proprioception that influences body posture is mediated by compensatory mechanisms through afferent pathways to the neuromuscular system maintaining good body balance and ideal posture. Posturographic analytical techniques can be employed for the study of postural physiology, but their clinical advantages in dentistry is poor. Thus it can be concluded that occlusal proprioception affects and controls postural balance independently by the morphology of dental occlusion.[5]

According to Peterson Kendall et al, good posture is that state of muscular and skeletal balance that protects the supporting structures of the body against injury or progressive deformity. Conversely, they describe poor posture as a faulty relationship of body parts resulting in increased strain and less efficient balance of the body over its base of support.[10]

In 1996, Ferrario et al studied whether occlusion and foot pressure variation are interrelated and concluded that any alteration in central foot pressure was not related to temporomandibular disorders and changes in occlusal relationship.[11]

In 2012 Manfredini et al studied relationship between body posture, occlusion and temporomandibular joint disorders and concluded that body posture and occlusion are not functionally related. The pain related to temporomandibular joint disorders is independent of any occlusal and postural abnormality. [5]

SITTING POSTURE:

Human spine has four natural curves; cervical lordosis, thoracic kyphosis, lumbar lordosis and sacral kyphosis.[12]The lumbar lordosis flattens when sitting unsupported which is a frequently observed posture in dentistry. The bony infrastructure provides very less support to the spine, which further depends on the paraspinal structures (muscles, connective tissue, ligaments) at the back resulting in increased tension. Paraspinal muscle ischemia can emanate, resulting in low back strain and trigger points.[12]

Forward head postures are common among dentists. Poor posture amongst dentists involves slightly bending the head and neck forward to gain good visibility during various dental procedures which is an unbalanced position. In this position the head and neck are forwardly placed and ahead of the central axis of the body. The vertebrae cannot support the spine, and the muscles associated with the cervical and upper thoracic spine are in a constant state of contraction to withstand the weight of the head. This

can cause pain, often referred to as tension neck syndrome which can cause headache, chronic neck pain often radiating towards arms and discomfort related to shoulders and inter-scapular muscles.[12, 13]

TEMPOROMANDIBULAR JOINT DYSFUNCTION AND ITS RELATIONSHIP WITH POSTURE:

Maximum skull weight and its centre of gravity is located in the anterior region of the cervical spine and temporomandibular joint. The complex biomechanical and anatomical interactions between the head and neck position and the stomatognathic system are interrelated with temporomandibular disorders and body posture. The forward head position will alter the position of mandible along with its functions, thus resulting in an increasing tension of the muscles of mastication and, as a result, cause TMD. [14]

Forward Head Posture (FHP) is closely related with temporomandibular disorders (TMD). Forward head posture (FHP) consisting of slumped or rounded shoulders with collateral extension of the upper cervical spine, results in the anterior shifting of head beyond its normal axis. This posture may result in altered neuromuscular influence on the entire masticatory apparatus, further altering the mandibular rest position. Forward Head Position has an immediate effect on the closing movements of mandible. In Forward head position, the supramandibular muscles elevate the mandible towards the maxilla and cause a decrease or elimination of the resting freeway space, as well as results in a more retruded position. As a result, the suprahyoid and posterior cervical muscles shorten isometrically, while the infrahyoid muscles stretch, thereby causing a decrease or elimination of the freeway space. This altered body position may exacerbate tension in the masticatory muscles and the supporting structures. Clinically, patients with forward head position are more prone to develop neurological disorders viz. dysphagia (difficulty in swallowing).[15]

In 1999, Eliza Saito et al studied the relationship between anterior disc displacement and global posture and concluded that there was an intimate relationship between human body posture and temporomandibular disorder, though it was not attainable to determine whether postural deviations are the causative factor or the result of the disorder.[1]

In 2001, Mariko Fujimoto et al studied the effect of different positions of mandible on the equilibrium of the body and concluded that any changes in mandibular position could affect gait stability. These changes in the mandibular position caused strain of head and neck muscles thereby the body equilibrium was impaired leading to walking imbalance.[6]

In 2006, Olivo et al carried a systematic review to evaluate the evidence

concerning the relationship between head, cervical posture and temporomandibular disorders (intraarticular TMD and muscular TMD). They concluded that this association is still unclear and better control studies, greater sample size and objective evaluation is required.[16]

In 2007, Sakaguchi et al evaluated the effect of different positions of mandible on body posture and reciprocally, body posture on mandibular positions and concluded that changing the mandibular position affected body posture. Conversely, changing body posture affected mandibular position.[17]

In 2009 Cuccia et al, studied relationship between the stomatognathic system and body posture and concluded that tension in the stomatognathic system can lead to impaired neural control of posture. If the proprioceptive mechanism of the stomatognathic system is improper and inaccurate, then body position and head control may be affected.[18]

In 2009 Cesar et al, verified possible relationship between global body posture and internal derangement of the temporomandibular joint and concluded that the features of the analyzed samples in terms of quantity and degree of severity of TMD and also the method used for postural analysis proved too scrupulous in drawing any conclusive relationship between TMD and body posture.[19]

PARAMETERS FOR THE CORRECT WORKING POSTURES:[20]

1. The posture during sitting should be upright, erect and bilaterally symmetrical.

2. The shoulders should be relaxed with the arms besides the body.

3. The forearms should be lightly elevated and comfortable.

4. The angle between upper and lower half of legs should be approximately 105-110^0.

5. Both the legs should be at an angle of 30-45° and should be slightly apart.

6. The patient's head should rest comfortably and should be adequately rotated in 3 directions.

7. The dental operating light should be properly focussed and adequately parallel to the working area for good visibility.

8. The sitting position normally should be between 09.00 - 12.00 o'clock and for left-handed person it should be between 03.00- 12.00 o'clock.

9. The feet should be flat resting on the floor.

10. The patient's head and the sitting position should be adjusted before the start of any procedure.

11. Instruments to be held at 3 supporting points and with a proper grasp to increase the working efficiency.

12. The upper body should be perpendicular on the chair and the spine

should not be curved during any forward movement.

13. The head should be bent at 20°-25° approximately.

14. The arms should be as close to the body as possible.

CONCLUSION:

As the occurrence of temporomandibular disorders is increasing amongst the growing population it has become mandatory to investigate the relationship between global posture and TMD. Evaluation of postural abnormalities in TMD patients is of prime importance for further prevention and control as well as adequate treatment. These evaluations will be of great help to the physicians, physiotherapists and dentists for a very precise diagnoses and thus selecting the best possible functional rehabilitation techniques. When treating the TMD patients, it is important to have a good level of interaction among the individuals of different therapeutic specialties.

Any changes in mandibular positioning affects the gait stability, may it be directly or indirectly. Research quality needs to be more precise and sound. Large trials need to be carried out so that the results are more valid and reliable. Methodologies for posturographic analysis should be improved.

Appearance of any symptoms related to craniocervical systems along with their underlying pathology may be interrelated to TMJ either neurophsiologically or arthrokinematically. As a result accurate diagnosis along with proper treatment planning plays an important role in prevention of any further abnormalities. According to the various authors, postural alignment and musculature reconditioning devices have proved to be an excellent method for correcting abnormalities related to the forward head positioning. Correcting the abnormalities related to FHP will normalize the muscles associated with head, neck and face, thus, eliminating the requirement of any other treatment.

According to the literature reviewed, various authors have suggested that there is a positive correlation between TMD and body posture. However, due to various factors being involved related to TMD and postural abnormalities, the available research has left important gaps in understanding. The findings are too critical to reveal any conclusive relationship between TMD and body posture. Large clinical trials with long term clinical evaluation of various symptoms along with patients follow up and improvement in research methodology is required. The quality of the research study available is relatively low and further studies with higher quality are required for conclusive results.

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