Risks of resistance training for the bruxism: a cross-sectional study

Risco da realização de musculação para o hábito do bruxismo: um estudo transversal

Riesgos del musculación para el bruxismo: un estudio transversal

Jean Soares Miranda[1], Joyce Fernanda Ribeiro Santos[2], Joni Andréa de Aquino[2], Letícia Ladeira Bonato[3], Ronaldo Luís Almeida de Carvalho[2], Gilberto Senechal de Goffredo Filho[4], Leticia Vilaça Willeman Bastos Tesch[4], Ricardo de Souza Tesch[4].

ABSTRACT

Objective: Evaluate the association between anxiety, sleep and awake bruxism in volunteers that practice resistance training. **Methods:** One hundred and two volunteers answered four questionnaires: checklist of oral behaviors to diagnostic the awake bruxism, international classification of sleep disorders to identify sleep bruxism, generalized anxiety disorder 7 (GAD-7) which checks levels of anxiety symptoms and characterization of resistance training (reason, frequency, periodicity and period of training, as well as the perception of orofacial pain or clenching during training). A descriptive analysis, Pearson's and Tukey test (α = 0.05) was made. **Results:** Dental clench during training and the perception of orofacial pain after this activity had a significant association (ρ = 0.36; p < 0.001). The extensive resistance training (ρ = 0.30; p = 0.005) and the frequency of training (ρ = 0.40; p > 0.001) also influenced the perception of pain. The diagnostic of sleep and awake bruxism proved to be associated (ρ = 0.36; p <0.001). Sleep bruxism was also associated with higher levels of anxiety symptoms. (ρ = 0.36; p = 0.002). The other variables showed no statistical association. **Conclusion:** It is concluded that the active adult population participating in this study has inadequate knowledge about functional foods, which are not included in their usual diet.

Key words: Bruxism, Sleep bruxism, Facial pain, Anxiety, Resistance training.

RESUMO

Objetivo: Avaliar a associação entre ansiedade e bruximos (de vigíla e do sono) em voluntários que praticam musculação. **Métodos:** Cento e dois voluntários responderam a quatro questionários: checklist de comportamentos orais para identificar a presença de bruxismo da vigília, classificação internacional de distúrbios do sono para diagnóstico do bruxismo do sono, transtorno de ansiedade generalizada (GAD-7) que verifica os níveis de sintomas de ansiedade e um último para caracterização do seu treino de musculação (motivo, frequência, periodicidade e período do treino, bem como a percepção de dor orofacial ou apertamento dentário durante o treinamento). Foi feita uma análise descritiva, teste de Pearson e Tukey (α = 0,05). **Resultados:** O apertamento dentário durante o treinamento e a percepção de dor orofacial após esta também atividade foi significativa (ρ = 0,36; p < 0,001). A prática de musculação para fins profissionais (ρ = 0,30; p = 0,005) e a frequência do treinamento (ρ = 0,40; p > 0,001) influenciaram na percepção da dor. O diagnóstico de bruxismo do sono apresentou correlação significativa com o bruxismo de vigília (ρ = 0,36; p < 0,001). O bruxismo do sono também foi associado com maiores níveis de sintomas de ansiedade (ρ = 0,36; p = 0,002). **Conclusão:** O apertamento dentário e a percepção de dor orofacial em pacientes que realizam musculação é influenciado pela frequência de treinamento.

Palavras-chave: Bruxismo, Bruxismo do sono, Dor orofacial, Ansiedade, Musculação.

RESUMEN

Objetivo: Evaluar la asociación entre ansiedad y brujería (vigilia y sueño) en voluntarios que practican musculación. **Métodos**: Ciento dos voluntarios respondieron cuatro cuestionarios: lista de verificación de

[1] Department of Dentistry, Federal University of Juiz de Fora (UFJF), Governador Valadares – MG.
[2] Braz Cubas University Center, Mogi das Cruzes – SP.
[3] School of Dentistry, Federal University of Juiz de Fora (UFJF), Juiz de Fora – MG.
[4] School of Medicine of Petrópolis, Petrópolis – RJ.

SUBMETIDO EM: 8/2022 | ACEITO EM: 8/2022 | PUBLICADO EM: 9/2022

comportamientos orales para identificar la presencia de bruxismo de vigilia, clasificación internacional de trastornos del sueño para el diagnóstico de bruxismo del sueño, trastorno de ansiedad generalizada (GAD-7) que verifica los niveles de síntomas de ansiedad y una última para caracterizar tu entrenamiento de fuerza (motivo, frecuencia, periodicidad y periodo de entrenamiento, así como la percepción del dolor orofacial o apretamiento durante el entrenamiento). Se realizó un análisis descriptivo, prueba de Pearson y Tukey (α = 0,05). **Resultados:** El apretamiento de dientes durante el entrenamiento y la percepción de dolor orofacial después de esta actividad también fueron significativos (ρ = 0,36; p < 0,001). La práctica de musculación con fines profesionales (ρ = 0,30; p = 0,005) y la frecuencia de entrenamiento (ρ = 0,40; p > 0,001) influyeron en la percepción del dolor. El diagnóstico de bruxismo del sueño mostró una correlación significativa con el bruxismo de la vigilia (ρ = 0,36; p < 0,001). El bruxismo del sueño también se asoció con niveles más altos de síntomas depresivos (ρ = 0.36; p = 0.002) **Conclusión**: El apretamiento de los dientes y la percepción del dolor orofacial en pacientes que realizan entrenamiento con pesas están influenciados por la frecuencia del entrenamiento.

Palabras clave: Bruxismo, Bruxismo del sueño, Dolor orofacial, Ansiedad, Musculación.

INTRODUCTION

The term "orofacial pain" is used to describe pain felt in the regions of the face and mouth. These pain complaints include not only dental pain, but also muscle and temporomadibular joint pain such as the Temporomandibular Disorders (TMDs) (GHURYE S and MCMILLAN R, 2017). The term TMD covers a wide range of clinical problems involving the masticatory muscles, temporomandibular joints (TMJ) and associated structures. TMD affect up to 80% of the world population, of which 11% have debilitating symptoms, such as chronic pain or mandibular functional disability, and are in treatment need (WETSELAAR P, et al., 2019). Of these patients who need treatment, most are women in adulthood, mainly due to the fluctuation of the estrogen hormone that occurs during the menstrual period, which can cause a reduction in the pain threshold (QUINELATO V, et al., 2018).

The different diagnoses under the “umbrella” term TMD can be a consequence of several risk factors, that can be structural (loosening of ligaments and anatomical variations), psychological (anxiety, emotional stress and catastrophism), traumatic (macro or micro-traumas), genetic, or behavioral (sleep or wake bruxism), partially responsible for triggering and/or perpetuating TMD (WETSELAAR P, et al., 2019; QUINELATO V, et al., 2018; SLADE GD, et al., 2016; KANDASAMY S, et al., 2020). Bruxism, especially its awake form, is indicated as one of the main factors involved in the evolution of TMD (SLADE GD, et al., 2016).

Bruxism can be characterized by tonic or phasic movements of the masticatory muscles that can result in static (dental clenching) or dynamic (grinding) contacts of the teeth, respectively, not occurring during rest or regular mandibular function (LOBBEZOO F, et al., 2018; MIRANDA JS, et al., 2017). According to the period of execution, it can manifest as sleep or awake bruxism (LOBBEZOO F, et al., 2018; DE LA TORRE CANALES G, et al., 2017). While sleep bruxism is a central nervous system mediate disorder, usually associated with micro-arousal during sleep, eventually culminating in dental wear and abfractions, awake bruxism is more related to the daily stress, culminating in dental clenching, edentulous tongue, enamel cracks and orofacial pain (MIRANDA JS, et al., 2017; FRIEDMAN RUBIN P, et al., 2019; TAVARES LMF, et al., 2016; ALHARBY A, et al., 2018).

This parafunctional habit, even during the resistance training, can characterizes awake bruxism, which may represent a risk for TMD development, because an increased frequency of clenching (low or high intensity) can increase the occurrence of musculoskeletal pain (FRIEDMAN RUBIN P, et al., 2019; CIOFFI I, et al., 2017). The literature states that, during resistance training, the athletes tend to clench their teeth as a reflex or even as an attempt to optimize their performance and 30% of the athletes showed some bruxism activity (FRIEDMAN RUBIN P, et al., 2019; MIRANDA JS, et al., 2017; JONES CS, et al., 2000; HUANG DH, et al., 2014).

Intense workouts can produce high levels of physical and mental stress. Included in this context is bruxism and its sequelae, some of which are permanent and physically detectable, such as: enamel wear, dental,

prosthetic and implant fractures and exacerbation of orofacial pain. However, despite the occurrence of systemic musculoskeletal injuries (knee, lumbar, cervical) as a consequence of resistance training is widely reported in the literature, little is known about the consequences of such comportments in the masticatory system and orofacial area (FRIEDMAN RUBIN P, et al., 2019). As these consequences are well reported for other systemic joints, it is possible that the TMJs and orofacial muscles are also involved (FRIEDMAN RUBIN P, et al., 2019; BESSA MS, et al., 2021).

So, it worthy to investigate the frequency of bruxism in individuals that practice or not resistance training, recreational or extensively, and evaluate the association between then. In addition, the role of anxiety be also analyzed in this context. Therefore, we aimed to identify the frequency of anxiety, awake and sleep bruxism, in a population of volunteers that practice or not resistance training. In addition, we sought to verify an association between these factors and the practice of bodybuilding. Targeting these aims, the following null hypotheses were tested: (1) there is no association between sleep or awake bruxism and the practice of resistance training; (2) there is no association between awake bruxism and anxiety; and (3) there is no association between the perception of pain and the reason for training (recreational or extensive resistance trainees).

METHODS

The research was executed by the application of selected remote questionnaires (Google Forms platform) during the period comprehended between February and March of 2021. It was approved by the human being's ethical research committee from the University of Mogi das Cruzes under the protocol nº39919820.0.0000.8100. Before participating, the volunteers (who attended a gym and patients from the aforementioned University) were informed about the methods, procedures, objectives, risks, and benefits of the study, and remotely signed a consent form, in which they allowed the confidential use of their data for research purposes. Individuals with age between 18 and 60 years, regardless of gender, were included.

These ages were chosen because they are the ones with the largest number of healthy volunteers who practice resistance training. However, at the beginning of the questionary interview, the ones who declared, to have any other painful disorder then TMD, such as fibromyalgia, headache, neck and back pain were excluded. In addition, the same questionnaires were also sent to other patients, all of them non-practitioners of resistance training, who attended the general dental clinic of the Braz Cubas University, located in the same city.

The questionnaires comprised the subjective evaluation of possible awake and sleep bruxism (Oral Behaviors Checklist), and anxiety symptoms (Generalized Anxiety Disorder - 7) and are part of the Diagnostic Criteria for TMD (DC/TMD) axis II evaluation. Based on the answers of the former questionnaire, the diagnosis of possible sleep bruxism was confirmed based on the report of dental grinding at night associated with at least one of the other four questions (perception of tooth wear, muscle fatigue in the jaw, pain in the temporal muscle and difficulty opening the mouth upon waking) (AMERICAN ACADEMY OF SLEEP MEDICINE, 2014).

The anxiety instrument (GAD-7) was developed by Spitzer RL, et al. (2006) and validated by Kroenke K, et al. (2017), according to the criteria of the Diagnostic and Statistical Manual of Mental Disorders (PETER H, et al., 2020). It consists of seven items, arranged on a four-point scale: 0 (not once) to 3 (almost every day), score ranging from 0 to 21, to measure the frequency of signs and symptoms of anxiety in a selected period (2 weeks). A positive indicator of signs and symptoms of anxiety disorders is a value equal to or greater than 10 (SCHIFFMAN E, et al., 2014).

The questionnaire for characterization of the resistance training, answered only by those who declared to perform such train, was originally designed for the aims of this research and checked: the objective of the training (recreational or extensive resistance trainees); its frequency (frequent: four or more times a week; infrequent: two or three days a week; or rarely: once a week); how long the volunteers have been practicing physical the training (over one year; between one year and six months; or less than six months); the period of activity (close to bedtime or well before bedtime); in addition to checking if the volunteers have already felt pain in the orofacial region (masseter and/or temporal) after training or perceived clenching their teeth during the resistance training practice.

All data obtained were recorded in digital spreadsheets (Excel 2019, Microsoft, Redmond, Washington, USA) and a descriptive analysis was performed allowing the pairing between the variables of interest. The data were submitted to the statistical treatment by the Pearson's correlation test in a computer software (Statistical Package for Social Sciences, SPSS Inc., Chicago, Illinois, USA). Fisher's test and chi square were also applied to analyze the relationships between variables. The level of significance considered was 95%.

RESULTS

From the one hundred and fifty sent questionnaires, one hundred and two responses were received and the descriptive data obtained are described in **Table 1**. This table informs the questions made to the volunteers and the diagnoses made by the application of the questionnaires, as well as, in a descriptive way, their results (quantitative and percentage).

Table 1 – Descriptive data obtained through the questionnaire answers.

Questions	Number of patients (percentage)	
Gender	Male: 53 (52%) Female: 49 (48%)	
Resistance training practice	Yes: 79 (77.5%) No: 23 (22.5%)	
Resistance training time (among those who perform it)	Less than a semester: 23 (29%) Between one semester and a year: 11 (14%) More than a year: 45 (57%)	
Reason for training (among those who perform it)	Recreational: 67 (85%) Extensive resistance trainees: 12 (15%)	
Training frequency (among those who perform it)	Rarely: 11 Infrequent: 15 Frequently: 53	
Period of activity (among those who perform it)	Close to bedtime (from minutes before to 2h before going to sleep):53 (67%) Well before bedtime (more than 2 hours before bed): 26 (33%)	
Perception orofacial pain after training (among those who perform it)	Yes: 15 (19%) No: 64 (81%)	
Perception of dental clenching during the resistance training (among those who perform it)	Yes: 46 (58%) No: 33 (42%)	
Anxiety symptom indicator	Among the resistance training practitioners Yes: 20 (25.3%) No: 59 (74.7%)	Among those do not practice resistance training Yes: 6 (26.1%) No: 17(73.9%)
	Total sample population: Yes: 26 (25.5%) No: 76 (74.5%)	
Diagnostic of sleep bruxism	Among the resistance training practitioners Yes: 37 (46.8%) No: 42 (53.2%)	Among those do not practice resistance training Yes:13 (56.5%) No: 10 (43.5%)
	Total sample population: Yes: 50(49%) No: 52 (51%)	
Diagnostic of awake bruxism	Among the resistance training practitioners Yes: 58 (73.4%) No: 21 (26.6%)	Among those do not practice resistance training Yes: 19 (82.6%) No: 4 (17.4%)
	Total sample population: Yes: 77 (75.5%) No: 25 (24.5%)	

Source: Miranda JS, et al., 2022.

With the application of Fisher's test between the different variables, a significant relationship was observed only between the reason for training and the perception of pain during training ($p = 0.03$), indicating that volunteers who perform resistance training have a greater tendency noticing pain during this practice.

All results reported below refer to statistics made about Person's correlation. Pearson's correlation coefficient indicated a weak ($\rho = 0.38$), but statistically significant correlation between ($p < 0.001$) the perception of dental clenching and the resistance training practice. Despite weak ($\rho = 0.36$), dental clenching perception during the resistance training also had a significant correlation with the perception of pain after this activity ($p < 0.001$).

Another significant association was observed, by the same method between the reason of practice resistance training and the pain perception after the training ($p = 0.005$), indicating that, again, despite a weak correlation ($\rho = 0.30$), the practice of extensive resistance training significantly influences the perception of pain in the orofacial region. The reported frequency of training per week was also able to influence the perception of pain ($\rho = 0.40$; $p < 0.001$), indicating that the higher the frequency of resistance training was, the greater the perception of pain presented.

Furthermore, sleep bruxism showed a weak, but significant correlation with awake bruxism ($\rho = 0.36$; $p < 0.001$), indicating that, from this sample, those who had a diagnosis with one of the bruxism were also more likely to have the other. In addition, the sleep bruxism was related to anxiety ($\rho = 0.36$; $p = 0.002$).

However, in this study population, the other relationships of interest did not show a statistically significant relationship (**Table 2**). They were: the practice of resistance training and awake bruxism ($p = 0.38$); the training period and sleep bruxism ($p = 0.20$); resistance training and orofacial pain ($p = 0.07$); and anxiety and awake bruxism ($p = 0.41$).

Table 2 - Result of the Pearson correlation test (ρ) and its statistical significance (p) for each variable.

Variables	Resistance training pratice	Reason for training	Training frequency	Period of activity	Perception orofacial pain	Perception of dental clenching	Sleep Bruxism	Awake Bruxism	Anxiety
Resistance training pratice	---	ρ = 0.83 p < 0.001	ρ = 0.88 p < 0.001	ρ = 0.75 p < 0.001	ρ = 0.17 p = 0.08	ρ = 0.38 p < 0.001	ρ = -0.11 p = 0.26	ρ = -0.11 p = 0.26	ρ = -0.11 p = 0.26
Reason for training	ρ = 0.83 p < 0.001	---	ρ = 0.79 p < 0.001	ρ = 0.62 p < 0.001	ρ = 0.30 p = 0.005	ρ = 0.27 p = 0.005	ρ = -0.11 p = 0.28	ρ = -0.07 p = 0.46	ρ = -0.10 p = 0.30
Training frequency	ρ = 0.88 p < 0.001	ρ = 0.79 p < 0.001	---	ρ = 0.73 p < 0.001	ρ = 0.40 p < 0.001	ρ = 0.39 p < 0.001	ρ = -0.11 p = 0.24	ρ = -0.06 p = 0.51	ρ = -0.16 p = 0.10
Period of activity	ρ = 0.75 p < 0.001	ρ = 0.62 p < 0.001	ρ = 0.73 p < 0.001	---	ρ = 0.20 p = 0.03	ρ = 0.35 p =<0.001	ρ = -0.12 p = 0.20	ρ = -0.13 p = 0.19	ρ = -0.10 p = 0.29
Perception orofacial pain	ρ = 0.17 p = 0.08	ρ = 0.30 p = 0.005	ρ = 0.40 p < 0.001	ρ = 0.20 p = 0.03	---	ρ = 0.36 p <0.001	ρ = -0.02 p = 0.84	ρ = -0.02 p = 0.85	ρ = 0.05 p =0.64
Perception of dental clenching	ρ = 0.38 p < 0.001	ρ = 0.27 p = 0.005	ρ = 0.39 p < 0.001	ρ = 0.35 p =<0.001	ρ = 0.36 p <0.001	---	ρ = -0.02 p = 0.86	ρ = -0.02 p =0.83	ρ = -0.05 p = 0.60
Sleep Bruxism	ρ = -0.11 p = 0.26	ρ = -0.11 p = 0.28	ρ = -0.11 p = 0.24	ρ = -0.12 p = 0.20	ρ = -0.02 p = 0.84	ρ = -0.02 p = 0.86	---	ρ = 0.36 p < 0.001	ρ = 0.36 p = 0.002
Awake Bruxism	ρ = -0.11 p = 0.26	ρ = -0.07 p = 0.46	ρ = -0.06 p = 0.51	ρ = -0.13 p = 0.19	ρ = -0.02 p = 0.85	ρ = -0.02 p =0.83	ρ = 0.36 p <0.001	---	ρ = 0.08 p = 041
Anxiety	ρ = -0.11 p = 0.26	ρ = -0.10 p = 0.30	ρ = -0.16 p = 0.10	ρ = -0.10 p = 0.29	ρ = 0.05 p =0.64	ρ = -0.05 p = 0.60	ρ = 0.36 p = 0.002	ρ = 0.08 p = 041	---

Source: Miranda JS, et al., 2022.

DISCUSSION

There is a clear increase in the practice of "health" activities, such as sports and resistance training, among the population in recent decades (ROMBALDI AJ, et al., 2014; BESSA MS, et al., 2021). At least 20% of the American population does some resistance training at least twice a week. Nowadays well-being and health are seen as benefits of physical exercises, which can generate positive feelings by the release of hormones, such as endorphins (LIZ CM, et al., 2016; WESTCOTT WL, 2012). It is known that some local muscle exercises, such as physical therapy, can even improve the level of pain and the masticatory efficiency of the masticatory muscles (BARBOSA MA, et al., 2019).

However, when not properly supervised, these activities can generate injuries, including the orofacial region, although these last consequences are still completely unexplored (FRIEDMAN RUBIN P, et al., 2019). Studies indicate an increase in the number of athletes with TMD, especially in contact modalities such as rugby, wrestling and soccer, being related to trauma to the face and head. In addition, it is possible to observe that high-intensity sports activities require a lot of effort, which generates unconscious tooth clenching (KAMINIECK AKM and DAVATZ GC, 2020).

It has been shown that during resistance training, athletes tend to clench their teeth to improve the performance (FRIEDMAN RUBIN P, et al., 2019). This can be considered a form of awake bruxism (LOBBEZOO F, et al., 2018). The results of this study demonstrated a high frequency of awake bruxism, superior to the frequency of sleep bruxism, among practitioners of resistance training, and that the report of dental clenching was significantly correlated not only with its practice but also the frequency of training ($p < 0.001$). But for another type of training, such as CrossFit, a relationship between the increase in frequency and the time of practice in the development of painful disorders such as TMDs has not yet been found (KAMINIECK AKM and DAVATZ GC, 2020).

Although the data show a significant association of the diagnosis of sleep and wake bruxism ($p < 0.001$), indicating that both pathologies have a tendency to occur simultaneously (WINOCUR E, et al., 2019). The fact of this association is not surprising because some risk factors for the development of both sleep and awake bruxism are the same, and both diagnoses can be performed in the same patient (LOBBEZOO F, et al., 2018). As well as multiple TMD diagnoses can be performed in a single patient. In addition to being common to find patients with bruxism and TMD, the first being a major risk factor for the second (SLADE GD, et al., 2016).

No association was found between awake bruxism and anxiety. However, a significant association was found between sleep bruxism and anxiety ($p = 0.002$). This contrasts with the study by Tavares LMF, et al. (2016), in which only waking bruxism could be associated with high levels of anxiety, but not sleep bruxism. However, some other studies have indicated that sleep bruxism has a positive correlation with anxiety and depression (MONTERO J, et al., 2017; AHLBERG J, et al., 2013). Finally, a systematic review published in 2019 reports that the literature is controversial regarding the association between sleep bruxism and generic symptoms of anxiety in adults. It appears that some specific symptoms on the spectrum of anxiety disorders may be probably associated with sleep bruxism (POLMANN H, et al., 2019).

The fact that awake bruxism was not associated with anxiety in this study can be justified by the recognized observation that the regular physical activities practice reduces the levels of stress, anxiety, the risk of developing depression and other diseases (MC DOWELL CP, et al., 2020; CHEN YC, et al., 2019; HU S, et al., 2020). Some still claim that physical exercises can induce analgesia in patients with chronic pain through endogenous mechanisms (SOUZA JB, 2009). According to the literature, the opioid system acts as a mechanism of action in exercise-induced analgesia in healthy individuals and athletes (SOUZA JB, 2009). Therefore, specifically in this case, dental clenching is understood as a temporary consequence of the effort made during resistance training, with the intention of improving performance, and not an anxiety manifestation habit (FRIEDMAN RUBIN P, et al., 2019).

According to the study by Soares EMS and Silva KMA (2018), the resistance training also did not cause long-term injuries to the stomatognathic system. What was also observed in the study by Oliveira ACS, et al. (2010), who reported that the habits of clenching or grinding teeth during the practice of physical exercises

had no significant association with the presence of dental or muscular injuries. But Bessa MS, et al. (2021) stated that abfraction was more frequent among bodybuilders that practiced resistance training more than 4 times a week. The attrition and the abfraction were the most unknown injuries in their study, which may result in deficiencies in the prevention of dental wear changes (BESSA MS, et al., 2021)

Bessa MS, et al. (2021) also report that bodybuilders were unaware of their abfraction injuries. But in our study, the perception of pain was significantly higher in volunteers who practice extensive resistance training then in those who perform it for recreation (Pearson's correlation chi share: p = 0.001; Fisher test: p = 0,03). Larson-Meyer DE, et al. (2020) hypothesizes that it can be related by the muscle and joint overload generated by a more intense and constant training, which can convert in high levels of physical and mental stress (FERREIRA A, et al., 2015), hormonal changes and exacerbate orofacial pain (LARSON-MEYER DE, et al., 2020; CONTI PC, et al., 1996; SINGH D, et al., 2017; KARAKOULAKI S, et al., 2015).

Even though it is not the objective of this study, it is notable that several athletes complain of TMD after the use of protectors (MURAKAMI S, et al., 2008). This can happen because the use of resilient protectors can stimulate tooth clenching and consequently promote pain (TANAKA Y, et al., 2017; WALILKO T, et al., 2004). However, when hard occlusal splints are made there is an improvement in the oral function and masseter muscle properties (TAKANO S, et al., 2021).

It is interesting to note that the frequency of training also resulted in a higher perception of dental clenching ($p < 0.001$), and also to the perception of orofacial pain after the training ($p < 0.001$). These results can be justified by the fact that it is not necessarily the load intensity but the frequency of the parafunctional activity the responsible for muscle pain sensitivity (SATOKAWA C, et al., 2020).

It is necessary to point some limitations of this study. The remote application of questionnaires can influence the estimation of the proposed diagnoses and cause a bias. Only the diagnosis of possible sleep bruxism was made by the questionnaires. To diagnose probable sleep bruxism, a clinical examination would be necessary. And the gold standard of definitive sleep bruxism assessment is polysomnography (LOBBEZOO F, et al., 2018; CASETT E, et al., 2017). The under-diagnosis of bruxism may also occur because the questions were intended to identify dental contact, which does not necessarily have to occur during bruxism events (LOBBEZOO F et al., 2018). Ideally, objective measures such as electromyography should be used for a definitive diagnosis of these conditions (LOBBEZOO F, et al., 2018).

In addition, the study was conducted during the pandemic period caused by COVID-19, which may have confused some participants perceptions of clenching and pain, because they were momentarily prevented from attending community environments such as gyms. So, the conduction of other clinical and observational studies on the subject are necessary given the sparse literature related to the demonstrated correlation among orofacial pain, bruxism and resistance training practice.

CONCLUSION

The study concluded that there is a significant greater perception of dental clenching and orofacial pain in patients performing resistance training, which is influenced by the frequency of training. However, it was not possible to observe a relationship between awake or sleep bruxism with the practice of resistance training.

REFERÊNCIAS

1. AHLBERG J, et al. Self-reported bruxism mirrors anxiety and stress in adults. Medicina oral, patologia oral y cirugia bucal, 2013; 18(1): e7-11.
2. ALHARBY A, et al. Parafunctional behaviors and its effect on dental bridges. Journal of clinical medicine research, 2018; 10(2): 73–76.
3. AMERICAN SLEEP DISORDERS ASSOCIATION. The international classification of sleep disorders. Psychological medicine, 1991; 21(4): 1079–1079.
4. BARBOSA MA, et al. Effects of 8 weeks of masticatory muscles focused endurance exercises on women with oro-facial pain and temporomandibular disorders: A placebo randomised controlled trial. J Oral Rehabil., 2019; 46(10): 885-894.

5. BESSA MS, et al. Desgastes dentários em praticantes de exercícios físicos de musculação. Archives Of Health Investigation, 2021; 10(2): 301–306.
6. CASETT E, et al. Validity of different tools to assess sleep bruxism: a meta-analysis. Journal of oral rehabilitation, 2017; 44(9): 722–734.
7. CHEN YC et al. Habitual physical activity mediates the acute exercise-induced modulation of anxiety-related amygdala functional connectivity. Scientific reports, 2019; 9(1): 19787.
8. CIOFFI I, et al. Frequency of daytime tooth clenching episodes in individuals affected by masticatory muscle pain and pain-free controls during standardized ability tasks. Clin Oral Investig., 2017; 21(4): 1139-1148.
9. CONTI PC, et al. A cross-sectional study of prevalence and etiology of signs and symptoms of temporomandibular disorders in high school and university students. Journal of orofacial pain, 1996; 10(3): 254–262.
10. DE LA TORRE CANALES G, et al. Is there enough evidence to use botulinum toxin injections for bruxism management? A systematic literature review. Clinical oral investigations, 2017; 21(3): 727–734.
11. DE LIZ CM, ANDRADE A. Análise qualitativa dos motivos de adesão e desistência da musculação em academias. Revista Brasileira de Ciências do Esporte, 2016; 38(3): 267–274.
12. FERREIRA A, et al. Saúde bucal e performance física de atletas Oral health and the physical performance of athletes, 2015; 7: 45-5645.
13. FRIEDMAN RUBIN P, et al. Potential orofacial hazards of resistance training: A controlled comparative study. Cranio: the journal of craniomandibular practice, 2019; 37(1): 45–52.
14. GHURYE S, MCMILLAN R. Orofacial pain – an update on diagnosis and management. British dental journal, 2017; 223(9): 639–647.
15. HU S, et al. Beneficial effects of exercise on depression and anxiety during the covid-19 pandemic: A narrative review. Frontiers in psychiatry, 2020; 11: 587557.
16. HUANG DH, et al. Frowning and jaw clenching muscle activity reflects the perception of effort during incremental workload cycling. Journal of sports science & medicine, 2014; 13(4): 921–928.
17. JONES CS, et al. Weight training injury trends: a 20-year survey: A 20-year survey. The physician and sportsmedicine, 2000; 28(7): 61–72.
18. KAMINIECKI AKM, DAVATZ GC. Frequência e severidade de sintomas de disfunção temporomandibular em praticantes de Crossfit: estudo transversal. Revista Pesquisa Em Fisioterapia, 2020; 10(2): 156–162.
19. KANDASAMY S, GREENE CS. The evolution of temporomandibular disorders: A shift from experience to evidence. Journal of oral pathology & medicine: official publication of the International Association of Oral Pathologists and the American Academy of Oral Pathology, 2020; 49(6): 461–469.
20. KARAKOULAKI S, et al. Relationship between sleep bruxism and stress determined by saliva biomarkers. The international journal of prosthodontics, 2015; 28(5): 467–474.
21. KROENKE K, et al. Anxiety disorders in primary care: prevalence, impairment, comorbidity, and detection. Annals of internal medicine, 2007; 146(5): 317–325.
22. LARSON-MEYER DE, GOSTAS DE. Thyroid function and nutrient status in the athlete. Current sports medicine reports, 2020; 19(2): 84–94.
23. LOBBEZOO F, et al. International consensus on the assessment of bruxism: Report of a work in progress. Journal of oral rehabilitation, 2018; 45(11): 837–844.
24. MC DOWELL CP, et al. Associations of self-reported physical activity and anxiety symptoms and status among 7,874 Irish adults across harmonised datasets: a DEDIPAC-study. BMC public health, 2020; 20(1): 365.
25. MIRANDA JS, et al. Are non-carious cervical lesions more frequent in sleep bruxism patients? Brazilian dental science, 2017; 20(4): 49–54.
26. MONTERO J, GÓMEZ-POLO C. Personality traits and dental anxiety in self-reported bruxism. A cross-sectional study. Journal of dentistry, 2017; 65: 45–50.
27. MURAKAMI S, et al. Influence of mouthguard on temporomandibular joint: Influence of mouthguard on TMJ. Scandinavian journal of medicine & science in sports, 2008; 18(5): 591–595.
28. OLIVEIRA ACS, et al. Análise clínica de pacientes portadores de lesões cervicais não cariosas e sua relação com hábitos. Rev Sul-Bras Odontol. 2010; 7(2): 182-92.
29. PETER H, PENZEL T. Diagnostic and statistical manual of mental disorders. Springer Reference Medizin 2020; 1: 1.
30. POLMANN H, et al. Association between sleep bruxism and anxiety symptoms in adults: A systematic review. Journal of oral rehabilitation, 2019; 46(5): 482–491.
31. QUINELATO V, et al. Association between polymorphisms in the genes of estrogen receptors and the presence of temporomandibular disorders and chronic arthralgia. Journal of oral and maxillofacial surgery: official journal of the American Association of Oral and Maxillofacial Surgeons, 2018; 76(2): 314.e1-314.e9.
32. ROMBALDI AJ, et al. Prevalência e fatores associados à ocorrência de lesões durante a prática de atividade física. Revista brasileira de medicina do esporte, 2014; 20(3): 190–194.
33. SATOKAWA C, et al. Evaluation of tissue oxygen saturation of the masseter muscle during standardised teeth clenching. Journal of oral rehabilitation, 2020; 47(1): 19–26.
34. SCHIFFMAN E, et al. Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) for clinical and research applications: Recommendations of the international RDC/TMD consortium network* and orofacial pain special interest group. Journal of oral & facial pain and headache, 2014; 28(1): 6–27.
35. SINGH D, et al. Trauma from occlusion: The overstrain of the supporting structures of the teeth. Indian journal of dental sciences, 2017; 9(2): 126.
36. SLADE GD, et al. Painful temporomandibular disorder: Decade of discovery from OPPERA studies: Decade of discovery from OPPERA studies. Journal of dental research, 2016; 95 (10): 1084–1092.

37. SOARES EMS, SILVA KMA. Prevalência de lesões em praticantes de musculação em academias do município de Morada Nova/CE. BIUS. 2018; 9(1): 67-78.
38. SOUZA JB. Poderia a atividade física induzir analgesia em pacientes com dor crônica? Rev Bras Med Esporte. 2009; 15 (2): 145-150
39. SPITZER RL, et al. A brief measure for assessing generalized anxiety disorder: the GAD-7: The GAD-7. Archives of internal medicine, 2006; 166(10): 1092–1097.
40. TAKANO S, et al. Effect of isometric exercises on the masseter muscle in older adults with missing dentition: a randomized controlled trial. Sci Rep., 2021;11(1): 7285.
41. TANAKA Y, et al. Effect of mouthguards on impact to the craniomandibular complex. Dental traumatology: official publication of International Association for Dental Traumatology, 2017; 33 (1): 51–56.
42. TAVARES LMF, et al. Cross-sectional study of anxiety symptoms and self-report of awake and sleep bruxism in female TMD patients. Cranio: the journal of craniomandibular practice, 2016; 34(6): 378–381.
43. WALILKO T, et al. Relationship between temporomandibular joint dynamics and mouthguards: feasibility of a test method. Dental traumatology: official publication of International Association for Dental Traumatology, 2004; 20(5): 255–260.
44. WESTCOTT WL. Resistance training is medicine: effects of strength training on health. Curr Sports Med Rep. 2012; 11(4): 209-16.
45. WETSELAAR P, et al. Associations between tooth wear and dental sleep disorders: A narrative overview. Journal of oral rehabilitation, 2019; 46(8): 765–775.
46. WINOCUR E, et al. Awake and sleep bruxism among Israeli adolescents. Frontiers in neurology, 2019; 10: 443.