



Incidence of injuries with the practice of active video games

Incidência de lesões com a prática de videogames ativos

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ABSTRACT

Introduction: The active video games (AVGs) emerge in order to enhance the participation of physical activity (PA) in sedentary people. However, it has been seen that the practice is associated with the development of many lesions. **Objectives:** To present a review of the major injuries reported during and/or after the session with active video games. **Method:** The procedure of search of the literature was composed by two researchers independently (RJ) and (JL), in databases: Bireme[®], PubMed[®], Scopus[®] and Web of Knowledge[®], between the years 2006 (year of creation and sales of Nintendo Wii) to 2014, only in the english language. **Results:** Initially identified 664 articles. However, after the selection criteria thirteen papers were selected and analyzed, all were performed with the console Nintendo Wii. Moreover, it can be noted that the games presented a framework of injury with the degree of light to vigorous. Being the major injuries around the shoulder joint and knee. **Conclusion:** The sports games especially Wii tennis and Wii bowling are the ones generated under higher incidence of injuries with the practice of active video games.

Keywords: Injuries; Video games; Physical activity.

RESUMO

Introdução: Os jogos de videogames ativos (VGAs) surgem com o intuito de aumentar a participação das pessoas sedentárias em atividade física (AF). No entanto, pode-se observar que a prática está associada com o surgimento de várias lesões. **Objetivo:** Apresentar uma revisão sobre as principais lesões relatadas durante e/ou após a sessão com videogames ativos. **Método:** O procedimento de busca da literatura foi composto por dois pesquisadores de forma independente (RJ) e (JL), nas bases de dados: Bireme[®], PubMed[®], Scopus[®] e Web of Knowledge[®], entre os anos de 2006 (ano de criação e vendas do Nintendo Wii) e 2014, apenas na língua inglesa. **Resultados:** Inicialmente identificou-se 664 artigos. No entanto, após os critérios de seleção treze trabalhos foram selecionados e analisados, todos foram realizados com o console Nintendo Wii. Além disso, pode-se notar que os jogos apresentaram um quadro de lesão com grau de leve à vigoroso. Sendo as principais lesões em torno da articulação do ombro e joelho. **Conclusão:** Os jogos das modalidades esportivas, em especial o Wii tênis e Wii boliche, são os que geraram maior incidência no quadro de lesões com a prática de videogames ativos.

Palavras-chave: Lesão; Jogos de vídeo; Atividade física.

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INTRODUCTION

Virtual reality is composed of a set of high quality technologies developed to create real-world simulations activities through electronic machines like video games and computers.⁽¹⁾ In this sense, technological innovation becomes so present, that the games are updated at a great speed, and end up becoming a public health problem because of a small leisure device, due to turning the influence of sedentary lifestyle activity.⁽²⁾

Conversely, games with higher body interaction arise in the context of changing this sedentary behavior, through active videogames (AVG). Between the islands (Xavix, PlayStation, EyeToy, Nintendo Wii and Xbox 360 with Kinect) available in the market, one that stands out is the Nintendo Wii, which was created along the American Heart Association (AHA) in order to minimize obesity rate and increase participation in physical activity in inactive population.⁽³⁾ However, even if characterized as a promotional tool to physical activity, it has been shown to increase the number of persons injured during practice of the AVG.⁽⁴⁾

The physical activity is associated with lesions that occur in most cases the existence of some basic harmful mechanisms, such as: Physical contact, uncontrolled excessive overload, muscle imbalance or even by conducting exhaustive efforts^(5,6) these risks may be heightened when these activities involve repetitive gestures of features, with quick changes of direction and without the proper guidance. Thus, during and after the sessions with AVG observed the occurrence of lesions from different levels such as: muscular discomfort and pain, bruises and broken bones.⁽⁴⁾

In this sense, it is necessary to investigate which are the main consoles and games offer higher risk in the development and aggravation of injuries during practice with AVG. The hypothesis is that the games that need more cyclical and repetitive movement, directly influence the injury picture.

Thus, the objective of this study was To present a review of the major injuries reported during and/or after the session with active video games.

METHODS

The selected studies were retrieved from electronic databases: Bireme®, PubMed®, Scopus® and Web of Knowledge®, between 2006 (the year of release of the Nintendo Wii) and 2014, in English, from strategy search by including a combination of these terms and keywords: “injury and active videogames”, “injury and videogames console”, “injury and exergame”, “active videogames and injury”, “video games and lesion”, “video games and injury” and “videogames console and injury”, in consultation with the DeCS - Health Sciences.

The article selection was performed by two investigators independently, and then the results were compared. In case of discrepancies, a third reviewer was consulted aiming at

a consensus. It was established as inclusion criteria: type of study (original articles and case report) and studies portraying injuries intervention with AVG. However, were excluded: review articles and duplicates.

RESULTS

For the selection of eligible articles in the inclusion of the study, carried out a refinement strategy for the title if they do not provide enough information, it performed reading the summary of each article. After this process, 21 articles were eligible for study participation. Subsequently, it performed the reading of all manuscripts in full, and eight of them were excluded, leaving 13 to be included in final. In addition, there was an additional analysis in the references of included studies, in order to verify potential studies not found in the databases. Have been identified potential articles thus remained the total of 13 selected manuscripts. Figure 1 shows the flowchart in which contains the steps of selecting studies.

It notes that the 13 selected studies were conducted between the years 2007 to 2012, reproducing the same research design: case study. It was found unanimity on the type of employee console, Nintendo Wii, exhibiting a predominance in the use of the game Wii Sports: Tennis (46%), accompanied the game Bowling (23%). In addition to these, 23% of the studies did not report the game used and 8% used the Wii Fit. The age of the subjects ranged between 8 to 55 years, with a total sample of 14 subjects, of both genders.

The studies reported that the AVG practice may provide light level to severe lesions, such as chest discomfort, tendonitis, twisting, dislocation, tendon and ligament rupture, bone fracture, dissection of the carotid artery and ocular trauma. Additionally way, found a study,⁽⁷⁾ which identified the participant while playing in multiplayer mode injured his opponent in the forehead with his control, possibly not respect the space proposed by the game maker.

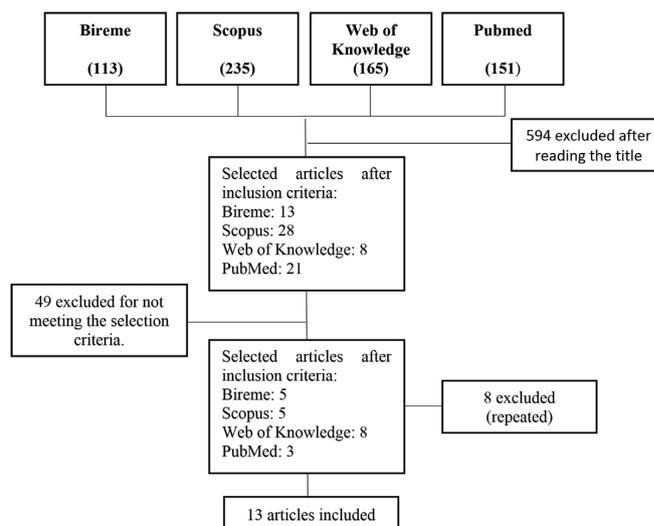


Figure 1. Flowchart of articles selection process.



DISCUSSION

The first report of injury during an intervention with virtual reality was described by Brasington,⁽²²⁾ in which related the process of inflammation with the practice of the Nintendo console, naming this aggression to the body as “Nintendinitis” (Nintendo + tendinitis). However, since the occurrence of the first case, video games undergo changes and enhancements to make closer to reality practice. Thus, in 2006 Nintendo launched the Wii console, with the aim of reducing the number of inactive people physically and trying to assist the treatment of obesity.

However, in accordance with Table 1 of this study, it can be seen that during the Nintendo Wii VGA practice, subjects reported the existence of various types and degrees of injuries.

On this viewpoint, there has been various forms of injury. The most common damage was observed in the joints and ligaments of the shoulder^(9,10,12) and knee.^(11,14,17) Diverting from the results found in another study, in which shows that the areas with higher risk of occurrence, using the Nintendo Wii, are the lacerations in his hand and periorbital hematomas.⁽⁴⁾

Table 1. General characteristics of the selected studies.

Author and year	Type of study	Sample and age	Console and game	Injury reported after practice with AVG	Clinic definition (8)
Bonis ⁽⁹⁾ .	Case report	N= 1 (M) 29 years	Nintendo Wii (Wii Sports: tennis)	Discomfort in the right shoulder, which was diagnosed as acute tendonitis: “Nintendinite”.	Degenerative change, which causes acute or chronic inflammation of the tissue.
Andrew D. Cowley ⁽¹⁰⁾ .	Case report	N= 1 (#)	Nintendo Wii (Wii Sports: *)	Narrated have shoulder pain after the AVG session.	Trauma in muscle tissue, the magnitude depends on the shock caused in the injured site.
Hirpara and Abouazza ⁽¹¹⁾ .	Case report	N= (F) 18 years	Nintendo Wii (Wii Sports: tennis)	Patellar luxation	Severe level of trauma caused by the loss of contact between the bone end and articular surface.
Nett et al. ⁽¹²⁾ .	Case report	N= 1 (M) 22 years	Nintendo Wii (Brunswick Pro bowling)	Pain in the shoulder and arm to throw the ball during the game: “acute tendinitis”	Degenerative change, which causes acute or chronic inflammation of the tissue.
Peek et al. ⁽¹³⁾ .	Case report	N= 1 (F) 55 years	Nintendo Wii (Wii Sports: tennis)	3 days after the practice AVG felt a chest discomfort on the left.	Diagnosis uninformed.
Robinson et al. ⁽¹⁴⁾ .	Case report	N= 1 (M) 16 years	Nintendo Wii *	Injury in the lateral femoral condyle and medial patellar: “abrasion”. Damage to the patellofemoral ligament.	Wear through an abnormal mechanical movement. As a result, condylar fracture, patellar ligament and damage displacement.
Bhangu et al. ⁽¹⁵⁾ .	Case report	N= **	Nintendo Wii (Wii Sports: tennis)	Hand injury: “rupture of the extensor ligament of the thumb”	Loss of continuity of a bind, causing severe trauma.
Brown and McKenna ⁽¹⁶⁾ .	Case report	N= 1 (M) 38 years	Nintendo Wii *	Fracture of the spinous process of the 7th cervical vertebra.	Loss of continuity of a part of the spinous process, generating a severe trauma.
Almedghio et al. ⁽¹⁷⁾	Case report	N= 1 (F) 23 years	Nintendo Wii (bowling)	Injury medial meniscos: “break”.	Loss of continuity of a bind, causing severe trauma.
Faivre et al. ⁽¹⁸⁾ .	Case report	N= 1 (F) 47 years N= 1 (M) 14 years	Nintendo Wii (Wii Sports: tennis)	Severe pain in the left side of neck and acute orbital pain in right side.	The two cases with dissection of the carotid artery due to loss of continuity of the artery.
Chao-Peng. ⁽¹⁹⁾ .	Case report	N= 1 (M) 14 years	Nintendo Wii (Wii fit balance board)	Torsion in the fifth metatarsal.	Movement rotate and / or twist about an axis injuring the membrane and the base of the metatarsal.
Razavi and Lam ⁽²⁰⁾	Case report	N= 1 (M) 7 years	Nintendo Wii (Wii Sports: tennis)	Final ocular trauma on the left side	Extended laceration on the left cornea. Total loss of vision in his left eye.
Galanopoulos et al. ⁽²¹⁾	Case report	N= 1 (M) 54 years	Nintendo Wii (Ten-pin bowling)	Fracture of the thumb metacarpal.	Loss of continuity of a bone, generating a severe trauma.

N – sample; F – female; M – male. * - game not informed. ** - sample not informed. # - gender and age not informed.



This new physical activity instrument has a control with 200 grams containing accelerometers that capture the body movements of the subject at different levels, recording the movements in various directions, allowing the user to simulate sports practices during a game session. However, even as a form of drilling, it can be noted according to the results of the analyzed studies that there is a high incidence of injuries in games that simulate sports activities, such as the tennis and bowling. These games involve repetitive and multidirectional movements while maintaining a predominance in the eccentric action, which generates micro significant lesions in muscle tissue, causing an inflammatory process in muscle cells which can last about 24 hours to one week.^(23,24)

Although been some cases in the literature that the AVG may be injuries precursors, it is noted that there are external factors that influence liable to be injured, as seen in the study Galanopoulos et al. (21), in which practitioner (54 years) shocked his hand on a glass table that was near the site of practice with AVG. Apart from negligence during the session, there is a lack of supervision of fitness-related physical fitness of subjects and oversight for missing the stretching and warm-ups prior sessions, are the main factors that influence the development and severity lesions.

Although the mechanisms involved in the occurrence of the lesions are not fully elucidated, using the Nintendo Wii appears to influence these responses. Physiologically it is believed that the repeated efforts during the session influenced quantitatively the proliferation of the lesions.

The main limitation of the research is that it was used only studies the type case report. Moreover, not determining the time of sessions and the different types of used games that were not contributed to a standard for the diagnosis of lesions. It is noteworthy that there are no studies with other consoles.

CONCLUSION

Can be confirmed the hypothesis that the games need more cyclical and repetitive movement, such that the Wii tennis and Wii Bowling, directly influence the injury picture of the practitioners of active video games. It is the main lesions those affected on the joints and ligaments of the shoulder and knee.

AUTHORS CONTRIBUTION

RJPM and JLBG (Published technical procedures, manuscript writing, interpretation of data, preparation of the manuscript and methodological design); MSSF (writing of the manuscript); SVVNP (writing of the manuscript) and MCC (critical review, drafting of the manuscript and final approval).

COMPETING INTERESTS

The authors declare no conflicts of interest.

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