Impact of the COVID-19 pandemic on facial pain, anxiety, depression, quality of life, and awake bruxism in sleep bruxism patients, occlusal splint users.

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ABSTRACT

Introduction: The COVID-19 pandemic may lead to increased risk of developing or worsening bruxism and facial pain. **Objective:** To evaluate the influence of pandemic on adults with Sleep Bruxism (BS), both sexes, rigid occlusal splint users. **Methods:** Longitudinal observational study conducted in adults, both sexes, with Possible BS (n= 50), mean age 35.95 ± 10.35 years, before (T1) and during (T2) COVID-19 pandemic, in person and remotely, respectively. Presence and intensity of pain (Visual Analog Scale) in the masseter and temporal muscles and temporomandibular joint (TMJ) region, anxiety and depression (HADS), quality of life (QoL) (WHOQOL - Brief) and Awake Bruxism (AB) were assessed. Student's t- test, Mann-Whitney U-test, Wilcoxon, Pearson's chi-square and Mc-Nemar tests were applied (p<0.05). **Results:** The frequency of subjects with masseter, temporal and TMJ pain was 72%, 22%, 42% at T1 and 44%, 26%, 60% at T2, respectively; AB was 78% at T1 and 70% at T2. At both times pain intensity was moderate, there was absence of anxiety and depression, and QoL was regular. At T2, the frequency of subjects with masseter pain decreased 28%, domains physical, psychological and QoL mean worsened (p<0.05). The other variables showed no difference between times (p>0.05). **Conclusions:** During the COVID-19 pandemic, the use of rigid occlusal splints contributed to pain control in masseter muscle; anxiety and depression were absent, QoL worsened, and AB frequency remained high.

Keywords: Bruxism, Occlusal splint, Quality of life, Anxiety, Depression, COVID-19.

IMPACTO DA PANDEMIA DA COVID-19 NA DOR FACIAL, ANSIEDADE, DEPRESSÃO, QUALIDADE DE VIDA E BRUXISMO EM VIGÍLIA EM PORTADORES DE BRUXISMO DO SONO USUÁRIOS DE PLACA OCLUSAL.

RESUMO

Introdução: A pandemia da COVID-19 pode levar ao maior risco de desenvolvimento ou agravamento do bruxismo e da dor facial. **Objetivo:** Avaliar a influência da pandemia em adultos com Bruxismo do Sono (BS), de ambos os sexos, usuários de placa oclusal rígida. **Métodos:** Estudo observacional longitudinal realizado em adultos, de ambos os sexos, com BS Possível (n= 50), idade média de 35,95 ± 10,35 anos, antes (T1) e durante (T2) a pandemia, de maneira presencial e remota, respectivamente. Avaliou-se presença e intensidade de dor (Escala Visual Analógica) na região do masseter, temporal e articulação temporomandibular (ATM), ansiedade e depressão (HADS), qualidade de vida (QV) (WHOQOL Abreviado), Bruxismo em Vigília (BV). Testes *t* de Student, U de Mann-Whitney, Wilcoxon, Qui-Quadrado de Pearson e Mc-Nemar foram aplicados (p<0,05). **Resultados:** A frequência de indivíduos com dor no masseter, temporal e ATM foi 72%, 22%, 42% no T1 e 44%, 26%, 60% no T2, respectivamente; de BV foi 78% no T1 e 70% no T2. Em ambos os tempos a intensidade da dor era moderada, houve ausência de ansiedade e depressão e QV era regular. No T2, a frequência de participantes com dor no masseter diminuiu 28%, QV físico, psicológico e QV média pioraram (p<0,05). As demais variáveis não apresentaram diferença entre tempos (p>0,05). **Conclusão:** Durante a pandemia da COVID-19, o uso de placas oclusais contribuiu para o controle da dor em músculo masseter, ansiedade e depressão eram ausentes, a QV piorou e a frequência de indivíduos com BV manteve-se alta.

Palavras-chave: Bruxismo, Placa oclusal, Qualidade de vida, Ansiedade, Depressão, COVID-19.

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INTRODUCTION

Sleep bruxism (SB) is the masticatory muscular activity during sleep, characterized as rhythmic (phasic) or non-rhythmic (tonic) and the awake bruxism (AB) is the masticatory muscular activity while awake,[1] which is characterized by repetitive or sustained tooth contact and/or tension of the masticatory muscles in the same position or performing mandibular movements, without tooth contact.[2] Bruxism is classified as Possible, when based only on positive self-report, Probable, when positive to clinical evaluation, with or without positive self-report, and Definitive, when positive to instrumental evaluation (polysomnography or electromyography), with or without positive self-report or clinical evaluation.[1]

The SB may be a physiological phenomenon, being quite common in healthy individuals;[3] it may also be associated with anxiety, depression,[4] stress,[5] obstructive sleep apnea[6] and gastroesophageal reflux,[7] in addition, to the consumption of some substances such as alcohol, smoking,[3,5] narcotics,[3] caffeine[5,8] and medications.[9] Some consequences of SB, such as temporomandibular dysfunction (TMD), fatigue and/or muscle pain in the stomatognathic system, tooth abrasion and fractures, cracks in restorative material, pulp necrosis, dentin hypersensitivity, tooth mobility, masseter hypertrophy, and indentations of mucosa and tongue,[10] are possible to occur and can affect the quality of life of its carrier.[11] SB control is essential to reduce such complications,[10] with the use of a rigid occlusal splint (OS) at bedtime is a valid strategy,[5] as well as reducing stress levels, eliminating habits such as smoking and drinking caffeine or alcohol before bedtime and, if necessary, a psychological approach.[5]

The world population mental health was severely aggravated in COVID-19 pandemic, with reported increased levels of anxiety,[12,13] stress,[14] fear,[15] depression[13] and decreased quality of life (QoL).[16,17] The worsening of these psycho-emotional factors may lead to increased risk of development, worsening and maintenance of bruxism, TMD and facial pain symptomatology.[18,19] A study conducted in adults in Italy showed increased frequency of bruxism behaviors, headache and/or migraine, temporomandibular joint (TMJ) pain and facial muscles pain during the COVID-19 pandemic.[13] Similarly, a longitudinal study conducted in Israel found that

female adults had a higher prevalence of SB and AB during the pandemic.(20) Therefore, the purpose of this study was to evaluate the impact of COVID-19 pandemic on facial pain, anxiety, depression, QoL and AB in individuals with SB who are OS users.

MATERIAL AND METHODS

This longitudinal observational study was conducted following the Declaration of Helsinki and the recommendations of the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.(21) The research project was approved by the local Ethics Committee on Human Research (no. 4.749.880 and amendment CAAE 76494717.9.1001.0020). All participants signed the Informed Consent Form.

Sample

The sample size calculation was performed using the sampling method of proportions for infinite population, with 95% confidence, considering the prevalence of 8% of SB in adults(3), i.e., p = 0.08 and (1-p) = 0.92. The sample size calculation indicated a sample size of n=56, with a maximum margin of error of 7.1%.

In 2017 and 2018, those who reported having BS were recruited from among the patients at the University Dental Clinic. The inclusion criteria were adults of both sexes, between 20 and 59 years old, with Possible BS.

Individuals who answered positively to at least one of the two questions regarding their behavior in the last two weeks were considered to have Possible SB:(1) Do you know that you grind your teeth during sleep? Has anyone told you that you grind your teeth during sleep? The exclusion criteria were those who had mouth opening limitations that hindered the process of making an OS, obstructive sleep apnea, alcohol and drug abuse. These eligibility criteria included 56 subjects.

At T1, before the pandemic, face-to-face (2017/2018), the participants answered questionnaires with personal data and to assess pain in regions of the masseter muscle, temporalis, TMJ, pain intensity, AB behaviors, anxiety, depression, and QoL. Later, in the same meeting, rigid OS were made with indication of use during sleep for SB control. Guidance was given about the SB and AB, such as the possible deleterious effects of these behaviors, the importance of keeping teeth apart and facial muscles relaxed, and the proposed use of tools during the day to control AB, such as reminders or

applications. It was emphasized the continuous nocturnal use for SB control and periodic visits for follow-up, for one year.

In 2021, in the first semester, all 56 individuals were invited to participate in a new evaluation (T2), but in a virtual way due to the pandemic. Of the total number of patients who were evaluated at T1, 6 did not respond to the invitation; therefore, the final sample consisted of 50 participants, with a maximum margin of error of 7.5%.

The participants answered the same questionnaires in an electronic form using the Google Forms® system (Google Forms Service, Google, USA). Since the researcher would not be present during the completion of the form, care was taken to insert some information in questions that presented terms difficult for lay people to understand, in order to seek the maximum standardization of the understanding of the questions in the two evaluation times. In addition, they were informed that the researcher would be available for any clarifications, and his contacts were made available via WhatsApp® and e-mail.

In addition to the outcomes described below, at T2, the SB was reassessed, and the use of the OS was questioned, both by means of self-report, with a dichotomous response.

Pain in the region of masseter and temporal muscles and TMJ

The questionnaire for this assessment had the following questions:

1. Presence of pain in some region of the face (yes/no).

2. If you have the presence of pain, indicate the regions (masseter muscle, temporal muscle and TMJ). At T2, lateral facial image was inserted to assist the participant in locating the regions (Figure 1).

3. If there is the presence of pain, choose the intensity of pain on the Visual Analog Scale (VAS), with zero being the lowest and 10 being the highest pain intensity. The pain was classified as light when the intensity was 0 to 2, moderate from 3 to 7, and intense from 8 to 10.

A – Temporal muscle area

B – TMJ (Temporomandibular Joint) area

C – Masseter muscle area
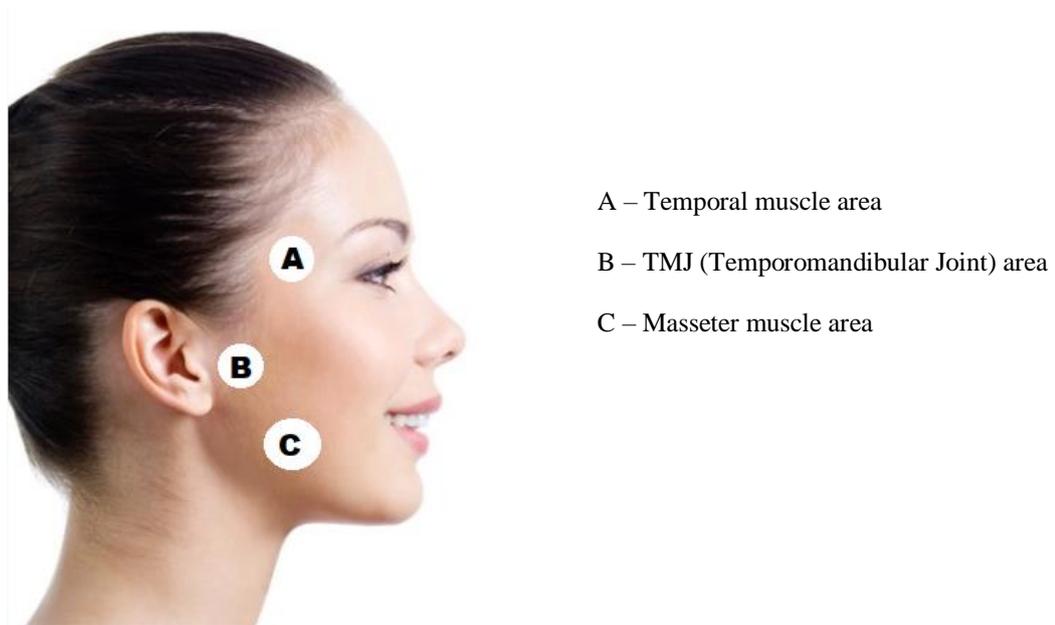
Figure 1 Lateral facial image for the participant to indicate the areas where he felt pain. Source: https://br.freepik.com

Anxiety and depression

The Hospital Anxiety and Depression Scale - HADS was applied, which has excellent validation in comparison with other scales, and adequate to excellent internal consistency (HADS-A [0.68-0.93] and HADS-D [0.67-0.90]).(22) This questionnaire is composed of 7 questions related to anxiety and 7 to depression, alternated among them. Each response can generate a value from 0 to 3 integers and the total score ranges from 0 to 21, with higher values indicating higher levels of anxiety and depression (0 to 7 - absence; 8 to 10 - mild; 11 to 14 - moderate; 15 to 21 - severe).

Quality of Life (QoL)

The WHOQOL - Brief (World Organization of Geneva Mental Health Program) questionnaire was applied, which shows good validity, internal consistency (0.66 to 0.84) and test-retest reliability (0.56 to 0.87). (23)

It consists of 26 questions, one for self-assessment, one for health satisfaction, and 4 domains covering physical, psychological, social relations, and environment. The results can vary in five full points, where the lowest values correspond to the lowest QoL indices. From the score obtained, the following scale is used for the classification and interpretation of the result: 1 to 2.9 - Needs improvement (0); 3 to 3.9 - Fair (1); 4 to 4.9 - Good (2); 5 - Very good (3).

Awake Bruxism

The AB was evaluated by means of self-report, and subjects who answered positively to the following question, which refers to the four behaviors, in the last two weeks, were considered to have Possible AB:(1) Have you somehow noticed that you contact, clench, grind your teeth or keep your jaw tensed, without contact between your teeth, during the day (except when chewing)?.

Statistical analysis

Statistical analysis was performed using the software SPPS IBM Statistics (SPSS, Inc., Chicago, III) version 25.0. The significance level adopted in all statistical tests (α) was 0.05.

Normality was checked using the Kolmogorov-Smirnov normality test. Since the variable age at T1 showed normal distribution for both genders, to assess whether there was a difference between the mean age of the individuals analyzed at T1 according to gender, the parametric Student's t test for independent samples was applied.

The analysis of independence between the variables with dichotomous or polytomous nominal scale at T1 and T2 according to gender was performed with the help of Pearson's chi-square test, followed by the Z test for differences between two proportions with Bonferroni correction.

To check whether there were differences between the mean scores of the ordinal scale variables analyzed at T1 and T2 according to gender, the nonparametric Mann-Whitney U test for independent samples was used.

To evaluate whether there were differences between the mean values of the variables with continuous scale at T1 and T2 according to gender, when the variable presented normal distribution for both genders, the parametric Student's t test for independent samples was applied. When the variable did not show normal distribution in at least one category of the gender variable, the nonparametric Mann-Whitney U test for independent samples was used.

To analyze the difference between T1 and T2, for variables with a nominal dichotomous scale, the nonparametric test of Mc-Nemar change significance for paired samples was used; for variables with an ordinal scale, the nonparametric Wilcoxon test

for paired samples was used; and for variables with a continuous scale, the parametric Student's t test for paired samples was used, since the sample size at each moment, T1 and T2, was n = 50.

RESULTS

The mean age of the 50 participants at T1 was 35.95 ± 10.35 years, with 37 females (35.32 ± 10.35 years) and 13 males (37.72 ± 10.56 years). There was no statistically significant difference between mean age at T1 according to gender (p>0.05).

The whole sample had the presence of SB at T1, since this was an inclusion criterion, and at T2 90% (n=45) of the subjects continued reporting this behavior, being 33 (89.2%) females and 12 (92.3%) males. The entire sample (n=50) received OS at T1, and 36 (72%) patients were using them at T2, 25 (67.6%) females and 11 (84.6%) males.

Outcomes

Pain in the region of masseter and temporal muscles and TMJ

The number of participants with pain in the masseter muscle region decreased from 36 (72%) at T1 to 22 (44%) at T2, with no difference between genders (p>0.05) (Table 1), with a statistical difference between times (p<0.05) (Table 2). For the temporal muscle there was no difference between time and gender (p>0.05) (Tables 1 and 2). Regarding pain in the TMJ region, there was no difference between times (p>0.05) (Table 2), but there was a higher frequency in female participants (n=19; 90.5%) compared to males (n=2; 9.5%) at T1 (p<0.05) (Table 1).

Pain intensity was moderate at T1 and T2, with no difference between times (4.88 ± 3.02 and 4.12 ± 2.82, respectively) and between genders, for females at T1 5.38 ± 2.95 and at T2 4.51 ± 2.72 and males at T1 3.46 ± 2.88 and at T2 3.00 ± 2.89 (p>0.05) (Table 3 and 4).

Anxiety and depression

Anxiety and depression were absent at both assessed times, with no difference between times and genders (p>0.05) (Tables 3 and 4).

Quality of life (QoL)

The physical domain was 3.93 at T1 and 3.60 at T2, the psychological domain was 3.84 at T1 and 3.52 at T2, and mean QoL was 3.80 at T1 and 3.58 at T2, all regular in both times, but lower at T2 ($p < 0.05$) (Table 3).

QoL self-assessment, QoL health satisfaction, and the social and environment domains of QoL were regular at T1 and T2, with no difference between times ($p > 0.05$). There was no difference between genders for all QoL variables ($p > 0.05$) (Table 4).

Awake Bruxism

Regarding BV, 39 participants had it at T1 (78%) and 35 at T2 (70%), with no difference between times ($p > 0.05$) (Table 2). There was a higher frequency of BV in females (n=29; 82.9%) than in males (n=6; 17.1%) at T2 ($p < 0.05$) (Table 1).

TABLE 1 Gender percentages of crossover frequencies for positive answers

Variable		Female (n=37) (%)	Male (n=13) (%)	Total (n=50) (%)	P Value
Sleep Bruxism T1	SB	74	26	100	.a
	Gender	100	100	100	
Sleep Bruxism T2	SB	73.3	26.7	100	0.7471
	Gender	89.2	92.3	90	
Occlusal Splint T1	Occlusal Splint	74	26	100	.a
	Gender	100	100	100	
Occlusal Splint T2	Occlusal Splint	69.4	30.6	100	0.2389
	Gender	67.6	84.6	72	
Masseter Pain T1	Masseter Pain	77.8	22.2	100	0.3288
	Gender	75.7	61.5	72	
Masseter Pain T2	Masseter Pain	72.7	27.3	100	0.8557
	Gender	43.2	46.2	44	
Temporal Pain T1	Temporal Pain	90.9	9.1	100	0.1477
	Gender	27	7.7	22	
Temporal Pain T2	Temporal Pain	76.9	23.1	100	0.78
	Gender	27	23.1	26	

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TMJ Pain T1	TMJ Pain	90.5	9.5	100	0.0238*
	Gender	51.4	15.4	42	
TMJ Pain T2	TMJ Pain	80	20	100	0.2362
	Gender	64.9	46.2	60	
Awake Bruxism T1	AB	76.9	23.1	100	0.3749
	Gender	81.1	69.2	78	
Awake Bruxism T2	AB	82.9	17.1	100	0.0292*
	Gender	78.4	46.2	70	

*P < 0.05 indicates dependence between the variables in the line concerning to gender. Pearson's Chi-square test.
a. No statistics were calculated because the variable in the line is a constant.
TMJ - Temporomandibular Joint; SB - Sleep Bruxism; AB - Awake Bruxism. T1 - Before pandemic; T2 - During pandemic.

TABLE 2 Cross tabulation between variables according to time points

Masseter Pain		T2		P Value
		no	yes	
T1	No	64.3	35.7	0.007*
	Yes	52.8	47.2	
	Total	56	44	

Temporal Pain		T2		P Value
		no	yes	
T1	No	79.5	20.5	0.7912
	Yes	54.5	45.5	
	Total	74	26	

TMJ Pain		T2		P Value
		no	yes	
T1	No	37.9	62.1	0.1222
	Yes	42.9	57.1	
	Total	40	60	

Awake Bruxism		T2		P Value
		no	yes	
T1	No	63.6	36.4	0.3884
	Yes	20.5	79.5	
	Total	30	70	

*P < 0.05 indicates statistically significant difference between T1 and T2.
Non-Parametric test of the significance of Mc-Nemar changes.
TMJ - Temporomandibular Joint; SB - Sleep Bruxism; AB - Awake Bruxism.
T1 - Before pandemic; T2 - During pandemic.

TABLE 3 Means and standard deviations according to time points

Variable	Time	Mean ± SD	P Value
Pain Intensity	T1	4.88 ± 3.02	0.060†
	T2	4.12 ± 2.82	
QoL Self-evaluation	T1	3.92 ± 0.7	0.062‡
	T2	3.68 ± 0.71	
QoL Health Satisfaction	T1	3.62 ± 0.88	0.342‡
	T2	3.46 ± 0.89	
Physical QoL	T1	3.93 ± 0.53	0.001*†
	T2	3.6 ± 0.65	
Psychological QoL	T1	3.84 ± 0.45	0.001*†
	T2	3.52 ± 0.66	
Social QoL	T1	3.85 ± 0.71	0.143†
	T2	3.68 ± 0.65	
Environment QoL	T1	3.63 ± 0.52	0.350†
	T2	3.56 ± 0.57	
Mean QoL	T1	3.8 ± 0.48	0.015*†
	T2	3.58 ± 0.52	
Anxiety	T1	0.8 ± 0.81	0.347‡
	T2	0.94 ± 0.98	
Depression	T1	0.28 ± 0.54	0.1536‡
	T2	0.46 ± 0.68	

*P < 0.05 indicates statistically significant difference between times.
† Student's t-test for paired samples. ‡ Nonparametric Wilcoxon test for paired samples.
QoL - Quality of Life. T1 – Before pandemic; T2 – During pandemic.

TABLE 4 Means and standard deviations of the variables according to gender

Variable	Time	Gender	Mean ± SD	P Value
Pain Intensity	T1	Female	5.38 ± 2.95	0.0523‡
		Male	3.46 ± 2.88	
Pain Intensity	T2	Female	4.51 ± 2.72	0.1181†
		Male	3 ± 2.89	
Anxiety	T1	Female	0.86 ± 0.86	0.4121†
		Male	0.62 ± 0.65	
Anxiety	T2	Female	1.03 ± 0.99	0.2557†
		Male	0.69 ± 0.95	
Depression	T1	Female	0.22 ± 0.48	0.1535†
		Male	0.46 ± 0.66	
Depression	T2	Female	0.41 ± 0.64	0.3479†
		Male	0.62 ± 0.77	
QoL Self-	T1	Female	3.97 ± 0.64	0.595†

evaluation		Male	3.77 ± 0.83	
QoL Self-evaluation	T2	Female	3.68 ± 0.75	0.9143†
		Male	3.69 ± 0.63	
QoL Health Satisfaction	T1	Female	3.59 ± 0.86	0.6879†
		Male	3.69 ± 0.95	
QoL Health Satisfaction	T2	Female	3.41 ± 0.93	0.4†
		Male	3.62 ± 0.77	
Physical QoL	T1	Female	3.96 ± 0.51	0.3741†
		Male	3.82 ± 0.61	
Physical QoL	T2	Female	3.56 ± 0.63	0.3622†
		Male	3.7 ± 0.74	
Psychological QoL	T1	Female	3.9 ± 0.43	0.1246†
		Male	3.67 ± 0.46	
Psychological QoL	T2	Female	3.5 ± 0.65	0.9380†
		Male	3.56 ± 0.74	
Social QoL	T1	Female	3.93 ± 0.69	0.1400†
		Male	3.62 ± 0.72	
Social QoL	T2	Female	3.72 ± 0.64	0.7864†
		Male	3.56 ± 0.7	
Environment QoL	T1	Female	3.72 ± 0.47	0.0834‡
		Male	3.38 ± 0.6	
Environment QoL	T2	Female	3.56 ± 0.56	0.9989‡
		Male	3.56 ± 0.64	
Mean QoL	T1	Female	3.85 ± 0.47	0.1635†
		Male	3.66 ± 0.49	
Mean QoL	T2	Female	3.57 ± 0.51	0.7653†
		Male	3.62 ± 0.55	

$P > 0.05$ indicates no difference between genders.

† Nonparametric Mann-Whitney U test for independent samples.

‡ Student's t-test for independent samples.

Female - n=37; Male - n=13; QoL - Quality of Life.

T1 - Before pandemic; T2 - During pandemic.

DISCUSSION

This research aimed to evaluate the impact of the COVID-19 pandemic on individuals who reported sleep bruxism, users of rigid OS. A decrease in the number of participants with pain in the masseter muscle and a worsening in mean QoL and in the physical and psychological QoL domains were verified.

It is a consensus that bruxism behaviors can cause orofacial pain,[1,2] more specifically, in the masticatory muscles and TMJ.[1] The worsening of psycho-emotional factors caused by the COVID-19 pandemic may intensify orofacial and facial muscle pain,[18] having increased the frequency of pain in TMJ by 36% and in facial muscles by

32.2%.(13) However, in the present study, we found that pain in the temporal muscle and TMJ, as well as pain intensity did not change over time, in agreement with a study in adults that observed similarity in pain during mandibular function (chewing, swallowing and phonation) and related to TMD, also, pain upon awakening and in the temporal muscle, before and during pandemic.(20)

The frequency of participants with masseter muscle pain decreased by 28% at T2, which could be explained by most participants wearing a rigid OS to aid in SB control, with an indication for daily nighttime use. The effect of OS use on pain is controversial. A randomized clinical trial observed that the OS alone generates reorganization of muscle activity, restores balanced muscle function and decreases muscle hyperactivity after 4 weeks, which leads to a decrease in pain.(24) Furthermore, it is reported that OS use decreases masseter and temporal muscle contraction(25) and facial and TMJ pain.(26) However, it has been reported that the reduction in muscle activity and SB episodes are transient, and it has been observed that after two weeks of using the splint, the measurement of masseter muscle activity and SB events did not show significant changes, as occurred at the beginning of its use.(27)

The reduction in the frequency of subjects with masseter pain could also be related to the placebo effect of the use of OS.(28) We believe it is due to the orientations given regarding the importance of bruxism control, and the tendency of these behaviors to increase in the presence of stressful events,(29) the participants felt the need to use them in this pandemic moment to help mitigate bruxism and its consequences, the majority were observed to actually continue their use at T2. In this study, men and women showed similar results at both times for most of the variables studied. However, there was a higher frequency of women with TMJ pain at T1 (51.4%) compared to men (15.4%), in agreement with the article that states that signs and symptoms of TMJ pain are more prevalent in females.(30)

The fact that the frequency of participants with pain in the masseter muscle decreased and there was no change in the frequency of participants with pain in the temporal muscle and TMJ region and in pain intensity between times may be a justification for not worsening the levels of anxiety and depression in this research. A cohort study observed the association of increased anxiety with pain aggravation and

physical disability and cited that anxiety may be associated with increased peripheral inflammatory cytokines involved in the painful inflammatory process. Furthermore, high levels of noradrenaline and serotonin are involved in the process of well-being and help decrease pain levels in some patients.(31)

Global stressors such as disasters,(32) pandemic,(15,18,19) lockdown, social isolation(15) and fear of contracting and transmitting the SARS-CoV-2 virus(15,19) can generate symptoms of anxiety(15,18) and depression in the population.(18) Notwithstanding the fact that the 2nd assessment of the present study was conducted during the COVID-19 pandemic and anxiety and depression were associated with SB,(4) the majority of participants were classified according to the HADS classification as having no anxiety and no depression in both periods assessed. A different result was seen in adults living in China, in whom the COVID-19 outbreak was associated with moderate to severe psychological impact.(12) It is suggested that this difference is due to the fact that this population resided where occurred the initial focus of the virus, in the first months of pandemic, a period in which there was less knowledge about COVID-19.(33) On the other hand, the present research was applied in a later period, in which the 1st dose of the vaccine was being applied in the Brazilian population, a time when there was already more knowledge about methods of prevention of transmission of SARS-CoV-2, symptoms and treatments for the disease, and the effectiveness of immunization.(34)

The results are different from those found in a study that evaluated adults before and during pandemic and observed worsening levels of anxiety and depression.(29) A research with adults in Italy also stated that the pandemic scenario caused threats to physical and mental health, due to the difficulty of living in this stressful period, and verified an increase in anxiety and depression.(13) The period of this research was at the end of the second partial lockdown in Italy, a period in which there was a high risk of contamination and the vaccination campaign had not yet begun in that country. The quarantine helped to restrict the spread of the virus, however, it was a burden on the mental health of the population.(33) A different situation occurred with the participants of the present study at T2, since the city of Curitiba was also in partial lockdown, but the first COVID-19 vaccine dose was already available, which may have generated greater emotional stability, providing more security to return to normal activities and improving mental health.(35)

It has been shown that fear, especially when intense, as in the case of the COVID-19 pandemic, can cause health problems,(12) in addition to affecting physical and psychological well-being and reducing QoL.(36) In the present study, the QoL of the participants was regular, which is in agreement with the statement that individuals with bruxism are significantly associated with worse levels of QoL, especially the physical and psychological domains.(37) However, a systematic review concluded that there are insufficient scientific data to support or reject the association between SB and QoL. The authors justify the heterogeneity of the results by the shared etiology of both and mention that results based on QoL questionnaires should be treated with caution, as it is a subjective variable with risk of intrinsic bias, especially because they are dependent on the individual perception.(38)

In this study, in both times QoL was classified as regular, however, a decrease was observed in the mean QoL and in the physical and psychological domains, corroborating study of adults living in Turkey who found a worsening in QoL during COVID-19 pandemic and suggests that this is due to fear, which generates damage to physical health and can negatively affect psychological well-being and lead to anxiety, stress, and depression.(39) Similarly, research with adults in Italy revealed worsening in the psychological and environmental domains of QoL in individuals with less education, and worsening in the psychological domain in those unemployed, during the pandemic.(16) Higher severity of depressive symptoms and stress were significantly associated with lower QoL in Malaysian medical students, justified by frustration at the interruption of studies or a high prevalence of COVID-19 cases in the area where they lived.(17) In the present research, levels of anxiety and depression showed no worsening according to the results of the questionnaires applied, thus, other factors may have led them to worse QoL, such as few moments of leisure, physical activity, feeling unable to enjoy life, and worsening sexual life,(16) as well as greater compliance with the rules of isolation and social distancing.(17)

A 78% frequency of participants with AB at T1 was found in the sample studied, higher than 28.3% in young adults in Italy(40) and 37.8% in the adult Brazilian population.(41) That may be justified by all participants had sleep bruxism at T1, also, SB and AB can express two phenotypes with similar origin, in addition to shared genetics,

and both are markedly associated with several risk factors in common, such as psychological and lifestyle factors.(42)

Also, it is known that psychological and stress factors are important in the etiology and aggravation of bruxism(1,4,8,19) orofacial pain and TMD.(43) Although the literature reports an increase in SB and AB during the pandemic(18,20) and a higher frequency of clenching activity (46.8%) and muscle tension (49%) during wakefulness,(13) in this study there was no difference between times for both types of bruxism. It was verified during T2 samples frequencies of 90% and 70% for SB and AB, respectively. The maintenance of the high frequency of SB was expected, since there is no treatment known to eliminate it definitively.(5) Regarding AB, when individuals are asked about such behaviors, there may be the promotion of self-awareness and positive change regarding the ability to self-recognize and avoid the behavior.(2) It is assumed that the frequency of participants with AB has not increased due to the use of the suggested tools, which intend to help control AB behaviors through self-awareness.

A higher female frequency of AB was also observed at T2, which is congruent with a higher prevalence of AB in female adults in Israel during the pandemic.(20) Although the sample in this study did not show high levels of anxiety and depression, AB increase may have occurred because during pandemic, women were more afraid of contracting the virus than men,(39) agreeing with the statement that AB behaviors are associated with psychological changes.(8)

Regardless of the pandemic, current life leads the population to a gradual increase in anxiety and stress levels(44) and consequently bruxism behaviors.(45) It is highlighted the importance of using reminders and apps in bruxism control,(45) as well as the use of the rigid occlusal splint, which in the present study proved to be effective in reducing pain in the masseter muscle.

Among the limitations of this research are that it was not conducted the assessment of Probable or Definite AB and SB, not quantifying tools use to control AB, as well as other possible negative events present in participants lives during the pandemic, such as loss of family or friends, affective distress, job aspect, financial problems, or other risks of bias that could influence some of the variables studied.

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and awake bruxism in sleep bruxism patients, occlusal splint users.
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CONCLUSIONS

The evaluation of adults who reported having sleep bruxism, who mostly used occlusal splint, allowed us to conclude that during the COVID-19 pandemic:

- There was maintenance in the frequency of individuals with TMJ and temporalis muscle pain, pain intensity, and levels of anxiety and depression.

- There was a lower frequency of individuals with pain in the masseter muscle and a higher frequency with worsening quality of life, higher frequency of women with AB.

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Compliance with Ethical Standards

The authors declare that the local Research Ethics Committee approved the project (no. 4.749.880 CAAE amendment 76494717.9.1001.0020) and that the study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments.

Competing Interests

The authors have no relevant financial or non-financial interests to disclose.

Informed consent to participate

Informed consent was obtained from all individual participants included in the study.

Informed consent to publish

The authors affirm that human research participants provided informed consent for publication of their data.