

Prevalence of temporomandibular dysfunction in athletes: integrative review

Prevalência da disfunção temporomandibular em atletas: revisão integrativa

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ABSTRACT

BACKGROUND AND OBJECTIVES: Temporomandibular disorder is considered to be a set of clinical manifestations that affect the masticatory muscles, the temporomandibular joint and adjacent structures, whose signs and symptoms can negatively impact the quality of life of their patients. A population group in which the prevalence of temporomandibular disorder has increased in recent years is that of athletes. The aim of the present study was to conduct an integrative literature review to verify the prevalence of temporomandibular disorders in athletes, as well as factors related to their predisposition.

CONTENTS: The searches were performed in the Medline, LILACS and Scielo databases, using the descriptors “temporomandibular joint”, “athletic injuries” and “temporomandibular disease”. Inclusion criteria were researches derived from primary data regardless of design, which was the target audience of athletes and that addressed the presence of temporomandibular joint or muscle dysfunction. Ten studies were selected and included in the review. The results obtained with the analysis of these articles showed that athletes are subject to temporomandibular disorders not only due to injuries suffered during competitions, but also due to factors associated with stress and the use of specific devices for sports practice.

CONCLUSION: The occurrence of temporomandibular disorders is common among athletes, but can be avoided with the use of preventive measures and conservative treatments. Dental monitoring is essential for these professionals to perform well, preventing the occurrence of temporomandibular disorders or treating them when they occur.

Keywords: Athletes, Bruxism, Oral health, Temporomandibular joint dysfunction syndrome.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A disfunção temporomandibular é considerada um conjunto de alterações que acometem os músculos mastigatórios, articulação temporomandibular e estruturas adjacentes, os quais podem impactar negativamente na qualidade de vida dos seus portadores. Um grupo populacional no qual a prevalência de disfunção temporomandibular tem aumentado nos últimos anos é o de atletas. Assim, o objetivo do presente estudo foi realizar uma revisão integrativa da literatura a fim de verificar a prevalência das disfunções temporomandibulares em atletas, bem como os fatores relacionados a sua predisposição.

CONTEÚDO: As buscas foram realizadas nas bases de dados Medline, LILACS e Scielo, utilizando os descritores “temporomandibular joint”, “athletic injuries” e “temporomandibular disease”. Os critérios de inclusão foram pesquisas oriundas de dados primários com qualquer delineamento; tendo como público-alvo os atletas e que abordassem a presença de disfunção temporomandibular articular ou muscular. Foram selecionados 10 estudos que foram incluídos nesta revisão. Os resultados obtidos com as análises dos artigos evidenciaram que atletas estão sujeitos às disfunções temporomandibulares não somente pelas lesões sofridas durante as competições, mas também por fatores associados ao estresse e ao uso de dispositivos específicos da prática desportiva.

CONCLUSÃO: A ocorrência de disfunções temporomandibulares é comum entre atletas, mas elas podem ser evitadas com a utilização de medidas preventivas e tratamentos conservadores. O acompanhamento odontológico é fundamental para prevenir ou tratar a disfunção temporomandibular.

Descritores: Atletas, Bruxismo, Saúde bucal, Síndrome da disfunção da articulação temporomandibular.

INTRODUCTION

With the growing need to reach ever higher levels of physical performance, during sports tournaments athletes are required to undergo ever more intense training in order to prepare them to compete without risk or decrease in their physical performance¹. In that context, oral health conditions have gained remarkable relevance in recent years.

Craniofacial problems such as mouth breathing, temporomandibular joint disorders (TMJ), periodontal disease, malocclusion

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and dental losses may influence the athlete's guiding triad: nutrition, training and rest. The imbalance in these three items can result in low performance or even in the athlete's distancing from training and competitions¹.

Temporomandibular dysfunction (TMD) is a generic term that includes numerous clinical issues that affect the masticatory muscles, the TMJ and associated structures. This set of alterations has a multifactorial etiology and can cause pre-auricular pain and in the masticatory muscles, limitations or deviations during mandibular movement, noises during chewing, joint edema, as well as the combination of them²⁻⁴. The prevalence of TMD in the adult population is about 10 to 15% and 4 to 7% in adolescents^{5,6}. More current data from an orofacial pain control service showed that 84% of patients reported the presence of tension in the temporomandibular region and 48% present daily pain in this region⁷.

As for athletes, the prevalence of TMD may vary according to the type of sport practiced and the intensity and frequency of training⁸. Authors⁹ demonstrated that changes in TMJ position can modify the synchronization of head and jaw muscles with muscles from other places in the body, triggering postural changes in body balance and physical performance.

Specifically regarding sports, it's suggested that boxers, due to practicing a sport of high level physical and psychological effort, are more likely to develop TMD due to the numerous traumas in the face region¹⁰. Other studies report that, during the practice of extreme sports, there is more risk for establishing TMJ alterations^{11,12}.

Moreover, another study demonstrated that the posture of softball athletes can influence the growth of TMD incidence due to the increase in the electrical activity of the masseter, the main muscle involved in the process of mandibular elevation¹³. Some authors indicate the presence of limited mouth opening and pain on palpation of the mandibular lifting muscles in adolescent competitors, which may influence their performance¹⁴. The prevalence of TMD in divers is close to 20% due to the barotrauma¹⁵.

Starting from the premise that TMD is present in a large part of the population, that athletes are considered a population group exposed to risk factors for TMD and that it was not found in the literature, until the present moment, no study that synthesizes the evidences related to the subject, the objective of the present study was to carry out an integrative review with the aim of verifying the prevalence of TMD in athletes, as well as the factors related to their predisposition.

CONTENTS

An integrative review was carried out with the objective of identifying the existing works in the national and international scientific literature on the subject of "temporomandibular dysfunction in athletes". With no filters for period of time, searches were made in the Pubmed, LILACS and Scielo databases during the months of August and September 2019. For the search strategy, the following Descriptors in Health Sciences (DeCS) were used: "temporomandibular dysfunction", "athletic injuries" and "temporomandibular joint".

The titles and abstracts of the articles found were read by two researchers independently. The inclusion criteria were primary data research, regardless of design, targeting athletes and that approached the presence of articular or muscular TMD (Figure 1). The exclusion criteria were literature reviews and the presence of TMD associated comorbidities. At the end of the categorization and analysis of the studies, the interpretation of the results was carried out, whose synthesis is presented in table 1.

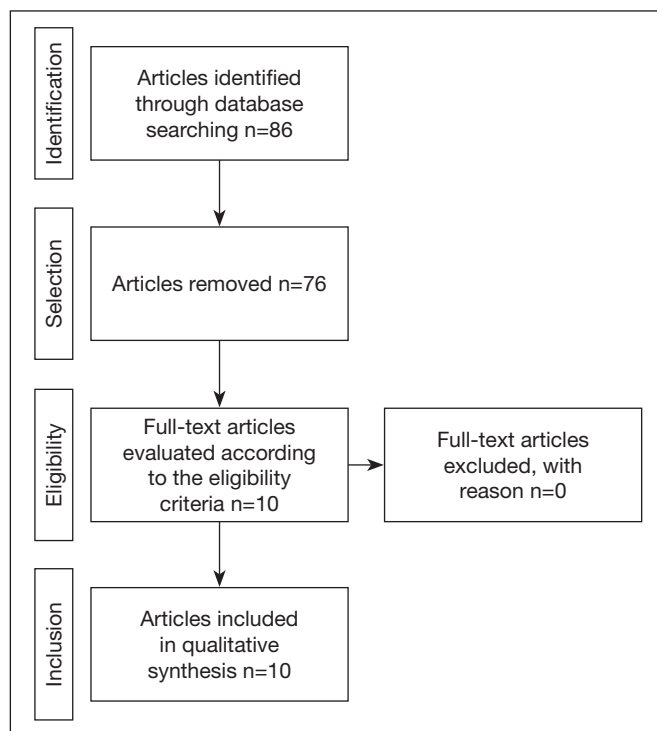


Figure 1. Study selection flowchart

Tabela 1. Relação dos estudos, segundo autores/país/ano, metodologia/amostra, resultados e conclusão

Authors/country	Methodology/sample	Results/conclusion
Hobson ¹⁶ Scotland	Cross-sectional, descriptive study. Sample: 74 divers (62 males and 12 females). Objective: To verify the impact of the diving mask in relation to the signs and symptoms of TMD in divers	Results indicated that the use of the diving mask can contribute negatively in cases of TMD. The discomfort during the use of the mask was considered as predictor for the presence of muscular alteration.
Persson and Kiliaridis ¹⁷ Sweden	Cross-sectional, descriptive study. Sample: 26 male fighters and 26 male non-fighters (control). Objective: to examine the prevalence of dental problems, TMD and dental caries.	The fighters presented more severe and frequent dental alterations, mostly located in the anterior region of the maxilla when compared to the controls. No statistical differences in the prevalence of caries or TMD between groups were identified.

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Table 1. List of studies, according to authors/country/year, methodology/sample, results and conclusion – continuation

Authors/country	Methodology/sample	Results/conclusion
Aldridge and Fenlon ¹⁸ United Kingdom	Cross-sectional, descriptive study. Sample: 63 divers (42 males and 21 females). Objective: To investigate the prevalence of TMD.	The prevalence of TMD among divers was 47.6%. When the values of TMD of hot water and cold water were analyzed separately, the prevalence of TMD was higher in the latter.
Jagger et al. ¹⁹ United Kingdom	Cross-sectional, descriptive study. Sample: 200 divers. Objective: to evaluate oral complications associated with diving, such as TMD and dental fractures.	The prevalence of orofacial pain was 44%, proving to be a common alteration in divers.
Weiler et al. ²⁰ Brazil	Cross-sectional, descriptive study. Sample: 46 basketball players, male adolescents and 41 non-athletes of the control group. Objective: To compare the prevalence of TMD signs and symptoms, as well as examine the association between TMD signs and symptoms at different Tanner stages.	There was no significant difference between athletes and non-athletes in relation to TMD signs or symptoms. When comparing adolescents who presented at least one TMD symptom in the different Tanner stage subgroups, no statistically significant differences was found.
Weiler et al. ²¹ Brazil	Cross-sectional, descriptive study. Sample: 89 adolescent female basketball players and 72 teenage non-athletes (control). Objective: To compare the prevalence of TMD signs and symptoms, as well as to examine the association between TMD signs and symptoms in this population at different Tanner stages.	There was no significant difference between athletes and non-athletes in relation to the presence of TMD. When comparing adolescents who presented TMD symptoms between the different subgroups of the Tanner stages, no statistically significant differences were found.
Mendoza-Puente et al. ²² Spain	Case control study. Sample: 18 boxers and 20 handball players. Objective: to evaluate differences in the incidence of headache, trigeminal nerve mechanosensitivity and TMD among athletes of different modalities.	The comparison between groups found significant differences in all outcome measures ($p < 0.05$) relative to the face region, with worse results in the boxers group.
Lobbezoo et al. ²³ Holand	Cross-sectional, descriptive study. Sample: 536 divers without TMD signs or symptoms before the start of the diving practice. Objective: to determine predictors for the development of TMD complaints in divers.	44.1% of divers reported pain associated with TMD. Tightness and biting, as well as a lower position of the diving mask are predictors for the presence of pain in this population. Diving in cold water proved to be a protection factor for pain in the TMJ.
Bonotto et al. ²⁴ Brazil	Cross-sectional, descriptive study. Sample: professional karate practitioners (group I; $n = 24$), amateur karate practitioners (group II; $n = 17$), high performance mixed martial arts fighters (group III; $n = 13$) and non-athletes (group IV; $n = 28$). Objective: to investigate the prevalence of TMD in high performance athletes and to compare it with the prevalence in amateur athletes and non-athletes.	The prevalence of TMD in groups I (54.2%; $p = 0.003$) and III (61.5%; $p = 0.002$) was significantly higher than in group IV (14.3%). The prevalence in group II was similar to group IV, ($p > 0.05$). Disc displacement diagnosis was identified more frequently in groups I (45.8%; $p = 0.013$) and III (38.5%; $p = 0.012$) than in group IV (7.1%). Chronic pain associated with TMD had low intensity and in none of the groups was disabling.
Bonotto et al. ²⁵ Brazil	Cross-sectional, descriptive study. Sample: 30 rugby players (group I) and 28 non-athletes (group II). Objective: to determine the prevalence of TMD in rugby players.	The prevalence of TMD was higher in group I (53.3%) when compared to group II (14.3%), as well as myofascial pain (40% and 7.1%, respectively). Diagnosis of disc displacement and tooth tightening were also higher in group I compared to group II.

The main causes for the exclusion of articles are: the presence of review studies (9), studies that did not evaluate the prevalence of TMD (30) and studies whose results did not fit within the research question of the present study (36).

DISCUSSION

Orofacial and dental traumas remain a common problem for those involved in group sports. All present some risk of orofacial injury, but those with more physical contact are more predisposed to such events. Common dental injuries in sports include fractures, intrusion, extrusion, dental avulsion and dislocation of the TMJ²⁶.

The prevalence of TMD is high in certain sport practices, especially those that generate impacts on the face and at the

TMJ region, as well as those that require the use of devices that can alter the functional position of the stomatognathic system¹⁶⁻²⁶. Therefore, the need for multidisciplinary monitoring of athletes is evident, with the indispensable presence of the dentist²⁷.

Female athletes, although capable of competing in the same manner as males, have anatomical and physiological variations that make them prone to a higher risk of injuries²⁸. Some of the studies evaluated reported a higher prevalence of TMD in women when compared to male athletes. This difference can also be observed in population studies. The prevalence of TMD was five times higher in women when compared to men according to a study that evaluated 748 individuals²⁹.

The presence of pain was also greater in females. This difference may be associated with the presence of important hormonal

changes in women²². Another possible explanation is the anatomical differences between the sexes related to mandibular angulation and masticatory muscle insertion^{20,21}.

Special attention has been given to divers, especially regarding the use of the diving mask. Tightening and biting, in addition to the lower position of the diving mask, have been reported as predisposing factors for the appearance of TMD^{18,23}. A study³⁰ demonstrated that TMD symptoms related to diving include pain and fatigue in the TMJ and masticatory muscles, crackling or clicking of the TMJ, headache and tinnitus.

Another matter pointed out in some works as a factor related to TMD in divers is the water temperature. It is known that cold water has a beneficial action in cases of rapid post-exercise recovery, and is widely used in sports medicine¹⁹. However, evidence shows that warm water has a better effect in cases of TMD, since diving in cold water can cause a high level of mandibular stiffness, resulting in greater TMJ activity¹⁴. However, there is still no consensus on the temperature of water for aquatic sports and its influence on the TMD scenarios. Further studies on this subject should be conducted in order to elucidate this issue.

Sports activities, especially competitive ones, influence emotions in a strong way and can be seen as powerful stress factors. The relationship established between anxiety or stress and TMD can be explained by the elevation of the contraction of the masticatory muscles, initiating a process of muscular hyperactivity³¹. Thus, the establishment of diagnosis and therapy in the initial periods of the sports life seems to be indicated, and the establishment of individual protocols for each athlete, contributing to the improvement of his/her performance is important.

As for the use of mouth protectors, a study³² showed that in individuals with anterior disc displacement, the use of these devices is not advised due to the worsening of the association between the mandibular head and the articular disc.

Existing studies are biased due to the method of diagnosing TMD, as is the case of a research that uses self-assessment to establish the diagnosis, which may influence the results. Therefore, better quality studies are necessary so that predictors, early prevention and treatment protocols are established in order to prevent the development and worsening of TMD.

CONCLUSION

The occurrence of TMD is common among athletes. In some cases, these dysfunctions can be avoided with the adoption of preventive measures and conservative treatments, and dental follow-up is essential to prevent or treat TMD.

AUTHORS' CONTRIBUTION

Bruna Prade Medeiros

Data Collection, Conceptualization, Methodology, Writing - Preparation of the original, Writing - Review and Editing

Eduardo Grossmann

Writing - Review and Editing, Supervision

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Data Collection, Conceptualization, Project Management, Methodology, Writing - Preparation of the original

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