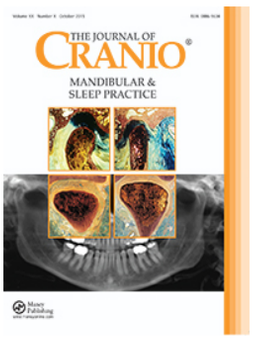

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CLINICAL PRACTICE

COVID-19 pandemic and the psyche, bruxism, temporomandibular disorders triangle

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ABSTRACT

Objective: To investigate the effect of the Coronavirus pandemic on the report of psychological status, bruxism, and TMD symptoms.

Methods: An online survey was drafted to report the presence of psychological status, bruxism activities, and reported symptoms of TMDs perceived during the COVID-19 pandemic in a population of 506 individuals.

Results: Mental health is not positive during the Coronavirus pandemic: almost half the subjects reported an increase in bruxism behaviors, while up to one-third reported an increase in their symptoms involving the TMJ and jaw muscles. Specifically, 36% and 32.2% of participants reported increased pain in the TMJ and facial muscles, respectively, and almost 50% of the subjects also reported more frequent migraines and/or headaches.

Conclusion: Increased psychosocial distress during the COVID-19 pandemic can increase the frequency of TMD symptoms and bruxism behaviors, which, in turn, constitute a triangle of mutually interacting factors with the psychological and emotional status.

KEYWORDS

COVID-19; orofacial pain; bruxism; psychological assessment; temporomandibular disorders

Introduction

The coronavirus disease (COVID-19) is a condition due to the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) virus infection, which caused a devastating pandemic officially acknowledged by the World Health Organization (WHO) [1].

This emergent infectious disease originated in December 2019 from mainland China with initial cases emerging from the city of Wuhan, Hubei Province [2] and led to the need for social distancing and partial and/or total lockdown to control the collapse of health systems and spread of the virus. By February 2021, vaccination campaigns had just started in some countries, but generalized partial or total lockdowns are still adopted in most regions of the world. The need to control the pandemic spread has, therefore, led to a drastic change of routine and lifestyle for millions of individuals. The ongoing situation gave rise to severe physical and mental health threats due to living through such a stressful period, leading to an increase in anxiety and depression reports. Not surprisingly, a recent study shows that the coronavirus outbreak is associated with a moderate to severe psychological impact in most individuals [3].

It is well known that these psychological factors may be important for the etiology of bruxism [4–7] as well as for the onset and aggravation of orofacial pain [8,9]. Thus, several studies have assessed the relationship between temporomandibular disorders (TMDs) and psychological stress [10,11]. In addition, TMD patients report that their symptoms increase during stressful situations [12].

Both bruxism and TMDs have a non-negligible prevalence: bruxism prevalence in adults ranges from 22% to 30% for awake bruxism (AB) and from 8% to 15% for sleep bruxism (SB) [13], while more than 50% of the population may present some signs of TMDs, even if just a minority of individuals requires treatment [14]. Moreover, bruxism represents a possible risk factor for several clinical consequences, including TMDs, thus representing a factor interplay that is very important for orofacial pain practitioners [5,6,15,16].

Within these premises, the aim of this study was to get deeper into the investigation of the effects of the COVID-19 pandemic on the psychological status, bruxism behaviors, and TMD symptoms of a large group of individuals recruited at the general population level.

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Materials and methods

A self-administered online survey was drafted for anonymous compilation by general population individuals to report the presence of increased bruxism behaviors, reported symptoms of TMDs, and psychological impairment perceived during the COVID-19 pandemic.

The study included voluntary participants who were first recruited by spreading word among dental patients and practitioners by text message, email, and social networks. They were then encouraged to pass it on to others during the last part of the second partial COVID-19 lockdown in Italy (November/December 2020). All participants accepted the privacy policy and provided informed consent before completing the questionnaire. The research protocol was approved by the Institutional Review Board of the University of Siena (Siena, Italy; 161120), and the STROBE Checklist was compiled. The survey was administered by an online form service (Google Form service, Google, USA).

The survey referred to the period from March 2020 to December 2020 and was organized in four sections. The first section focused on sociodemographic data, including gender, age, and education. The second section was about bruxism behaviors and some related habits. In detail, the following bruxism behaviors were investigated: clenching and grinding (both during wakefulness and during sleep), muscle tension and oral habits, such as pushing the tongue against the teeth and/or tongue, cheeks, objects, and fingernail biting. The third section was based on the report of signs and symptoms that are potentially related with TMDs, such as facial muscle and/or TMJ pain, TMJ noise, difficulties in mouth opening and/or pain in the jaws on awakening. Questions on pain interference on daily activities, presence of migraine and/or headache, and tinnitus were also included. The fourth section investigated factors related to the psychological sphere, such as smoking, difficulties in falling asleep, loss of interest for any activity, sense of melancholy or solitude, and disturbed/restless sleep.

All items concerning bruxism, TMD symptoms, and psychological status were based on the report of frequency with respect to the period prior to the COVID-19 pandemic.

After data collection, a descriptive analysis was performed for all items. A binary correlation test was used to assess the correlation among the psychological status, bruxism activities, and reported symptoms of TMDs perceived during the COVID-19 pandemic.

Results

The questionnaire was fully completed by 506 individuals, of whom 62.3% were females and 37.7% were males. The most represented age groups were those 26–40 and 41–60 years, accounting for 73.7% of participants. Concerning work duties, the majority of participants were self-employed workers (44.7%) (Table 1).

Regarding SB, the percentages of subjects who reported an increase in grinding and clenching activities during the pandemic period were 25.7% and 41.3%, respectively. The percentage of individuals reporting an increase in their AB behaviors was up to 46.8% for teeth clenching activity during wakefulness and 49% for the report of muscle tension during wakefulness. In addition, 40% of the subjects also reported that they had an increased frequency of other oral behaviors (i.e., pushing the tongue against the teeth and/or tongue, cheeks, objects, and fingernail biting) (Table 2).

Concerning TMD signs and symptoms, 36% and 32.2% of participants reported increased pain in the TMJ and facial muscles, respectively. Almost 50% of the subjects also reported having more frequent

Table 1. Demographic data of the study population expressed in percentage.

Gender		Age				Employment Status			
Male	Female	18–25	26–40	41–60	>60	Student	Unemployed	Self-employed	Employee
37.7	62.3	19.8	35.2	38.5	6.5	20	8.1	44.7	27.3

Table 2. Bruxism data of the study population expressed in percentage.

	SB		AB		OTHER BEHAVIORS
Did you experience an increase in the following behaviors during the pandemic?	Grinding	Clenching	Teeth Clenching	Muscle tension during wakefulness	Pushing tongue against teeth or biting tongue, cheeks, objects, fingernails
Yes	25.7	41.3	46.8	49	40.3
No	31.8	23.5	32.6	32.4	47.8
I can't answer	26.5	23.5	12.5	8.3	4
I have never had this habit	16	11.7	8.1	10.3	7.9

AB: Awake bruxism; SB: Sleep bruxism.

Table 3. TMD data of the study population expressed in percentage.

Did you experience an increase in the following behaviors during the pandemic?	TMDS				TMD-Related Conditions			
	Facial muscle pain	TMJ pain	TMJ noise	More difficulties in mouth opening on awakening	Pain in the jaws on awakening	Pain interference on daily activities	Migraine and/or headache	Tinnitus
Yes	36	32.2	19.2	19.8	27.7	19.4	44.9	16.2
No	47.2	49.4	61.1	59.9	52.2	60.1	46.2	57.5
I can't answer	6.3	4.7	5.1	7.3	4.9	4.9	4	8.1
I have never had this habit	10.5	13.6	14.6	13	15.2	15.6	4.9	18.2

TMD: Temporomandibular disorder; TMJ: Temporomandibular joint.

migraines and/or headaches, while an increase in tinnitus was reported by 16.2% (Table 3).

More than half of the participants reported an increase in difficulty falling asleep, loss of interest, sense of melancholy or solitude, and disturbed/restless sleep (Table 4).

Concerning the relationship between variables, there is a general pattern of positive correlation between the psychological status, bruxism activities, and reported symptoms of TMDs perceived during the COVID-19 pandemic (Table 5).

Discussion

The coronavirus disease (COVID-19) has spread rapidly worldwide since late 2019 due to its greater transmission

Table 4. Psychological data of the study population expressed in percentage.

Did you experience an increase in the following behaviors during the pandemic?	Smoking	Difficulty falling asleep	Loss of interest	Sense of melancholy or solitude	Disturbed/restless sleep
Yes	14.8	54.3	51.2	61.5	65
No	35	43.5	43.3	36	32.2
I can't answer	50.2	2.2	5.5	2.6	2.8

Table 5. Pearson correlation coefficient test used to evaluate the existence of correlation among the main variables of psychological status, bruxism activities, and reported symptoms of TMDs perceived during the COVID-19 pandemic.

		Sleep Grinding	Awake Clenching	Oral Behaviors	Muscle Pain	TMJ Pain	TMJ Clicking	Loss of Interest	Disturbed Sleep
Sleep Grinding	Correlation coefficient	1	0.643**	0.401**	0.306**	0.423**	0.318**	0.524**	0.382**
	Sign. (2-tailed)	.	0	0	0.002	0	0.002	0	0
Awake Clenching	Correlation coefficient	0.643**	1	0.351**	0.506**	0.530**	0.209*	0.572**	0.504**
	Sign. (2-tailed)	0	.	0	0	0	0.037	0	0
Oral Behaviors	Correlation coefficient	0.401**	0.351**	1	0.208*	0.274**	0.351**	0.364**	0.178
	Sign. (2-tailed)	0	0	.	0.038	0.006	0	0	0.076
Muscle Pain	Correlation coefficient	0.306**	0.506**	0.208*	1	0.724**	0.387**	0.389**	0.382**
	Sign. (2-tailed)	0.002	0	0.038	.	0	0	0	0
TMJ Pain	Correlation coefficient	0.423**	0.530**	0.274**	0.724**	1	0.469**	0.368**	0.453**
	Sign. (2-tailed)	0	0	0,006	0	.	0	0	0
TMJ Clicking	Correlation coefficient	0.318**	0.209*	0.351**	0.387**	0.469**	1	0.293**	0.200*
	Sign. (2-tailed)	0.002	0.037	0	0	0	.	0.004	0.047
Loss of Interest	Correlation coefficient	0.524**	0.572**	0.364**	0.389**	0.368**	0.293**	1	0.640**
	Sign. (2-tailed)	0	0	0	0	0	0.004	.	0
Disturbed Sleep	Correlation coefficient	0.382**	0.504**	0.178	0.382**	0.453**	0.200*	0.640**	1
	Sign. (2-tailed)	0	0	0.076	0	0	0.047	0	.

*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).

potential than SARS-CoV and MERSCoV. This led to a "public health emergency" to the point that the WHO declared pandemic status in the first quarter of 2020 [1].

Several studies have since shown how it is not uncommon for individuals with a confirmed diagnosis or with suspected COVID-19 disease to experience great psychological pressure [17]. In addition, people who are quarantined or living in lockdown may feel the psychological difficulties associated with social isolation and lack of interpersonal contacts, work restrictions, and health and financial concerns. This combination of factors resulting from the loss of daily certainties and social relationships can easily lead to high levels of anxiety and depression [18].

The very same psychological features that have been reported in people experiencing lockdown have often been described in association with temporomandibular disorders [19]. Indeed, within the multifactorial etiology of TMDs, which includes a combination of biomechanical and neurological factors, some psychological traits and personality features (e.g., anxiety, depression, somatization) may represent the necessary background for triggering symptoms and treatment-seeking behaviors [19–21]. Concurrently, increasing evidence suggests a multifaceted etiology for bruxism as well, with a combination of several psychosocial, physiological/biological, and exogenous factors [6,7,21–23]. Nonetheless, despite the complexity of performing clinical research on the topic, the role of psychosocial factors, such as anxiety and stress sensitivity, in particular, has been generally accepted as a major determinant for patients self-reporting bruxism, especially during wakefulness [7,22–24]. Thus, the triangle of bruxism, pain, and psychosocial factors is an important target for clinical research in the field of orofacial pain and temporomandibular disorders.

Considering these premises, the aim of this study was to get deeper into the topic by investigating the effect of the COVID-19 pandemic on the psychological status, bruxism behaviors, and TMD symptoms of individuals experiencing the psychological difficulties caused by the prolonged lockdown. This strategy of report has emerged as very fruitful for gathering data on several topics during the pandemic.

The main general finding is that most of the subjects reported an increase in bruxism behaviors and TMD symptoms in association with a worse psychological status. Concerning this last aspect, participants reported falling asleep with difficulty (54.3%), loss of interest for any activity (51.2%), sense of melancholy or solitude (61.5%), and disturbed/restless sleep (65%). These findings are in line with other studies performed by other health professionals [16,17]. These results, therefore, support the hypothesis that both bruxism and TMD can be intensified by psychologic factors, as often hypothesized by several authors [6,7,21–26].

In detail, regarding bruxism behaviors, almost half of the individuals who answered the survey reported an increase in frequency: 46.8% reported an increased clenching activity compared to the pre-pandemic period, and 49% said they felt increased muscle tension during wakefulness. As an additional finding, 40.3% of subjects reported an increase in other oral behaviors, such as pushing the tongue against teeth or biting the tongue, cheeks, objects, or fingernails. These data are in accordance with the suggestions that psychosocial factors, such as stress and anxiety, are associated with self-reported SB and AB [5–7,21,23–25].

With regard to TMDs, about one-third of responders reported an increase in pain in the facial muscles and temporomandibular joints compared to the period prior to the COVID-19 pandemic. Opening the mouth upon awakening also became more difficult for 19.8% of subjects. In addition, 44.9% responded that they suffer more from migraine and/or other headaches. These results are in agreement with Wu et al. [27], who also found that TMD patients have a higher level of anxiety and depression than orthodontic patients as well as the general population. They are also in line with the data by Medeiros et al. [28], who showed, in a population of students, that social isolation and stressful situations due to the COVID-19 pandemic can increase the number of people with symptoms of TMD, anxiety, and depression. Also, in the case of both Israeli and Polish populations recruited for the above two studies, the Coronavirus pandemic has caused significant adverse effects on the psycho-emotional status, resulting in the intensification of their bruxism and TMD symptoms [29]. To further support this hypothesis, the study by Saccomano et al. [30] showed that 51.4% of subjects reported a worsening of TMD symptoms in the last month and related this condition to the coronavirus lockdown and to the stress experienced in that period.

Taken together, these findings suggest that increased psychosocial distress during the COVID-19 pandemic can exacerbate reported bruxism (especially during wakefulness) and TMD symptoms, including those associated with orofacial pain, which, in turn, may further negatively interact with the psychological and emotional status of an individual.

In this scenario, cognitive behavioral therapy (CBT) could be promoted on a routine basis for all dental patients, with the aim of mitigating maladaptive coping behaviors by enhancing their ability to manage stress [31]. However, although the results of the present study appear to be straightforward to suggest the increase of

self-reported bruxism and TMDs in relation to the lockdown's psychological pressure and are in agreement with several studies, further investigations should be carried out to overcome the possible limitations of the present study. For instance, the adoption of a data collection strategy based on a self-reported evaluation with a single observation point is poorly specific to identify possible fluctuations of symptoms and behaviors in relation with the different phases of the pandemic. Additional factors concerning the personal life sphere that could have increased the perceived stress with respect to the average situation (e.g., COVID-19 disease running in the family, financial problems, loss of work, marital status) may be used to build multiple variable models that get deeper into the prediction of effects at the individual level.

Conclusion

The stress of living during such a devastating period as the ongoing worldwide COVID-19 pandemic caused an aggravation of the psychological and emotional status of many individuals, with possible consequences on the increase of self-reported bruxism behaviors and TMD symptoms. In a population of more than 500 Italian individuals, more than half of the participants reported an increase in difficulty falling asleep, sense of melancholy or solitude, disturbed/restless sleep, and loss of interest. Similarly, almost half the subjects reported an increase in their AB clenching (41.3%) and/or SB clenching (46.8%) activities during the pandemic period; 49% of subjects also reported increased muscle tension. Up to one-third reported an increase in their symptoms involving the jaw muscles and the temporomandibular joint; finally, almost 50% of the subjects also reported having more frequent migraines and/or headaches.

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