The Prevalence of Temporomandibular Disorder and Bruxism During the COVID-19 Pandemic: A Cross-Sectional Survey in Mizoram

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Introduction

Temporomandibular joints (TMJ) are complex joints, which can acquire dental and non-dental related pain in the maxillofacial region known as temporomandibular disorders (TMD). TMD is a group of conditions that cause pain and dysfunction of the masticatory muscles, the temporomandibular joints (TMJs), and associated structures [18]. Their characteristics include regional pain, limited jaw movements, and acoustic sounds from TMJs during motion. TMD was previously attributed solely to alterations in dental occlusion that affected maxilla-mandibular position and function. Even though it has a complex etiology, there are multiple factors contributing to the development of symptoms such as comorbidity factors, including biological, behavioural, environmental, and cognitive factors, often the actual causative factor may be unclear in many instances [9, 15, 22, 25]. One of the symptoms of TMD which is strain on the jaw is one of the main causative of bruxism. Bruxism is an involuntary habitual grinding of the teeth, it is defined as: "A movement disorder of the masticatory system characterized by teeth-grinding and clenching during sleep as well as wakefulness" [30]. This parafunction has two manifestations, i.e. sleep bruxism (SB) and awake bruxism (AB). SB is defined as the activity of masticatory muscles during sleep, which may be rhythmic (phasic) or non-rhythmic (tonic), and is not a movement disorder or a sleep disorder in otherwise healthy individuals. AB is the activity of the masticatory muscles occurring during wakefulness, which is characterised by sustained or repetitive contact between the teeth or/and stiffening or thrusting of the mandible and is not a movement disorder in otherwise healthy individuals [26]. SB and AB can act as a potential risk factors for several negative consequences

of health such as masticatory muscle pain, oral mucosa damage, mechanical tooth wear, and failures of prosthodontic constructions [13, 27, 32].

TMD and bruxism are correlated with subconscious determinants. According to existing evidence, parafunction, i.e. the impaired or altered functions of the TMJ such as excessive teeth clenching and grinding, are possible risk factors for TMD [7].Trauma in the head and neck region, malocclusions along with genetics, joint hyperlaxity, and joint hypermobility could act as risk cofactors [7]. Hormones also play an essential role. The signs and symptoms of TMD are four times more among women than men [17]. TMD can have an impact on many aspects of a personal health and well-being which go well beyond the face and jaw [12].The role of psychological risk factors, including depression and stress, in the physical symptoms of TMD are widely acknowledged [1, 27]. Bruxism acts as an inherent risk factor for infrequent adversarial wellness outcomes, such as masticatory muscle soreness, oral mucosa injury, mechanical tooth damage, and breakdown of prosthodontics format [4]. It is associated with some medical disorders such as Parkinson's disease, torus mandibularis, oromandibular dystonia, Rett syndrome, Down syndrome, trauma and atypical facial pain [20].

Psychological factors (emotional stress), genetics and occlusal interference are risk factors for bruxism. In Italy, the prevalence of SB is estimated at 16% among young adults and 38% among adults. In comparison, the prevalence of AB in the general population is estimated at 22-30% where both forms of bruxism affect men and women equally [19].

The COVID-19 pandemic has caused various psychological effects including tension, fear, and despair, depression, among others [19]. Research demonstrates that TMD indications and predictions after the pandemic are suspected to ensue related to post-traumatic stress disorder [10]. The incidence of oral disorder increased in cases of elevated anxiety. People with unusual anxiety levels were more prone to having a more significant repetition of oral behaviour. Additional pain intensified the corporal body consciousness and gave way to hyper diligence [24]. The prevalence of TMD is about 1.5 times higher in women than men. The most significant risk of the onset of TMD is between the ages of 18-44 years of age [18,29]. Studies among COVID-19 patients indicate adverse effects on subjects' psycho-emotional status, leading to the intensification of TMD and Bruxism symptoms. This increased the orofacial pain among the patients [4]. There is a higher prevalence of TMD symptoms, anxiety and depression among the participants, which is associated with gender and anxiety symptoms. The oral behaviour and TMD symptoms, anxiety symptoms, and depression positively correlate. The studies show that social isolation due to the COVID-19 pandemic has impacted the prevalence of TMD symptoms [10]. A number of people examined in dental clinics were diagnosed with attrition, which is one of the side effects of bruxism, as well as several reports of symptoms that indicated TMD. A study conducted in India, where

one-third of the respondents showed significant psychological impact due to the COVID- 19 incidence, showed a higher effect on younger people.

Moreover, the psychological impact among women was higher than that among men [28]. In Mizoram, studies among adolescents within the age range of 15-18 years showed that females have higher stress levels than males [21]. These, among other studies, show a correlation between TMD and bruxism and the high-stress levels during the COVID-19 pandemic, especially among young female individuals. This review examines and evaluates the effect of the COVID-19 pandemic on the prevalence of temporomandibular disorder and bruxism symptoms.

Material and Methods

The study was a cross-sectional one using questionnaires to examine the significance of TMD problems and bruxism among those who met the inclusion criteria for respondents aged 18 years and older from the state of Mizoram, India. To collect data using Google Forms, we used an online survey questionnaire distributed over the Internet (in English and Mizo) via WhatsApp, email, and social media.

A series of questions with demographic and general information, concerns regarding coronavirus, questions commonly used to evaluate TMD Screening [2, 14, 21]. Bruxism screening and Stress screening [5, 8], which is utilized to explore the diagnosis appropriately and assists in determining the cause and related information was used. A consent form along with the following data was collected.

This research uses the positivism paradigm research philosophy to determine the causes and effects of bruxism and TMD disorder especially during COVID-19. It primarily focuses on the impact of bruxism and TMD disorder during COVID-19 in Mizoram, and the influence of gender on these effects. The study uses the quantitative method for data collection and analysis and along with this, the explanatory method is used. The reliability and validity of the research have been ensured. The quantitative approach is used to identify what male and female think and know about the bruxism and TMD during the COVID-19 outbreak. The questionnaire was developed to assess the opinion and understanding of bruxism and TMD.

Results and Discussion

Table 1 below shows the number of males and females affected by the different stress-related dental disorders. The percentage of females affected by these disorders is higher than that of males in all categories.

Table 1

Males and females affected by the different stress-related dental disorders

Dental disorders		Gender			
		Male		Female	
		Count	Column N %	Count	Column N %
Sleep Bruxism Category	No	152	42,3%	267	42,0%
	Yes	207	57,7%	369	58,0%
Awake Bruxism Category	No	326	90,8%	563	88,5%
	Yes	33	9,2%	73	11,5%
TMD Category	NO TMD*	177	49,3%	196	30,8%
	Mild TMD*	130	36,2%	319	50,2%
	Moderate TMD	41	11,4%	101	15,9%
	Severe TMD	11	3,1%	20	3,1%
PSS Category	Low*	88	24,5%	102	16,0%
	Moderate	244	68,0%	450	70,8%
	High*	27	7,5%	84	13,2%

*p<0,05

The table below (table 2) shows the different age groups affected by the various stress-related dental disorders. The population between 18-35 years is overall affected more by awake bruxism, moderate TMD with moderate number of stress than other age groups. The difference is significant for moderate (* $p_{12}<0,05$).

Table 2

Different ages affected by the stress-related dental disorders

Dental disorders		Age					
		18-35 years		36-55 years		56 and higher	
		Count	Column N %	Count	Column N %	Count	Column N %
Sleep Bruxism Category	No	336	42,7%	79	41,4%	3	18,8%
	Yes	450	57,3%	112	58,6%	13	81,2%
Awake Bruxism Category	No	698	88,8%	174	91,1%	15	93,8%
	Yes	88	11,2%	17	8,9%	1	6,2%
TMD Category	NO TMD	280	35,6%	83	43,5%	9	56,2%
	Mild TMD	352	44,8%	92	48,2%	4	25,0%
	Moderate TMD*	125	15,9%	15	7,9%	2	12,5%
	Severe TMD	29	3,7%	1	0,5%	1	6,2%
PSS Category	Low* **	115	14,6%	69	36,1%	6	37,5%
	Moderate*	570	72,5%	113	59,2%	10	62,5%
	High*	101	12,8%	9	4,7%	0	0,0%

* $p_{12}<0,05$, ** $p_{13}<0,05$

Table 3 compares the PSS totals against COVID-19 Vaccination. The totals are lower for vaccinated individuals than non-vaccinated individuals and those who are against vaccination.

Table 3

TMD and PSS totals against COVID-19 vaccination

Dental disorders	COVID–19 vaccine					
	1st / 2nd dose taken		Not yet vaccinated		Against vaccination	
	Mean	Standard error of mean	Mean	Standard error of mean	Mean	Standard error of mean
TMD total points	25,64	0,61	28,16	2,76	33,08	6,11
PSS total	18,86	0,21	19,65	0,92	18,38	1,58

The results in table 1 show a higher number of females affected by TMD and bruxism overall than males. For instance, only 9,2% of males reported awake bruxism compared to 11,5% of females. 36,2% of males reported mild TMD compared to 50,2% of females. For moderate TMD, the number of females was also higher at 15,9% than the number of males at 11,4%. Both males and females scored at 3,1% for severe TMD (see table 1). The perceived stress score (PSS) for males was statistically significant and higher at 24.5% than for females at 16%. However, females reported a higher PSS score for moderate and high stress. The increased stress score was statistically significant ($p_{12} < 0,05$) at 13,2% for females compared to 7,5% for males. There are studies that match these results. One such study showed a higher frequency of women than men as reporting awake bruxism among the Dutch adult population. Women reported 6,4% while men scored 3,2% for awake bruxism. This difference was statistically significant at ($p = 0,05$) [31]. A study by Bueno et al., 2018 showed that women had a higher prevalence and twice as high a risk of developing TMD than men [6].

The age group of 18-35 years was most affected compared to other ages. Table 2 shows statistically significant results for the high frequency of moderate TMD reported by the 18-35 years group than other age groups at ($p < 0,05$). This younger age group also shows a high prevalence of awake bruxism. The 18-35 age groups had the lowest low perceived stress scores frequency. However, this group's PSS score for moderate and high stress is higher than the rest of the age groups, and this result is statistically significant at $P_{12} < 0,05$. Two studies showed a higher incidence of TMD and bruxism symptoms, respectively, among younger than older people [3, 11].

This survey was carried out during the COVID-19 pandemic. The pandemic has caused concern over the mental health status of people worldwide. Reports of increased mental illness symptoms are linked to the

Coronavirus outbreak. The emergence of COVID-19 has exacerbated anxiety, symptoms of psychosis, anxiety, trauma, suicidal thoughts, and panic attacks, depression, and post-traumatic stress among other effects in populations globally. An analysis reported the prevalences of stress, anxiety, and depression due to the pandemic in the general population as 29, 6; 31,9 and 33,7% respectively [23]. Mental health professionals hypothesise that COVID-19 has had a significant impact on global mental health. For instance, the Indian Psychiatric Society survey showed an increase in mental health conditions by twenty per cent as a result of the outbreak of COVID-19 in India [16].

Results show that 57,8% of the respondents reported distress due to changes in daily activity caused by COVID-19. The above tables show the prevalence of low, moderate, and high-stress levels among the survey respondents. From the data analysis, 184, 683 and 110 individuals were affected by stress during the COVID-19 pandemic. The specific frequency of individuals reporting stress parameters related to dental disorders is also recorded. 57,1% of the respondents reported parameters for sleep bruxism, and 10,5% for awake bruxism. The comparison of TMD frequency and perceived stress scores with COVID-19 vaccination was made. The PSS points are lower for vaccinated respondents but score high for unvaccinated individuals. These results exhibit a relationship between COVID-19 and stress, which contributes to the dental disorders discussed (TMD and bruxism). Similar to the studies mentioned above, there is a link between the outbreak of the pandemic and an increase in mental or stress-related disorders.

Conclusion

From the data above, many respondents experienced distress due to the lifestyle changes that COVID-19 has brought on. This stress brings about many negative consequences. It resulted in an altered state of psycho-emotional changes which affects the population's mental health status. Stress-related oral disorders like bruxism and TMD increase when the population is experiencing high amounts of stress. Therefore, it is possible that the pandemic intensifies the prevalence of TMD and Bruxism in this population. However, this population is not aware of the specific oral diseases discussed: TMD and Bruxism. Therefore, the study used typical symptoms of the disease to carry out the survey and data analysis, such as tooth grinding, jaw pain, clenching, and the presence of a clicking sound. A significant limitation is that there is no documentation regarding TMD and Bruxism within the surveyed population. The population of Mizoram is also not well educated on these disorders. One recommendation would be to create awareness on TMD and bruxism to better understand the impact of these dental diseases and access to treatment.

Распространенность дисфункции височно-нижнечелюстного сустава и бруксизма во время пандемии COVID-19. Опрос в Мизораме

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Дисфункция височно-нижнечелюстного сустава (ВНЧС) и бруксизм – состояния, которые снижают качество здоровья полости рта, вызывают боль и нарушение функции ВНЧС и связанных с ними областей.

Бруксизм – непроизвольная привычка, характеризующаяся сдавливанием и стираемостью зубов. Со вспышкой COVID-19 наблюдается высокая распространенность расстройств, связанных со стрессом. Дисфункция ВНЧС и бруксизм связаны с психологическими симптомами, включая стресс, тревоги и депрессии в качестве факторов риска.

Это исследование было направлено на изучение вопроса, влияет ли стресс, спровоцированный пандемией COVID-19, на увеличение распространенности бруксизма и дисфункцию ВНЧС. В нем рассматриваются связь между COVID-19 и психическим здоровьем, связь между стрессом и бруксизмом и дисфункцией ВНЧС.

Данные были собраны методом опроса с помощью вопросника, распространенного через Google Sheets. Нами были разработаны анкеты для респондентов в возрасте 18 лет и старше в штате Мизорам в Индии. Все вопросы в анкете были основаны на разнице степени бруксизма и дисфункции во время COVID-19 между мужчинами и женщинами различных возрастных групп. Статистический анализ проводился с помощью пакета SPSS (Statistical Package for the Social Sciences Inc., USA 16, 0). Различия в пропорциях сравнивали с тестом Хи-квадрат или точным тестом Фишера. Модуль t равен 2 ($CL = 95\%$, $p < 0,05$).

Распространенность дисфункции ВНЧС и бруксизма может быть связана со стрессом, который увеличился из-за вспышки COVID-19. Женщины в возрасте 18-35 лет и молодежь в целом более подвержены стрессу. Для подтверждения этих результатов следует провести дополнительные корреляционные исследования.

Քունք-ստործնոտային հոդի հիվանդությունների և բրուքսիզմի տարածվածությունը COVID-19 համաճարակի ժամանակ: Խաչաձև հարցում Միզորամում

Անժելա Պարմավիի, Աննա Վարդանյան, Արմինե Չոփիկյան

Քունք-ստործնոտային հոդերի դիսֆունկցիան և բրուքսիզմը այն հիվանդություններն են, որոնք նվազեցնում են բերանի խոռոչի առողջական վիճակը՝ առաջացնելով ցավ և ֆունկցիայի խանգարումներ քունք-ստործնոտային հոդերի և դրանց հարակից տարածքներում:

Բրուքսիզմը ատամների սեղմումով և մաշվածությամբ բնութագրվող սովորույթ է: COVID-19-ի բռնկման հետ մեկտեղ գրանցվել է սթրեսի հետ

կապված տարատեսակ խանգարումների բարձր տարածվածություն։ ՔՍՃՀ -ի դիսֆունկցիան և բրուքսիզմը կապված են հոգեբանական ախտանիշների հետ, ներառյալ սթրեսը, անհանգստությունը և դեպրեսիան՝ որպես ռիսկի գործոններ:

Այս ուսումնասիրության նպատակն է հետազոտել, թե արդյո՞ք COVID-19 համաճարակի հետևանքով առաջացած սթրեսը մեծացնում է ինչպես բրուքսիզմի, այնպես էլ ՔՍՃՀ-ի դիսֆունկցիայի տարածվածությունը: Այն ուսումնասիրում է COVID-19-ի և հոգեկան առողջության փոխհարաբերու-թյունները, ինչպես նաև սթրեսի և բրուքսիզմի ու ՔՍՃՀ-ի դիսֆունկցիայի միջև կապը:

Տվյալները հավաքագրվել են հարցման եղանակով՝ օգտագործելով Google Sheets-ի միջոցով բաշխված հարցաթերթիկներ։ Մենք մշակել ենք հարցաթերթիկները Հնդկաստանի Միգորամ նահանգում 18 և բարձր տարիքի հարցվողների համար։ Հարցաթերթիկ բոլոր հարցերը հիմնված են եղել տարբեր տարիքային խմբերի տղամարդկանց և կանանց միջև COVID-19-ի ընթացքում բրուքսիզմի և դիսֆունկցիայի աստիճանի տարբերության վրա։ Վիճակագրական վերլուծությունը կատարվել է SPSS (Statistical Package for the Social Sciences Inc., ԱՄՆ 16, 0) վիճակագրական փաթեթի միջոցով։ Համա-մասնությունների տարբերությունները համեմատվել են Chi-square թեստի կամ Fisher-ի ճշգրիտ թեստի հետ։ Մոդուլ t-ն հավասար է 2-ի (CL = 95%, p <0,05):

ՔՍՃՀ-ի դիսֆունկցիայի և բրուքսիզմի տարածվածությունը կարող է կապված լինել սթրեսի հետ, որն աճել է COVID-19-ի բռնկման պատճառով: Սթրեսի գործոններին ավելի հակված են երիտասարդները և 18-35 տարեկան կանայք:

Այս արդյունքները հաստատելու համար պետք է իրականացվեն լրացուցիչ, այն է՝ հարաբերակցության ուսումնասիրություններ:

References

1. AU Y, KB T, EK C, HH T. Depression and somatization in patients with temporo-mandibular disorders. J Prosthet Dent. 2002, 88(5):479-484. doi:10.1067/MPR. 2002.129375.
2. *Akalu T.Y., Gelaye K.A., Bishaw MA. et al.* Depression, anxiety, and stress symptoms and its associated factors among residents of gondar town during the early stage of covid-19 pandemic. Risk Manag Healthc Policy, 2021, 14:1073-1083. doi:10.2147/RMHP. S296796.
3. *Ali Abdullah B.,* Yassin Hamed G., in Mosul City Part B. Bruxism in Mosul City Part 2. Int J Dent Sci Res., 2020, 8(3):83-86. doi:10.12691/IJDSR-8-3-6.
4. *Alona E-P, Ilana E.* One year into the COVID-19 pandemic – temporomandibular disorders and bruxism: What we have learned and what we can do to improve our manner of treatment. Dent Med Probl., 2021, 58(2):0-0. doi:10.17219/dmp/132896.
5. *Asquini G., Bianchi AE., Borromeo G., Locatelli M., Falla D*. The impact of Covid-19-related distress on general health, oral behaviour, psychosocial features, disability and pain intensity in a cohort of Italian patients with temporomandibular disorders. PLoS One., 2021, 16(2):e0245999. doi:10.1371/JOURNAL.PONE.0245999.

6. *Bueno CH., Pereira DD., Pattussi MP., Grossi PK., Grossi ML.* Gender differences in temporomandibular disorders in adult populational studies: A systematic review and meta-analysis. J Oral Rehabil., 2018, 45(9):720-729. doi:10.1111/JOOR.12661.

7. *Chisnoiu AM., Picos AM., Popa S. et al.* Factors involved in the etiology of temporomandibular disorders - a literature review. Clujul Med., 2015, 88(4):473. doi:10.15386/CJMED-485.

8. D B-G, TC C, AS de O, V M-P. Anamnestic index severity and signs and symptoms of TMD. Cranio., 2006, 24(2):112-118. doi:10.1179/CRN.2006.018.

9. *De Rossi SS, Greenberg MS, Liu F, Steinkeler A.* Temporomandibular disorders: evaluation and management. Med Clin North Am., 2014, 98(6):1353-1384. doi:10.1016/j.mcna.2014.08.009.

10. *De Medeiros RA., Vieira DL., Da Silva EVF, De Rezende LVML, Dos Santos RW., Tabata LF.* Prevalence of symptoms of temporomandibular disorders, oral behaviors, anxiety, and depression in dentistry students during the period of social isolation due to COVID-19. J Appl Oral Sci., 2020, 28:1-8. doi:10.1590/1678-7757-2020-0445.

11. *De Mello VVC, Barbosa AC da S, Morais MPL de A*, Gomes SGF, Vasconcelos MMVB, Caldas Júnior A de F. Temporomandibular disorders in a sample population of the Brazilian northeast. Braz Dent J., 2014, 25(5):442-446. doi:10.1590/0103-6440201302250.

12. Definitions and Scope: What Are TMDs? - Temporomandibular Disorders - NCBI Bookshelf. Accessed June 21, 2022. https://www.ncbi.nlm.nih.gov/books/NBK557995/

13. *Emodi Perlman A., Lobbezoo F., Zar A., Friedman Rubin P., van Selms MKA, Winocur E.* Self-Reported bruxism and associated factors in Israeli adolescents. J Oral Rehabil., 2016, 43(6):443-450. doi:https://doi.org/10.1111/joor.12391.

14. *Fernandes G., Franco AL., Siqueira JTT, Gonçalves DAG, Camparis CM.* Sleep bruxism increases the risk for painful temporomandibular disorder, depression and non-specific physical symptoms. J Oral Rehabil., 2012, 39(7):538-544. doi:10.1111/j.1365-2842.2012.02308.x.

15. *Kothari SF., Baad-Hansen L., Svensson P.* Psychosocial Profiles of Temporomandibular Disorder Pain Patients: Proposal of a New Approach to Present Complex Data. J oral facial pain headache, 2017, 31(3):199-209. doi:10.11607/ofph.1666.

16. *Kumar A., Nayar KR.* COVID 19 and its mental health consequences. https://doi.org/101080/0963823720201757052. Published online 2020:1-2. doi:10.1080/09638237.2020.1757052

17. L F, JT C, CH T. The protective role of testosterone in the development of temporomandibular joint pain. J pain., 2007, 8(5):437-442. doi:10.1016/J.JPAIN.2006.12.007.

18. *LeResche L.* Epidemiology of temporomandibular disorders: Implications for the investigation of etiologic factors. Crit Rev Oral Biol Med., 1997, 8(3):291-305. doi:10.1177/10454411970080030401.

19. *Manfredini D., Colonna A., Bracci A., Lobbezoo F.* Bruxism: a summary of current knowledge on aetiology, assessment and management. Oral Surg., 2020, 13(4):358-370. doi:10.1111/ors.12454.

20. *Murali R. V., Rangarajan P., Mounissamy A.* Bruxism: Conceptual discussion and review. J Pharm Bioallied Sci., 2015, 7(Suppl 1):S265-S270. doi:10.4103/0975-7406.155948.

21. *Ralte R., Lalrochami C.* Senhri Journal of Multidisciplinary Studies Stress, Self-Esteem and Peer Pressure among Mizo Adolescents. Senhri J Multidiscip Stud. 4(2):22-31. doi:10.36110/sjms., 2019, 04.02.003.

22. *Rener-Sitar K., John MT., Pusalavidyasagar SS., Bandyopadhyay D., Schiffman EL.* Sleep quality in temporomandibular disorder cases. Sleep Med., 2016, 25:105-112. doi:10.1016/j.sleep.2016.06.031.

23. *Salari N., Hosseinian-Far A., Jalali R., et al.* Prevalence of stress, anxiety, depression among the general population during the COVID-19 pandemic: A systematic review and meta-analysis. Global Health., 2020, 16(1):1-11. doi:10.1186/S12992-020-00589-W/TABLES/2.

24. *Silva ETC da, Silva AF da, Lourenço AHA, et al.* A relação dos sintomas de bruxismo e disfunção temporomandibular e a ansiedade ocasionada pela pandemia da COVID-19: uma revisão de literatura. Res Soc Dev., 2021, 10(2):e6110212609. doi:10.33448/rsd-v10i2.12609

25. *Slade GD., Ohrbach R., Greenspan JD., et al*. Painful Temporomandibular Disorder: Decade of Discovery from OPPERA Studies. J Dent Res.. 2016, 95(10):1084-1092. doi:10.1177/0022034516653743.

26. *Smardz J., Martynowicz H., Wojakowska A., Michalek-Zrabkowska M., Mazur G., Wieckiewicz M.* Correlation between Sleep Bruxism, Stress, and Depression—A Polysomnographic Study. J Clin Med., 2019, 8(9):1344. doi:10.3390/jcm8091344.

27. *Van Selms MKA, Visscher CM., Naeije M., Lobbezoo F*. Bruxism and associated factors among Dutch adolescents. Community Dent Oral Epidemiol., 2013, 41(4):353-363. doi:https://doi.org/10.1111/cdoe.12017.

28. *Varshney M., Parel JT., Raizada N., Sarin SK.* Initial psychological impact of COVID-19 and its correlates in Indian Community: An online (FEEL-COVID) survey. PLoS One, 2020, 15(5). doi:10.1371/journal.pone.0233874.

29. *Von Korff M., Resche L Le., Dworkin SF*. First onset of common pain symptoms: a prospective study of depression as a risk factor. Pain., 1993, 55(2):251-258. doi:10.1016/0304-3959(93)90154-H.

30. *Wassell R., Naru A., Steele J., Nohl F*. Applied occlusion. :194, 2015.

31. *Wetselaar P., Vermaire EJH, Lobbezoo F., Schuller AA.* The prevalence of awake bruxism and sleep bruxism in the Dutch adult population. J Oral Rehabil., 2019, 46(7):617. doi:10.1111/JOOR.12787

32. *Winocur E., Messer T., Eli I et al.* Awake and Sleep Bruxism Among Israeli Adolescents. Front Neurol., 2019, 10:443.

33. *Yap AUJ, Tan KBC, Chua EK, Tan HH*. Depression and somatization in patients with temporomandibular disorders. J Prosthet Dent., 2002, 88(5):479-484. doi:10.1067/MPR.2002.129375.