

Prevalence of signs and symptoms for temporomandibular disfunctions in boxers

Prevalência de sinais e sintomas para disfunção temporomandibular em lutadores de boxe

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RESUMO | INTRODUÇÃO: A disfunção temporomandibular (DTM) possui origem multifatorial, sendo os mais relevantes: fatores psicossociais, fisiopatológicos e traumáticos. O boxe é considerado um fator traumático por ser um esporte de contato que impõe grande energia cinética no seu gestual esportivo, que pode afetar a face e, conseqüentemente, a ATM, com 10% dos atletas podendo sofrer uma lesão facial, representando uma possível predisposição à DTM. **OBJETIVOS:** Estimar a prevalência de sinais e sintomas para DTM em lutadores de boxe, verificar se o uso do protetor bucal altera a intensidade de sinais e sintomas da DTM e verificar a diferença de variação dos sinais e sintomas em lutadores de boxe amador ou profissional. **METODOLOGIA:** Estudo transversal, realizado em uma academia de boxe, na cidade de Salvador, Bahia, Brasil em Abril/2017. Lutadores de boxe foram avaliados pelo Índice Anamnésico de Fonseca. As variáveis foram analisadas através do teste t-Student e o nível de significância estabelecido foi de 5%. Seguiu as normas da Resolução 466/12, e obteve aprovação do Comitê de Ética em Pesquisa da Universidade Católica do Salvador (CAAE 64281616.8.0000.5628). **RESULTADOS:** 51% dos atletas não possuem DTM, 43,1% possuem DTM leve, 5,9% possuem DTM moderada, nenhum participante apresentou DTM severa. Atletas que participam de campeonatos apresentaram maior prevalência de sintomatologia para DTM que os que não participam ($p < 0,05$). **CONCLUSÃO:** Houve associação entre participação em campeonatos e presença de DTM, demonstrando que atletas de competição apresentam predisposição ao desenvolvimento da disfunção.

PALAVRAS-CHAVE: Articulação temporomandibular. Transtornos da ATM. Boxe. Traumatismos em atletas.

ABSTRACT | INTRODUCTION: The temporomandibular disfunction (TMD) has multifactorial origin, being the most relevant: psychosocial factors, pathophysiological and traumatic. The Boxing is considered one traumatic factor for being a contact sport that imposes large expenditure of kinetic energy on sports sign, which could affect the face and, consequently, the TMJ, with 10% of the athletes could suffer a facial injury, representing a possible predisposition to TMD. **OBJECTIVES:** Estimate the prevalence of signs and symptoms for TMD in boxers, check if the use of mouthguard chengs the intensity of signs and symptoms of TMD, check the variation difference of the signs and symptoms in amateurs and professional boxers. **METHODOLOGY:** cross-sectional study, accomplished in a Box gym, in the city of Salvador, Bahia, Brasil in April/2017. Boxers were evaluated by the Anamnesis Index of Fonseca. The variables were analyzed through the test t-Student and the level of meaningfulness established were from 5%. Followed the standards of the Resolution 466/12, and obtained approval from the Research Ethics Committee of the Universidade Católica do Salvador (CAAE 64281616.8.0000.5628). **RESULTS:** 51% from the athletes do not have TMD, 43,1% have light TMD, 5,9% have moderate TMD, none participant presented several TMD. Athletes that participate of championships presented more prevalence of simtomatology for TMD than the ones that do not participated ($p < 0,05$). **CONCLUSION:** There was association between participation in championships and presence of TMD, demonstrating that athletes of competitions gift predisposition to develop disfunction.

KEY-WORDS: Temporomandibular joint. TMJ disorders. Boxing. Traumas in Athletes.

Introduction

The temporomandibular dysfunction (TMD) is a joint of disturbances that involves the masticatory muscles, the temporomandibular joint (TMJ) and associated structures¹⁻². The TMD has multifactorial origin and, among the factors that are most relevant stand out psychosocial factors, pathophysiological and traumatic³. Related to the traumatic factors, the boxing is a contact sport that imposes large expenditure of kinetic energy on sports sign, which could affect, most of the times, the face and, consequently, the TMJ, which could generate a possible predisposition to TMD⁴. Knows itself that the prevalence of TMD is bigger on female sex related to the male sex⁵, however, due to the general population of boxing have more practitioners from the male sex, this situation of gender it reverses, that is why the impairment of TMJ is more prevalent in men⁶.

The boxing is one of the oldest sport and, most of their facial injuries are resulting of the strokes characteristic of this modality. The principal objective is apply aggressive blows with the wrist joint, only allowed in regions above the opponent's hip⁷. This factor, associated to the big exhibition of the face, turn this region the most impairment and, depending on the intensity of the injury, affects the quality of life of the athlete that suffers psychological impacts, physicists and technical⁸.

Epidemiological studies point to 40% to 75% of the population bring forward at least one sign of TMD, such as joint sound, decrease range of motion, clicks on the joint, and that 33% bring forward at least one symptom, such as orofacial pain or on TMJ, headache or buzzing¹⁻⁹. According with the National Youth Sports Foundation, body responsible for prevent sports injuries, any athlete, who has participation in a contact sport, has until 10% of chances to suffer a facial injury, being that, 35% to 56% of this individuals could have sequels on throughout your career¹⁰.

The injury that affect the bucomaxillofacial sistem are present on contact sports, mainly on boxing, however, this information is not considered important for the most athletes¹⁰. Such lesions could be minimized with the use of a mouth guard, which is

an appliance responsible for separate the soft tissue from the hard tissue, increasing absorption of charge triggered by punches¹¹. Soon, his use during training and competitions are fundamental to prevent TMD¹¹.

The evidences are meager about these disfunctions in boxers. The prevention of this lesions are essential, after all, the TMD, regardless of its etiology, bring forth pain and discomfort, moving way the athletes of their activities and competitions. Against the limitation that is caused on the athlete performance, the TMD turns to a public health problem because of the prevalence of signs and symptoms presented by the population associated to the psychosocial impacts that could be caused. A larger knowledge is necessary for preventive measures to be taken, with the purpose to contribute to the development of physiotherapy, in view of this theme suggests new preventive approaches, minimizing the distance from the sport as a work activity and recreation. The objectives of this study were estimate the prevalence of signs and symptoms for TMD in boxers; check if the use of mouth guard changes the intensity of signs and symptoms of TMD, and check the variation difference of the signs and symptoms in amateurs and professional boxers.

Metodology

Were realized a cross-sectional study with composite sample by individuals that are boxer in a private box gym, in the city of Salvador, Bahia, in the year 2017. The inclusion criterion established were: to e a practitioner in the modality with weekly frequency of at least twice times a week. Were excluded of the study boxers that suffered previous injuries of the TMJ (mandible and/or jaw fractures), the ones that exercise more teaching activities than sports practice, the ones that realized exodontia from the 3° upper molar and/or lower in the last two years and others bucomaxillofacail surgeries that could generate bias confusing as a etiological factor for TMD's).

The instruments used were an anamnesis clinical record (containing a questionnaire with sociodemographic, professional, and clinical data) and the Anamnesic Index of Fonseca

(AIF)¹². The file containing the anamnestic clinical questionnaire was composed of: name, sex, age, weight, height, weekly frequency, participation in competition, previous TMD lesions (mandible and/or jaw fracture), accomplishment of specific dental treatment (exodontia of any 3° molar), if uses or not mouth guard and their types (type I or prefabricated) and type III or under measure).

AIF is a validate instrument composed of ten questions that verify the presence of pain in the temporomandibular joint, the nape of the neck, chewing, in the head, difficulties of movement, noises, parafunctional habits (tightening and grinding of teeth), perception of malocclusion and feelings of emotional stress. The participant answers yes, no or sometimes (10, 0 and 5 points respectively). Through the sum of the points, the Index could classify the participants into categories of symptom severity, such as: no TMD (0 to 15 pints), mild TMD (20 to 40 points), moderate TMD (45 to 65 points) and severe TMD (70 to 100 points).

For study, were adopted as predictors variables, the sex, participation in competitions and the use of mouth guards and their types (type I or prefabricated and type III or under measure) and the outcome variable was the degree of TMD severity.

The database was analyzed in the software R (version 3.4.0). Descriptive analysis was performed (absolute/relative frequency, mean values and

standard deviation and median and interquartile range) with the purpose of identifying the general and specific characteristics of the sample studied. The normality of the distribution of the data was checked using the Shapiro-Wilk test and homogeneity of variances by Levene's test. To check the association between study groups and variables of interest we used the Qui-Quadrado test or Fisher Exact when these variables were qualitative and the t-student or the Mann-Whitney test, depending on the normality of the distribution of data, when the variables were quantitative. The level of meaningfulness established were from 5%.

This work followed the standards of the 466/12 Resolution, and obtained approval of the Research Ethics Committee of the Universidade Católica do Salvador (CAAE 64281616.8.0000.5628).

Results

The sample was composed of 51 individuals, who have an average age of 20.76 years (sd ± 7.92), which shows a population of young adults. According to the clinical characteristics of population health (Table 1), the average weight was 66.24 kg (sd ± 14.79). As for the height, the participants showed an average of 1.69 m (sd ± 0.12), the average BMI was 22.65 kg/m² (sd ± 3.34) and presented a weekly frequency average of 4.92 days (sd ± 1.56).

Table 1. Health characteristics of the fighters and weekly training frequency of boxing fighters at a reference gym in the city of Salvador, Bahia.

Variable	Average	Standard deviation	Median
Age (years)	20.76	7.92	18
Weight(kg)	66.24	14.79	66
Height (m)	1.69	0.12	1.7
BMI	22.65	3.34	22.13
Weeklyfrequency (days)	4.92	1.5	5

BMI = Bodymass index

As for distribution of the sample according to gender, educational level and professional data (Table 2), 41 individuals were males (80.4%) and ten were female (19.6%). To the distribution of the sample in relation to participation in championships, 25 athletes (49%) reported having participated in championships and 26 athletes never participated (51%). About the use of mouth guard, 13 athletes (25.5%) do not use the mouth guard and 38 use (74.5%). From the 38 individuals who use the mouth guard, 27 reported using the protector type I (71.1%) or prefabricated, while 11 reported using the type III (28.9%) or made by the dentist. As for performance as boxing teacher, 5 participants act as teachers (9.8%) and 46 do not (90.2%).

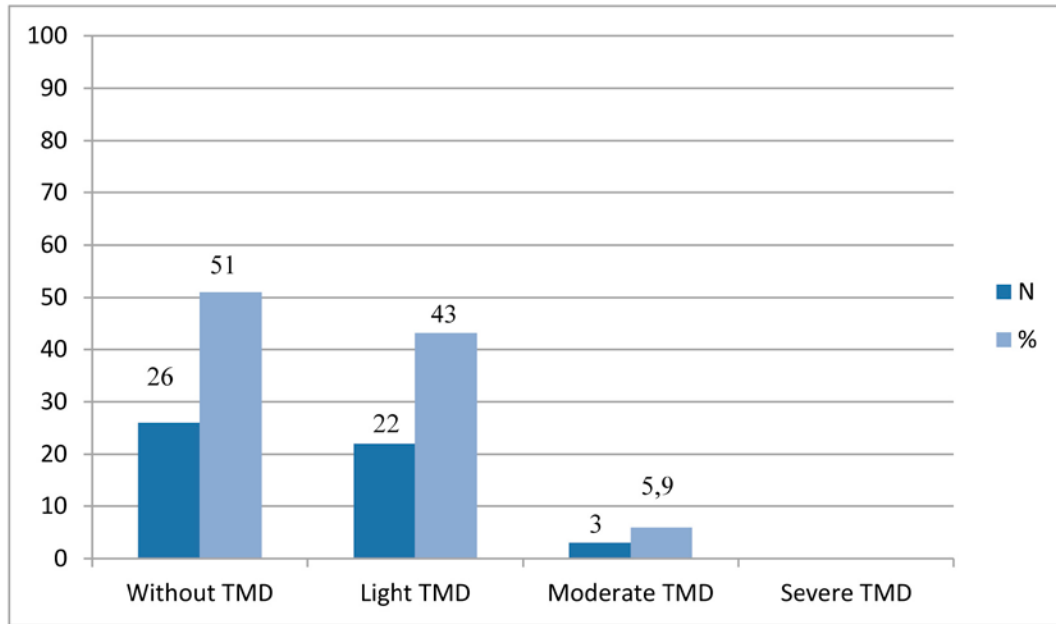
Table 2. Distribution of athletes according to gender, schooling and professional data of boxing fighters of a reference gym in the city of Salvador, Bahia.

Variable	N	%
Gender		
Female	10	19.6%
Male	41	80.4%
Schooling		
Elementary school	17	34.7%
High school	26	53.1%
Higher education	4	8.2%
Postgraduate	2	4.1%
Participation in championships		
Yes	25	49%
No	26	51%
Act as a boxing teacher		
Yes	5	9.8%
No	46	90.2%
Use of mouthguard		
Yes	38	74.5%
No	13	25.5%
Type of mouthguard		
Prefabricated	27	71.1%
Tailor-made	11	28.9%

N = number of individuals

The results showed that the categorization of fighters through the AIF, 26 athletes (51%) did not evolve with signs and symptoms to TMD. Among those who have evolved, there was a higher prevalence for the lightweight category, represented by 22 individuals (43.1%), followed by the moderate category, with only three individuals (5.9%) (Chart 1). No athlete performed in your category presented severe disfunction.

Graphic 1. Distribution of general population according to the Anamnesis Index of Fonseca of boxing fighters of a reference gym in the city of Salvador, Bahia.



According to the distribution in respect of the presence of signs and symptoms to TMD, 25 athletes showed symptomatology, being 6 women and 19 men. There was no statistically significant difference between groups ($p = 0.49$) (Table 3).

Regarding the use of the mouth guard associated with the presence of signs and symptoms to TMD, of 38 athletes who use, 20 did not developed the syndrome and 18 developed, corresponding to 52.6% and 47.4%, respectively. As for the type of protector used in associated with the presence or absence of symptomatology to TMD, 27 athletes use type I protective and 13 did not evolve with the

injury and 14 have evolved. The protector of type III were used for 12 individuals, which four were attended with TMD.

By combining the variable participation in competitions with the presence or absence of symptoms and signs for TMD, it was observed that nine athletes (36%) that participate in competition did not developed TMD, while 16 athletes (64%) developed. Of those who do not participate, 17 athletes (65.4%) do not have TMD while nine (34.6%) have. The results are statistically significant ($p < 0.05$) (Table 3).

Table 3. Association of variables according to the presence of TMD of boxing fighters of a reference gym in the city of Salvador, Bahia.

Variable	N° of individuals with out TMD	N° of individuals with TMD	p value
Gender			
Female	4 (40%)	6 (60%)	0.49
Male	22 (53.7%)	19 (46.3%)	
Act as boxing teacher			
Yes	4 (80%)	1 (20%)	0.35
No	22 (47.8%)	24 (52.2%)	
Use of mouthguard			
Yes	20 (52.6%)	18 (47.4%)	0.68
No	6 (46.2%)	7 (53.8%)	
Type of mouthguard			
Prefabricated	13 (48.1%)	14 (51.9%)	0.38
Tailor-made	7 (63.6%)	4 (36.4%)	
Participation in championships			
Yes	9 (36%)	16 (64%)	0.03
No	17 (65.4%)	9 (34.6%)	

TMD = temporomandibular dysfunction

Discussion

The results found in the study showed that some of the athletes do not have TMD and the other part has mild to moderate TMD and that no athlete presented severe TMD. The literature shows that facial enunciate that any contact sport is directly proportional to the incidence of lesions in this zone¹³. These findings converge with Tim et al¹⁴ study, which surveyed 1,219 lesions in athletes from a North American boxing team from 1977 to 1992, concluding that 18% of injuries were to the face, being the most frequent: soft tissue lacerations and loss of one or divers teeth and less frequently: cellular and jaw fractures, traumatic injuries on TMJ. The study of Cavalcanti et al¹⁵, showed that after the analysis of the occurrence of orofacial injuries in 85 individuals fighting sports, 64.9% had suffered injuries in the regions of the head and face and 16.5% in the TMJ. Thus, it is suggested that the contact sport is an important causal factor of injuries in the face and, but it is not directly related to the process of lesions on TMJ and reason for TMD.

With respect to the use of mouth guard, it was found that is common and frequent use of this feature among the athletes, who usually report know your importance, as shown by the study of Cavalcanti

et al¹⁵, where an analysis were made with the kind of sport practiced and the us the mouth guard and boxing were the sport in which the athletes make use of this instrument (58.1%), corroborating the results found in this study. Protector plus used was of type I or prefabricated, that has a more affordable and standard measurement for any mouth, but feature a false perception of security¹⁶. The use of type III or under protective measure was reported with less frequency in relation to the first, demonstrating that a small part of the sample uses the protector that's made to measure by the dental surgeon, respecting each individual's anatomy and showing better absorption of punches and distribution of charges¹⁷. When comparing the athletes that use protector of type I and type III that is associated with the presence or absence of TMD, no statistically significant differences were found ($p = 0.386$). However, according to Di Leone et al¹⁸, the prevalence of use of type III guard is increasing and Lages¹⁹, reports that the custom-made mouth guards ensure a good adaptation of bite and good stability of the TMJ to prevent injury, confirming their importance during the trainings and competitions.

In this study, to compare athletes who participate in competition with those who do not participate, was noted a higher prevalence of TMD in the first group in relation to the second ($p < 0.05$). Newlsome et al²⁰

have confirmed this result to report that regardless of the sporting event be professional or amateur, fighters can show TMD. However, the professional matches are more dangerous. According to Shirani et al²¹, injuries that affect professional athletes are more severe when compared to amateurs. Therefore, it is suggested that the level of competitiveness of a game associated with the great intensity of the fight right now is a predisposing factor to the emergence of signs and symptoms to TMD, therefore, being highest in professional athletes than in amateur athletes.

Divers authors report more practitioners of males compared to females in contact sports such as boxing²² as was presented in this study. However, even the number of female athletes being lower in this study and there is no statistically significant differences by associating gender with the presence of TMD, still, proportionally, the prevalence of TMD was higher on female by the literacy, corroborating with what is in literature²³. Some authors explain this situation due to risk factors that affect women, such as hormonal and emotional factors, influence in such a way that the prevalence of signs and symptoms to be greater disfunction in females even when the sport of contact has largest on population males.

Noting the prevalence of TMD in some sports, Tozobglu & Tozobglu²³ reported 27% in football players, since Jagger et al²⁴ assessed 35 autonomous divers confirmed 44% frequency of pain in the orofacial region, being 16% of these TMJ related. Yet among diving enthusiasts, Aldrige & Fenlon²⁵ found a prevalence ranging in 47.6% displaying only a symptom and 9.5% displaying three symptoms, being that in this study were considered only patients who exhibited symptoms. The boxers who had one or two symptoms were not considered as symptomatic to TMD. Therefore, according to the literature it is possible to verify that boxing has increased prevalence when compared to other sports, whether or not contact, thus confirming the alternative hypothesis of the study.

On the results found in this study, as limitations, could be reported the number of participants in the research, the emotional factors awakened in athletes, the low sensitivity for detection of signs and symptoms of dysfunction presented by AIF

and not using a more specific index. On the other hand, your relevance can be demonstrated by the low cost of implementation, practical application of questionnaires, using an index that, though little specific, validated scientifically, and the positive contribution to clinical practice based on evidence.

Conclusion

The study showed that 49% of the athletes expressed signs and symptoms to TMD. There was a higher prevalence of the symptomatology in disfunction on light category corresponding to 43.1%. There was association between participation in leagues and presence of TMD, demonstrating that competitive athletes present great risk factor for development of disfunction. In this way, the use of mouth guard type III or tailor-made, must have your use encouraged, both in training when competitions, considering that could contribute to the prevention of traumatic TMD boxing related.

Author contributions

Duplat YS participated in the study design, literature review, data collection, writing, interpretation of the data. Statistical analysis was performed by a third-party statistician. Nunes AM supervised the work; participated in the study design and conception and critical review of the work.

Competing interests

No financial, legal or political competing interests with third parties (government, commercial, private foundation, etc.) were disclosed for any aspect of the submitted work (including but not limited to grants, data monitoring board, study design, manuscript preparation, statistical analysis, etc.).

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