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CARRERA DE ODONTOLOGÍA

THE IMPACT OF STRESS ON ORAL HEALTH. LITERATURE REVIEW.

PROYECTO DE TITULACIÓN PREVIO A LA OBTENCIÓN DEL TÍTULO DE ODONTÓLOGA

AUTOR: ALYSSON FIONNA QUITO PEÑA

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The impact of stress on oral health. Literature review.

ABSTRACT

Objective: To determine how stress impacts on oral health, the different kinds of pathologies it can generate, and to make people aware of the adverse effects, so that they can prevent them. **Materials and methods:** Scientific articles, literature reviews and longitudinal studies were searched in repositories such as: Google Scholar, Scielo and PubMed. The inclusion criteria were articles from 2015 to the present year, in English and Spanish. Exclusion criteria were: obsolete texts and articles that did not have relevant information on the impact of stress on oral health. **Conclusions:** This literature review demonstrated how stress affects oral health in various ways, leading to a poor lifestyle and causing adverse effects not only on the oral cavity, but on the whole organism. Innovative healthcare strategies now prioritize the reduction of stress levels in patients, because managing stress is essential for good oral health.

Key words: oral health, preventive dentistry, stress, psychological.

RESUMEN

Objetivo: Determinar cómo el estrés impacta en la salud oral, los diferentes tipos de patologías que puede generar, y sensibilizar a las personas sobre los efectos negativos, para que puedan prevenirlos. **Materiales y métodos:** Artículos científicos, revisiones bibliográficas y estudios longitudinales fueron buscados en diferentes repositorios como: Google Académico, Scielo y PubMed. Los criterios de inclusión fueron artículos desde el 2015 hasta el presente año, en idiomas inglés y español. Los criterios de exclusión fueron: textos obsoletos, y artículos que no tienen información relevante sobre el impacto del estrés en la salud oral. **Conclusiones:** En esta revisión de la literatura, se demostró cómo el estrés afecta la salud oral de varias maneras, llevando a un mal estilo de vida, causando efectos negativos no solo en la cavidad oral, sino en todo el organismo. Las estrategias innovadoras de atención médica ahora priorizan la reducción de los niveles de estrés en pacientes, porque manejar el estrés es esencial para una buena salud oral.

Palabras clave: salud bucal, odontología preventiva, estrés psicológico.

Introduction

Stress is described as a response our body creates when it's under pressure, it has a significant negative impact on an individual's life. It affects mental, physical and oral health. Stress releases cortisol, a hormone that causes negative effects in the oral cavity. Additionally, bad hygiene is normally seen in a person who is stressed, causing them not to floss their teeth, and not brushing them regularly, which would produce an accumulation of plaque. Stress also involves a change in nutrition, and habits because poor food choices give a negative effect on the oral cavity, the ingesta of high sugar or carbohydrate food would lead to weak teeth. As for the habits, people who are going through stress would tend to smoke or drink alcohol, as a way of releasing their emotions, generating halitosis, stained teeth, gum disease and even oral cancer.[1–3]

Furthermore, stress affects the immune system, causing our body the difficulty of fighting the infections in the oral cavity and taking more time to heal in the different procedures in the dental area. Moreover, stress may lead to xerostomia, which means the sensation of a dry mouth, developing into to cavities and bad breath, because there's less production of saliva, caused by hyposalivation.[1,2]

In addition to side effects, bruxism stands out, it’s a disorder where the jaw makes repetitive muscular movements of grinding, leading to multiple dental problems such as tooth wear, cracked dental surfaces, dental sensitivity to different temperatures or to foods, jaw pain, migraines, tooth loss, and also causes gum recession. A temporomandibular joint disorder (TMJ) may occur as well, when being under pressure, causing pain on the joint and surrounding muscles.[4]

Having regular dental appointments, conserving good hygiene and managing stress is a fundamental thing in life, reason why this literature review has as an objective to determine how stress impacts on oral health, the different kinds of pathologies it can generate, and make people aware of the negative effects, so they can prevent them.

Materials and methods

Scientific articles, literature reviews and longitudinal studies were searched in various repositories such as: Google Scholar, Scielo and PubMed. The inclusion criteria were articles from 2015 to the present year, in languages English and Spanish. The key words taken from DECS were: oral health, preventive dentistry, stress, psychological. Exclusion criteria were: obsolete texts and articles that did not have relevant information on the impact of stress on oral health.

State of the Art

Stress is a health condition, which increases its prevalence each year. It has also become more sever, especially in industrialized countries.[5,6] It's a response our body creates when being through mental, physical or emotional pressure. It's perceived differently in men and women, being women who experiment it more frequently. [6] Oral diseases have a multifactorial origin,

biological and host factors such as stress, can predispose negative effects on the oral cavity affecting it in multiple aspects. [7]

Stress stimulates an unhealthy oral cavity, encouraging a patient to adopt a poor diet and potentially lead to consumption of alcohol, tobacco, illicit drug use, etc.[3] Long term stress would lead to an increased allostatic load, which could induce an imbalance in the physiological systems function, which are necessary for preserving homeostasis. Consequently, this would impact the mechanisms of disease progression.[3,8]

Xerostomia and Dental cavities

Xerostomia, is a disease where there's a sensation of dry mouth, it occurs when there's a decrease or absence of saliva production, causing taste alterations.[9] Xerostomia causes discomfort and a deterioration in the overall quality of life. Moreover, it is known that a patient who consumes psychotropic drugs, will also show a salivary flow decrease.[7,10] Lastly, besides reducing salivary flow, it also disrupts ph, inducing the eruption of different lesions. The absence of saliva boosts the formation of uncommon forms of dental decay including decays at incisal, cervical or cusp tips, also radicular lesions. [2,11]

Stress is a psychological factor that will induce the elevation of cortisol, leading to imbalanced cytokines that could develop oral autoimmune diseases. Additionally, this would lead to speaking and eating difficulty, as well as a lack of oral hygiene.[12] It has been found that stress causes salivary changes, which would produce susceptibility to dental caries. [13] Dental cavities produced by a lack of oral hygiene would also lead to toothache.[13]

Bruxism

Bruxism is known as an unconscious grinding of teeth with a constant jaw parafunction, causing complications in the oral muscles, in the periodontal ligament, and the temporomandibular joint. (TMD)[4] Around 10% to 20% of the population is affected by bruxism.[4,14] This pathology can cause chronic and constant trauma in the stomatognathic system. It has been seen its prevalence is relevant in patients from ages 20 and 50 years old.[15]

Kids or adults may be affected by bruxism, and it can be perceived at day or night. It is a multifactorial origin pathology. Stress provokes this condition, causing many negative effects. Some people claim headaches, articular, dental and mandibular pain, but it may also present itself asymptomatic. This pathology can alter the quality of sleep. Not to mention, hypertrophy of masticatory muscles is presented as well. [4,15,16]

Patients who have bruxism are also found having fractured teeth, exostoses, teeth sensibility, and dental wear. Stress will also produce a muscle contraction, causing pain in the neck, head, and masticatory muscles, such as temporal and masseter.[17] The orofacial system is compromised and the excess of muscle activity will induce hypertonia, meaning there would be an increased muscle tone.[17]

This pathology can lead to problems with dental prosthetics, as well as a general fatigue sensation and tiredness.[18] Elevated levels of stress increase the likelihood of bruxism by almost six times.[4] Teeth grinding, could cause an overactivity of the chewing muscles, leading to

overwork in these muscles, vasoconstriction, and ischemia. And with ischemia, some harmful chemicals such as prostaglandins and bradykinin are released, causing muscle pain.[19]

Additionally, the correlation between bruxism and temporomandibular joint disorder caused by stress, induces higher problems such as: pain, restricted mouth opening, TMJ noise, unusual opening pattern, displaced articular disc and osteoarthritis.[19] It is evidenced that patients with bruxism have a tendency to show depression, stress, and anxiety, meaning they would have issues with social interactions and are more likely to have psychosomatic disorders. [15]

Periodontal disease

Periodontal disease is described as the gradual deterioration of the soft and hard tissues of the periodontal complex, it can be caused by stress, because of the secretion of the glucocorticoid and catecholamine hormones.[20,21] Leading to a suppressed immune system response, and a reduced salivary flow, which would cause the accumulation of bacterial plaque in the oral cavity. Periodontal pathology is mostly shown on middle aged people and elderly as well.[21]

In vitro proliferation of *Porphyromonas gingivalis* is increased by cortisol, meaning there is a correlation between stress and periodontal disease.[22] Stress increases the susceptibility of bacterial expansion. The constant presence of bacteria in dental plaque leads to an ongoing production of proinflammatory cytokines, resulting in significant tissue damage, this shown on the alveolar bone and periodontal ligament as well.[22,23]

Abundant research has shown that stress aggravates inflammation. Additionally, stress has been found to be a factor that increases the progression of necrotizing periodontal disease. This pathology would include gingival interdental papilla ulceration, bleeding and pain.[22] Stress causes unhealthy behaviors in the individual's diet, for example, the consumption of high sugar and fat foods. It induces bad hygiene, smoking, alcohol drinking and less dental visits, all these deteriorating the progression of periodontal disease. Inadequate brushing will make plaque accumulate on gums and teeth, smoking and alcohol drinking affects the healing and repairing ability of gums.[3]

Lichen Planus

Oral lichen planus is a recurring health condition, an inflammatory pathology of mucous and skin membranes.[24] Stress has been denominated as lichen planus' primary cause. Its symptoms appear gradually manifesting as bilateral form, whitish and reticular pattern on the oral mucosa.[14] Cortisol level studies have been made in patients who have oral lichen planus, and results have shown a notable rise in them. The analysis was done through urine, serum and saliva, being urine the optimum indicator for stress.[25,26]

Covid-19 stress impact on oral health

Covid-19 has significantly impacted mental health. Stress is a factor that has increased in this period of time. It's been demonstrated that pandemic stress has developed bruxism, leading to periodontal disease in patients.[27] Additionally, it has led to aphthoid ulcers and herpetic recurrences. These oral ulcers affect the patients eating, swallowing and talking.[27] Covid-19

stress has been linked to the secondary type of herpetic gingivostomatitis, which leads to lip blisters, skin rashes and desquamative gingivitis. Patients have also claimed to have inflammation of tongue papillae, inducing ulcers and macules, producing discomfort at the moment of ingesting food.[27]

Research has suggested that parents' stress due to Covid-19 has affected children's oral health. Parenting could be slightly modified, and with this, children's hygiene habits.[28] Furthermore, as a result of the pandemic, their socioeconomic status was also involved, in the way that with less job opportunities, there would be less income for taking kids to their dentist appointments, leading to a possible poor oral health.[28] To lower the viral load in Covid-19 patients, it is essential to use local antiseptics such as hydrogen peroxide-based suspension.[27] The consumption of medicines to manage Covid-19, has led to xerostomia. Additionally, the functioning of salivary glands may change because of the presence of the SARS-CoV-2 virus, resulting in xerostomia.[29]

Professionals working on the oral health area, should now include to their treatment plan the information regarding a patient's personality. Their profiles must be followed so interventions can be comprehended easily and dentists can offer the most efficient treatment to each patient, depending on their mental health and oral needs.[12] Reducing stress has become a fundamental factor for improving healthcare.[3]

Lastly, other pathologies that stress can cause that affect oral health are: herpes simplex, specially type I. It affects skin and mucosa in the upper part of the body, staying inactive, and then coming back once a stress event is presented. It can be showed as cold sores around the mouth or on the lips. To avoid these symptoms, it is recommended to practice a good oral hygiene as well as managing stress with a healthy living.[14]

Discussion

Oral health is defined as a state where there are no diseases that alter the oral cavity. There are some risk factors familiar to oral diseases, which include consumption of alcohol, lack of proper oral hygiene, unhealthy diet, etc. This literature review focused on risk factor of stress and all the pathologies it involves in the oral cavity.[30]

Many studies show the association between stress and bruxism. Abekura et al. mentions that bruxism is associated with a stressful lifestyle. Van Selms et. al back up this statement by mentioning that teeth grinding has been reported to be caused by stress.[31] Also, Arman K. reports that in her study 95.9% participants with bruxism experience stress. Additionally, this study also proved the relationship of bruxism with smoking. Nicotine dependance has been found to be a risk factor for bruxism.[11] Moreover, Chemelo V et al. corroborates the hypothesis by proving in their study how bruxism has multifactorial origin, being stress one of them.[32] Dental caries is also more prevalent in patients with a high level of stress. Previous research done by Tsai K et al. unveiled that mental stress impacts the growth of dental caries in children.[11,21]

Rodrigues's D et al. study claims that patients were found with oral herpes due to stress at work. Additionally, stress would be causing orofacial pain.[33] The findings of Ives A et al. corroborate Rodrigues's statement, finding that receptors for stress hormones are present on sensory and sympathetic neurons that are involved in oral herpes.[34] Adding up to these ideas,

Yan C et al. claim stress perturbs the organism's balance. A patient with emotional stress will be more susceptible to contract oral lesions and oral herpes.[35]

The study made by Oliviera C, Lima J et al. indicated that temporomandibular disorder (TMD) is more frequent in women due to stress, since women tend to be more vulnerable to have stress, and have a lower pain tolerance. Herrero Solano Y et al. sustain this, by showing in their study how bruxism if more prevalent in women. However, Levartowvsky S et al. differs on these statements. In their study they found men being more likely to present bruxism due to stress, because they exceed women in some tasks.[36–38]

Bergdahl et al. made a study where they concluded the relationship between psychological factors as stress and anxiety, led to xerostomia. [39] Bulthuis et al. states that stress has a strong relationship with xerostomia, as well as xerostomia would have a substantial correlation with oral health-related quality of life.[40] Stress is prevalent in elderly according to Luppa et al. and it will affect salivary secretion eventually, causing xerostomia. Additionally, psychological factor such as stress and depression would lead patients to the consumption of antidepressant drugs, which cause xerostomia as well.[41]

Besides all these oral disorders that stress has caused, it is also significant to mention the relevance of Covid-19 in oral health. Research made by Poly A, Lopes et al. show how during stress due to Covid-19, the frequency of tooth brushing decreased meaningfully. Mask wearing caused people to be less worried about their smiles.[42]

Numerous investigations have reported a correlation between stress and periodontal disease. A study made by Irani S indicated that individuals experiencing job stress, decreased salivary cortisol levels. Arman K supports this idea, by adding that problems related to gum are more common in groups with high stress levels. Castro M et al. has validated that patients have an increased cortisol level in the gingival crevicular fluid due to stress, and this has been linked to the severity of periodontitis.[11,23,30]

Conclusions

This literature review demonstrated how stress affects oral health in various ways, leading to a poor lifestyle, causing negative effects not only in the oral cavity, but on the whole organism. The different pathologies stress can cause will be: bruxism, xerostomia, periodontal disease, dental caries, temporomandibular joint disorder, bad hygiene, less salivary flow, xerostomia, oral herpes, etc. Covid-19 outcome has also hugely affected oral health, due to the stress it has put on people, causing bruxism, ulcers, and deficient hygiene. Innovative healthcare strategies now prioritize the reduction of stress levels in patients, because managing stress is essential for having a good oral health.

Stress can be reduced by exercise and physical activity, as well as doing meditation or yoga. Practicing good oral hygiene habits is important for preventing oral diseases. A healthy and balanced diet can promote oral health and reduce levels of stress. Avoiding tobacco and limiting alcohol consumption can also help decreasing the possibilities of developing oral diseases. Finally, having regular dentist appointments and mental health professional help will facilitate having good oral health and manage stress.

Conflict of interests

Author claims there's no conflict of interests.

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Bibliographic references

1. Claros Sabrina Antonella Z, Rocío Inés S, Guardia Jazmín S. Influencia del estrés académico percibido, sobre la calidad de la microbiota oral y el pH salival Influence of academic stress perceived, on the quality of oral microbiota and salivary pH.
2. Rebolledo M, Reyna M. Presencia de lesiones orales en pacientes con afecciones psicológicas, atendidos en una institución de salud [Internet]. Available from: https://orcid.org/0000-0002-0488-2464
3. Vasiliou A, Shankardass K, Nisenbaum R, Quiñonez C. Current stress and poor oral health. BMC Oral Health. 2016 Sep 2;16(1).
4. Moron M. El Estrés y Bruxismo por COVID-19 como Factores de Riesgo en la Enfermedad Periodontal.
5. Sato Y, Saijo Y, Yoshioka E. Work stress and oral conditions: A systematic review of observational studies. Vol. 11, BMJ Open. BMJ Publishing Group; 2021.
6. Herrera D, Coria G. Impacto del estrés psicosocial en la salud.
7. Sharaf M, Abou El-Fadl R, Badran A. Effect of Trait Anxiety on Oral Health Status: A Review Article. Advanced Dental Journal. 2022 Jan 1;4(1):1–10.
8. Sabbah W, Gomaa N, Gireesh A. Stress, allostatic load, and periodontal diseases. Vol. 78, Periodontology 2000. Blackwell Munksgaard; 2018. p. 154–61.
9. Ristevska I, Armata RS, DAmbrosio C, Furtado M, Anand L, Katzman MA. Xerostomia: Understanding the Diagnosis and the Treatment of Dry Mouth. 2015.
10. Rossow I. Illicit drug use and oral health. Addiction. 2021 Nov 1;116(11):3235–42.
11. Arman K. Stress experience and effect on self-perceived oral health status among high school students. Vol. 18, Baltic Dental and Maxillofacial Journal. 2016.
12. Rivera-Reza DI, Villanueva-Vilchis MC, Gaitán-Cepeda LA. Impact on Quality of Life of Oral Diseases Related to Stress. Odovtos - International Journal of Dental Sciences. 2020 Apr 22;22(2):143–56.

13. Febriane BALAFIF F, Susanto A, Suasani WAHYUNI I. The effect of natural silver modified with Zeolite Journal of Syiah Kuala Dentistry Society Oral health assessment during Covid-19 pandemic: community self-report questionnaire. 2021; Available from: www.jurnal.unsyiah.ac.id/JDS

14. Mabel D, Aguilar Á. ESTRÉS Y PSICOTERAPIA EN ESTOMATOLOGÍA. 2019.

15. von Bischhoffshausen KP, Wallem AH, Allendes AA, Díaz RM, Bischhoffshausen V. Bruxism and Stress Prevalence in Dentistry Students of the Pontificia Universidad Católica de Chile. Vol. 13, Int. J. Odontostomat. 2019.

16. Amorim CSM, Vieira GF, Firsoff EFO, Frutuoso JRC, Puliti E, Marques AP. Symptoms in different severity degrees of bruxism: a cross-sectional study. Fisioterapia e Pesquisa. 2016 Dec;23(4):423–30.

17. Cerqueira TR do C, Batista SG, de Mello EB, DosSantos MF, Tuñas IT de C. Impact of the COVID-19 Pandemic on Stress, Sleep, and Oral Health in University Students. Frontiers in pain research (Lausanne, Switzerland) [Internet]. 2021;2:744264. Available from: http://www.ncbi.nlm.nih.gov/pubmed/35295424

18. Vlăduțu D, Popescu SM, Mercuț R, Ionescu M, Scrieciu M, Glodeanu AD, et al. Associations between Bruxism, Stress, and Manifestations of Temporomandibular Disorder in Young Students. Int J Environ Res Public Health. 2022 May 1;19(9).

19. Phuong NTT, Ngoc VTN, Linh LM, Duc NM, Tra NT, Anh LQ. Bruxism, related factors and oral health-related quality of life among vietnamese medical students. Int J Environ Res Public Health. 2020 Oct 2;17(20):1–10.

20. Sedghi LM, Bacino M, Kapila YL. Periodontal Disease: The Good, The Bad, and The Unknown. Vol. 11, Frontiers in Cellular and Infection Microbiology. Frontiers Media S.A.; 2021.

21. Tsai KZ, Tsai SC, Lin KH, Chang YC, Lin YP, Lin GM. Associations of decayed teeth and localized periodontitis with mental stress in young adults: CHIEF oral health study. Sci Rep. 2022 Dec 1;12(1).

22. Spector AM, Postolache TT, Akram F, Scott AJ, Wadhawan A, Reynolds MA. Psychological Stress: A Predisposing and Exacerbating Factor in Periodontitis. Vol. 7, Current Oral Health Reports. Springer Science and Business Media B.V.; 2020. p. 208–15.

23. Castro MML, Ferreira RDO, Fagundes NCF, Almeida APCPSC, Maia LC, Lima RR. Association between Psychological Stress and Periodontitis: A Systematic Review. Vol. 14, European Journal of Dentistry. Georg Thieme Verlag; 2020. p. 171–9.

24. Villa TG, Sánchez-Pérez Á, Sieiro C. Oral lichen planus: a microbiologist point of view. Available from: https://doi.org/10.1007/s10123-021-00168-y

25. De Porras-Carrique T, González-Moles MÁ, Warnakulasuriya S, Ramos-García P. Depression, anxiety, and stress in oral lichen planus: a systematic review and meta-analysis. Clin Oral Investig. 2022 Feb 1;26(2):1391–408.

26. Karthikeyan P, Aswath N. Stress as an etiologic co-factor in recurrent aphthous ulcers and oral lichen planus. J Oral Sci. 2016 Jun 1;58(2):237–40.

27. Swain SK, Debta P, Sahu A, Lenka S. Oral cavity manifestations by COVID-19 infections: a review. International Journal of Otorhinolaryngology and Head and Neck Surgery. 2021 Jul 23;7(8):1391.

28. Anwar AI, Panna SS, Akbar FH. Differences in Early Childhood Caries Status on Parental Stress Levels and Socioeconomic Status in Makassar City, Indonesia, During the COVID-19 Pandemic. Pesqui Bras Odontopediatria Clin Integr. 2022 Jan 24;22.

29. Fathi Y, Hoseini EG, Atoof F, Mottaghi R. Xerostomia (dry mouth) in patients with COVID-19: A case series. Future Virol. 2021 May 1;16(5):315–9.

30. Irani S. Oral Health and Related Factors: An Update. Vol. 8, Journal of International Oral Health. Wolters Kluwer Medknow Publications; 2016. p. 1140–4.

31. Przystańska A, Jasielska A, Ziarko M, Pobudek-Radzikowska M, Maciejewska-Szaniec Z, Prylińska-Czyżewska A, et al. Psychosocial Predictors of Bruxism. Biomed Res Int. 2019;2019.

32. Chemelo V dos S, Né YG de S, Frazão DR, Souza-Rodrigues RD de, Fagundes NCF, Magno MB, et al. Is There Association Between Stress and Bruxism? A Systematic Review and Meta-Analysis. Vol. 11, Frontiers in Neurology. Frontiers Media S.A.; 2020.

33. Rodrigues D, Queluz D de P. Systemic and oral alterations associated with stress in nurses of public referral hospital. Braz J Oral Sci. 2015;14(2):171–5.

34. Ives AM, Bertke AS, Sandri-Goldin RM. Stress Hormones Epinephrine and Corticosterone Selectively Modulate Herpes Simplex Virus 1 (HSV-1) and HSV-2 Productive Infections in Adult Sympathetic, but Not Sensory, Neurons VIRUS-CELL INTERACTIONS crossm. 2017;91:582–99. Available from: https://doi.org/10.1128/JVI

35. Yan C, Luo Z, Li W, Li X, Dallmann R, Kurihara H, et al. Disturbed Yin–Yang balance: stress increases the susceptibility to primary and recurrent infections of herpes simplex virus type 1. Vol. 10, Acta Pharmaceutica Sinica B. Chinese Academy of Medical Sciences; 2020. p. 383–98.

36. OLIVEIRA CB de, LIMA JAS de, SILVA PLP da, FORTE FDS, BONAN PRF, BATISTA AUD. Temporomandibular disorders and oral habits in high-school adolescents: a public health issue? RGO - Revista Gaúcha de Odontologia. 2016 Mar;64(1):8–16.

37. Herrero Solano Y, Arias Molina Y, Cabrera Hernández Y, citar C, Solano HY, Molina AY, et al. Vulnerability and stress levels in patients with bruxism [Internet]. Vol. 56, Rev Cubana

Estomatol. 2019. Available from: http://www.revestomatologia.sld.cu/index.php/est/article/view/1996

38. Levartovsky S, Msarwa S, Reiter S, Eli I, Winocur E, Sarig R. The association between emotional stress, sleep, and awake bruxism among dental students: A sex comparison. J Clin Med. 2022 Jan 1;11(1).

39. Bulthuis MS, Jan Jager DH, Brand HS. Relationship among perceived stress, xerostomia, and salivary flow rate in patients visiting a saliva clinic. Clin Oral Investig. 2018 Dec 1;22(9):3121–7.

40. Atif S, Syed SA, Sherazi UR, Rana S. Determining the relationship among stress, xerostomia, salivary flow rate, and the quality of life of undergraduate dental students. J Taibah Univ Med Sci. 2021 Feb 1;16(1):9–15.

41. Sutarjo FNA, Rinthani MF, Brahmanikanya GL, Parmadiati AE, Radhitia D, Mahdani FY. Common Precipitating Factors of Xerostomia in Elderly. Journal of Health and Allied Sciences NU [Internet]. 2023 Apr 14; Available from: http://www.thieme-connect.de/DOI/DOI?10.1055/s-0043-1762916

42. Poly A, Lopes LIG, Câmara JVF, Barreto SC, Pereira GD da S. Health changes during Covid-19: a nationwide study with dental students. Rev Saude Publica [Internet]. 2023 Apr 14 [cited 2023 Apr 17];57:22. Available from: https://www.scielo.br/j/rsp/a/sMxBw3bLDbnqmLKd43zqHZk/?lang=en#