KNOWLEDGE, AWARENESS AND PERCEPTION ON BURNING MOUTH SYNDROME AMONG DENTAL STUDENTS-A SURVEY

Running Title: Awareness on burning mouth syndrome- A Survey

ABSTRACT

Introduction: Burning mouth syndrome is a condition distinguished by painful burning sensation of the tongue and mucosal tissue of the mouth, lips and palate that lasts from a few days to a few months. Common symptoms of burning mouth syndrome include burning sensation in the mouth, altered taste sensation and xerostomia or dry mouth despite normal salivation. Treatment of BMS is by either local or systemic medications that temporarily relieve symptoms and on improving quality of life. Menopausal or postmenopausal women with hormonal changes or psychological disorders have higher risk of developing burning mouth syndrome.

Aim: The aim of this study is to evaluate and assess the knowledge, awareness and perception on burning mouth syndrome among dental students.

Materials and methods: A cross sectional survey was conducted among dental students to evaluate the awareness about burning mouth syndrome. The study population in the study are the dental students with a sample size of 100. The questionnaire consisted of 14 questions and was shared to dental students using online survey platform. Frequency table was prepared for each question and analysed using spss data analysis software.

Results and discussion: 82% of the participants were aware about burning mouth syndrome and 18% of the participants were not aware. 69% of the participants were aware that psychological problems like anxiety, depression can cause bms whereas 31% of the participants were not aware

Conclusion: The dental students have a moderate level of awareness about burning mouth syndrome. Most of the dental students were aware about burning mouth syndrome but there was still a group of teenagers who were not aware. More awareness and better understanding will result in better management and better treatment plans.

Keywords: awareness, perception, burning mouth syndrome, dental students, survey, Innovative technology, Novel method

INTRODUCTION

Burning mouth syndrome is a condition distinguished by painful burning sensation of the tongue and mucosal tissue of the mouth, lips and palate that lasts from a few days to few months (1). Common symptoms of burning mouth syndrome include burning sensation in the mouth, altered taste sensation and xerostomia or dry mouth despite normal salivation (2). Treatment of BMS is by either local or systemic medications that temporarily relieve symptoms and on improving quality of life (3). Primary BMS are generally idiopathic and can occur spontaneously without any identifiable precipitating factors (4). Secondary BMS is associated with systemic factors but the exact etiology of BMS is still unknown and the condition appears to be multifactorial (5). Secondary BMS has been associated with different conditions such as thyroid disease, psychiatric illnesses, oral infections, drug use and dental treatment (6,7).

Burning mouth syndrome occurs at a much higher rate in females than males and also has a strong association with advancing age. The syndrome is almost non-existent in children and rarely seen in those under age 30. Menopausal or postmenopausal women with hormonal changes or psychological disorders have higher risk of developing burning mouth syndrome (8). Patients with burning mouth syndrome should avoid tobacco, spicy foods, acidic foods, carbonated beverages and excessive stress to alleviate the symptoms of burning mouth syndrome (9). Based on symptoms, BMS is classified into three general categories, with Type 2 being the most prevalent and Type 3 being the least common. In type 1, symptoms are not present upon waking and then gradually increases during the day. Symptoms are present throughout the day in type 2 and there is no regular pattern of symptoms in type 3.

The presence of taste changes and sensory anomalies in burning mouth syndrome indicates that the BMS has some neuropathic basis (10). Histopathologic modifications to nociceptive nerve fibres in the oral cavity, such as dysplasia, have been reported in some studies, though symptoms

may appear without evidence of histologic improvement. There are no known histopathologic findings unique to burning mouth syndrome (11). Benzodiazepines is used as the first- line medication in pharmacological management of burning mouth syndrome. The cause-and-effect association between depression, anxiety, or neuroticism and BMS is unclear, as psychic causes may be either causative or consequential to oral symptoms (12)(13). Therefore, in order to achieve the best clinical outcome, treatment should also include psychological intervention. Psychotherapy and complementary and alternative medicine (CAM) are the non pharmacological management of burning mouth syndromeOur team has extensive knowledge and research experience that has translate into high quality publications (14),(15),(16),(17),(18),(19), (20), (21),(22),(23),(24),(25),(26),(27),(28),(29),(30),(31),(32),(33) . The aim of this study is to evaluate and assess the knowledge, awareness and perception on burning mouth syndrome among dental students.

MATERIALS AND METHODS

Study Design

A cross sectional survey was conducted among dental students to evaluate the awareness of burning mouth syndrome among dental students. The sampling method is simple random sampling method. The sample size of this study is 100. The participants did the survey voluntarily and no incentives were given to them. The study was conducted in the month of Feb,2021. Ethical approach and informed consent from the participants were obtained.

Survey Instrument

The survey instrument which was a questionnaire was prepared after extensive review of the existing literature. The questionnaire was reviewed and amendments were made to improve clarity of the questions to eliminate ambiguous responses. The questionnaire consisted of 14 questions with both open and closed ended questions. The questionnaire was shared to dental students using online survey platform.

Data Analysis

Only completed surveys were taken for analysis and the incompleted surveys were eliminated. The statistical test used is descriptive statistics . All the responses obtained were tabulated and

reliability of the data was checked. Frequency table was prepared for each question and analysed using spss data analysis software (34–36).

RESULTS

Out of the 100 participants,52% of them belong to the age group of 16 to 19 years, 31% of them belong to the age group of 20 to 23 years and the remaining 17% were above 23 years (figure 1). 58% of the participants were females and 42% were males (figure 2). 82% of the participants were aware about burning mouth syndrome and 18% of the participants were not aware (figure 3). 56% of the participants were aware that bms is primarily due to a hormone imbalance in women and 44% were not aware (figure 4). 29% of the participants said that oral mucosal pain as the common complaints in patients with bms, 15% of the participants said altered taste sensation, 9% said as dry mouth and 46% of the participants said all of the these are the common complaints in patients with bms (figure 5). 70% of the participants were aware that certain oral rinses can be used to treat bms and 30% were not aware (figure 6). 66% of the participants were aware that vitamin deficiency could cause bms and 34% were not aware (figure 7).

30% of the participants said that oral swab test is used for diagnosis of bms, 9% of the participants said that allergy test is used for diagnosis of bms, 17% of the participants said that tissue biopsy is used for diagnosis of bms and 44% of the participants said that all of these methods are used for diagnosis of bms (figure 8). 60% of the participants were aware that allergies to dental products and materials can cause bms and 40% of the participants were not aware (figure 9). 69% of the participants were aware that psychological problems like anxiety, depression can cause bms whereas 31% of the participants were not aware (figure 10). 63% of the participants agreed that toothpaste can cause bms and 37% disagreed (figure 11). 56% of the participants said that thyroid problems can cause bms and 44% of the participants said that thyroid problems does not cause bms (figure 12). 71% of the participants agreed that baking soda can be used to reduce the sensation of burning in bms and 29% of the participants disagreed (figure 13). 62% of the participants were aware that bms can even take months to years to cure and 38% of the participants were not aware (figure 14).

In the chi square analysis between age group and awareness of burning mouth syndrome, the p value obtained was 0.357 and it was statistically not significant (figure 15). In the chi square analysis between age group and awareness about psychological problems causing BMS, the p value obtained was 0.028 and it was statistically significant (figure 16). In the chi square analysis between gender and awareness of burning mouth syndrome, the p value obtained was 0.019 and it was statistically significant (figure 17). In the chi square analysis between gender and awareness about psychological problems causing BMS, the p value obtained was 0.386 and it was statistically not significant (figure 18).

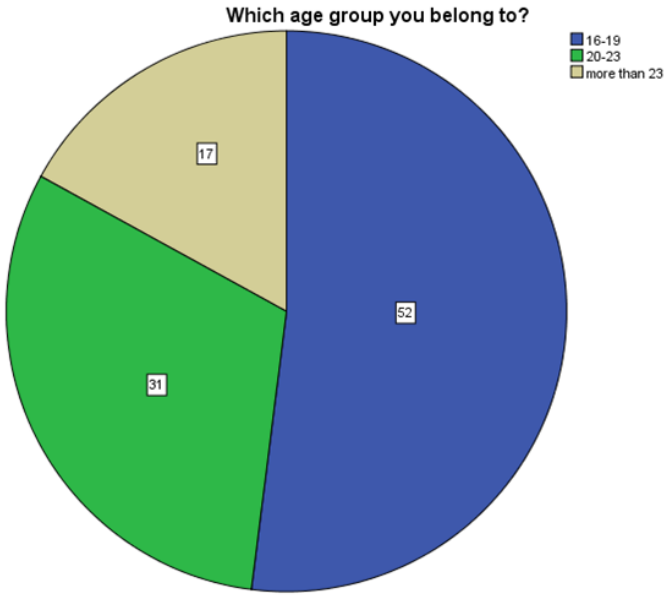

Figure 1: Pie chart showing the age group of the participants. 52% of them belong to the age group of 16 to 19 years, 31% of them belong to the age group of 20 to 23 years and the remaining 17% were above 23 years.

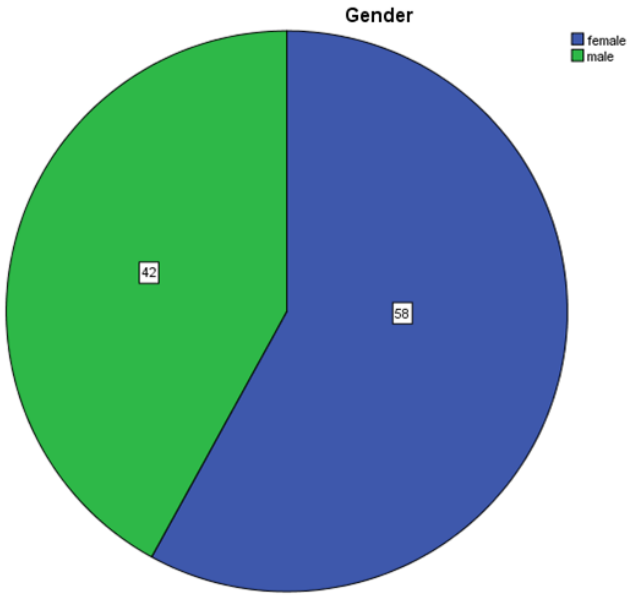

Figure 2: Pie chart showing the gender of the participants. 58% of the participants were females and 42% were males.

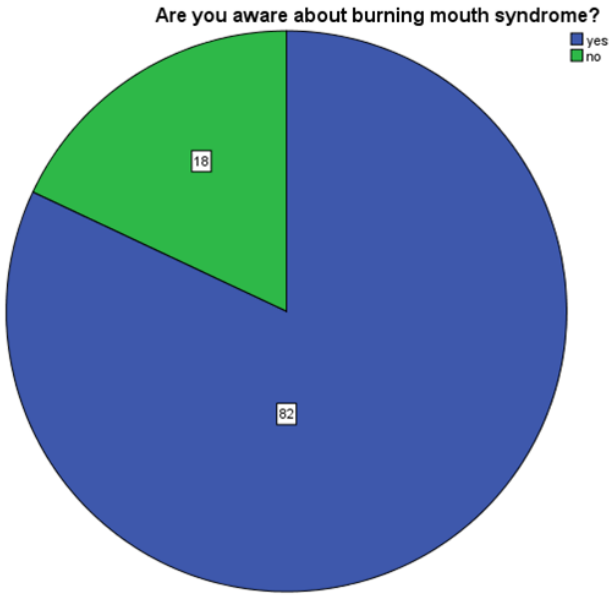

Figure 3: Pie chart showing the awareness of burning mouth syndrome among dental students. 82% of the participants were aware about burning mouth syndrome and 18% of the participants were not aware.

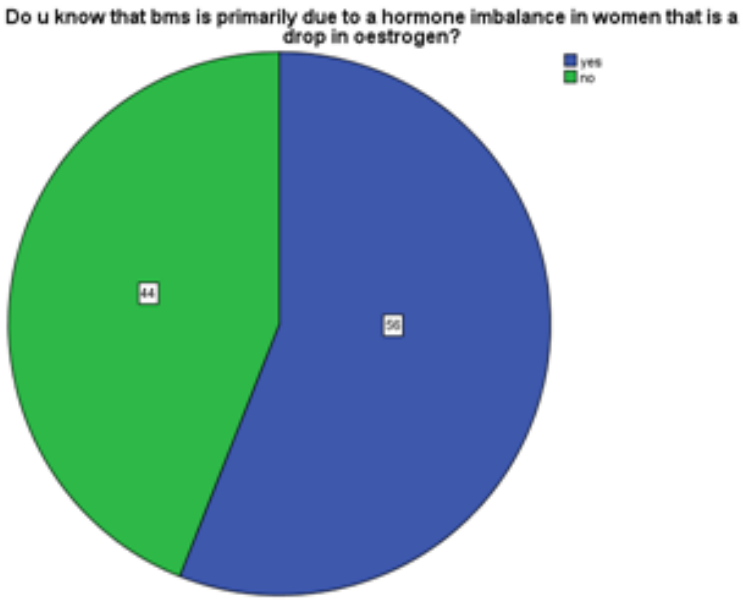

Figure 4: Pie chart showing the awareness about bms caused primarily due to a hormone imbalance in women. 56% of the participants were aware that bms is primarily due to a hormone imbalance in women and 44% were not aware.

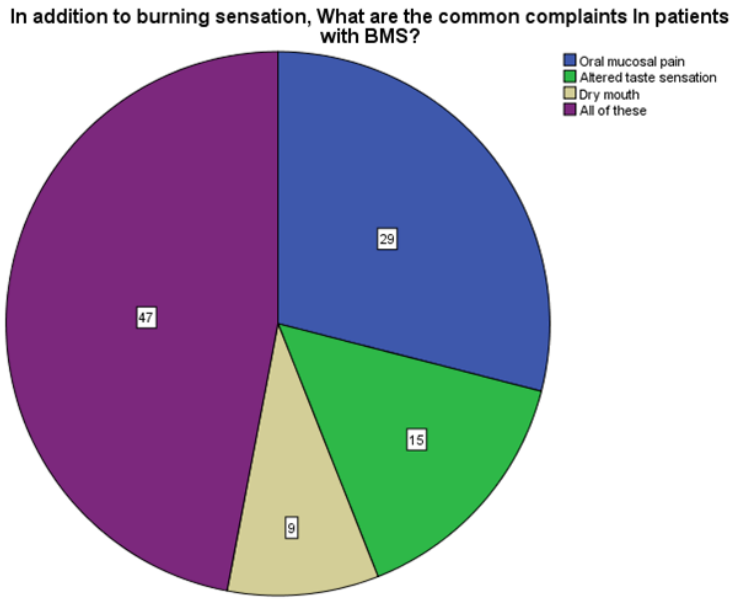

Figure 5: Pie chart showing the awareness about the common complaints in patients with BMS. 29% of the participants said that oral mucosal pain as the common complaints in patients with

bms, 15% of the participants said altered taste sensation, 9% said as dry mouth and 46% of the participants said all of the these are the common complaints in patients with bms

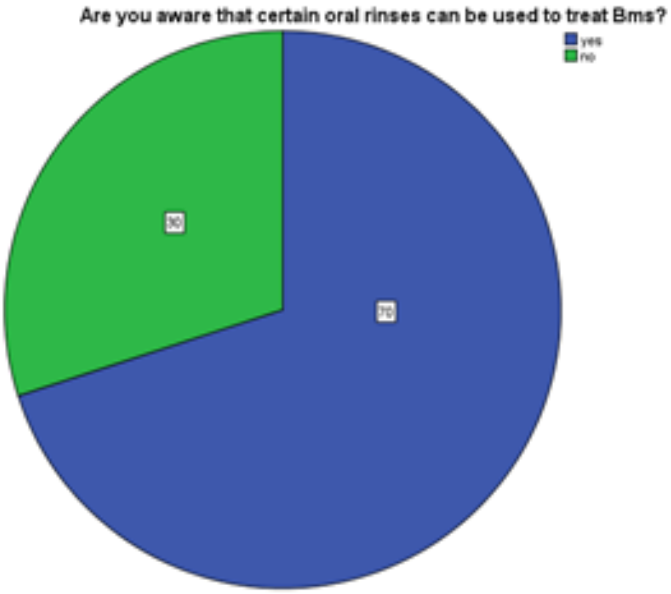

Figure 6: Pie chart showing the awareness of oral rinses used to treat BMS. 70% of the participants were aware that certain oral rinses can be used to treat bms and 30% were not aware.

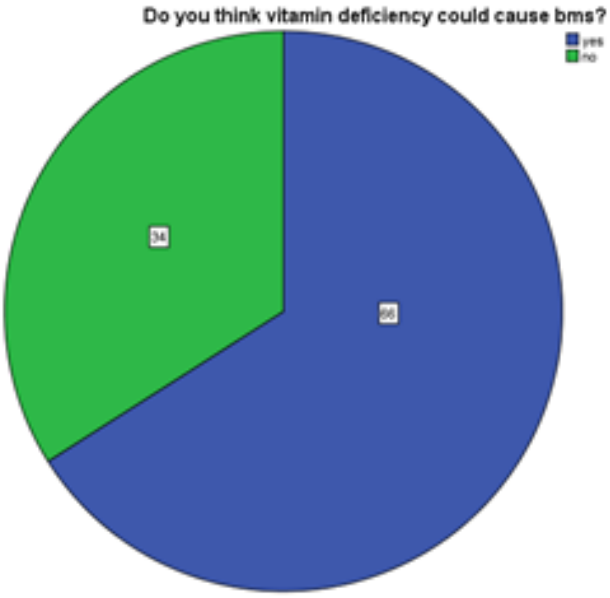

Figure 7: Pie chart showing the responses of whether vitamin deficiency could cause BMS. 66% of the participants were aware that vitamin deficiency could cause bms and 34% were not aware

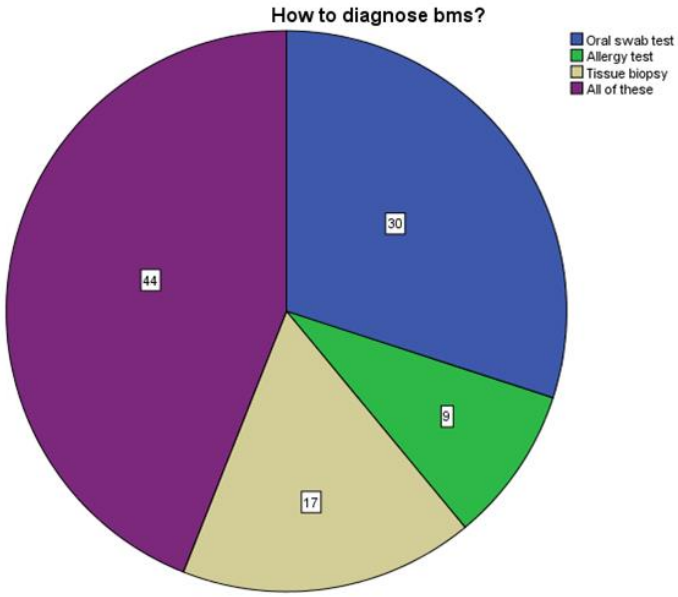

Figure 8: Pie chart showing the awareness about diagnosis of BMS. 30% of the participants said that oral swab test is used for diagnosis of bms, 9% of the participants said that allergy test is used for diagnosis of bms, 17% of the participants said that tissue biopsy is used for diagnosis of bms and 44% of the participants said that all of these methods are used for diagnosis of bms.

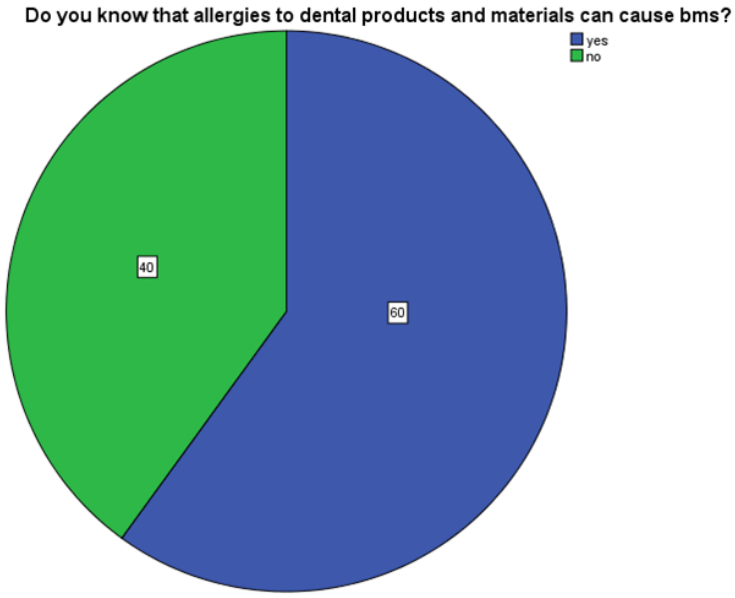

Figure 9: Pie chart showing the awareness that allergies to dental products and materials can cause BMS. 60% of the participants were aware that allergies to dental products and materials can cause BMS and 40% of the participants were not aware.

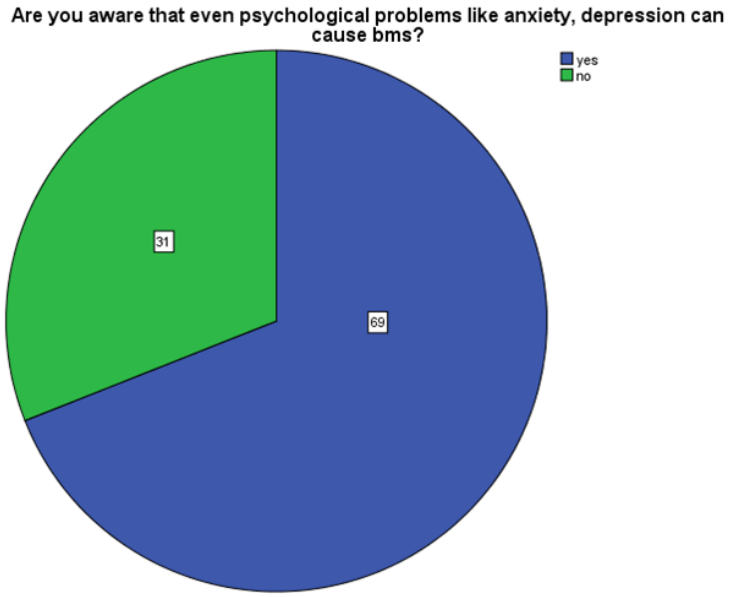

Figure 10: Pie chart showing the awareness of psychological problems causing BMS. 69% of the participants were aware that psychological problems like anxiety, depression can cause bms whereas 31% of the participants were not aware.

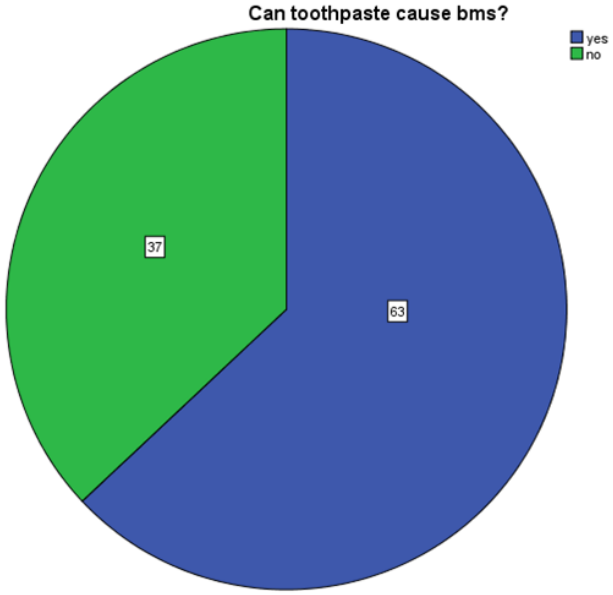

Figure 11: Pie chart showing the responses whether toothpaste can cause BMS. 63% of the participants agreed that toothpaste can cause bms and 37% disagreed.

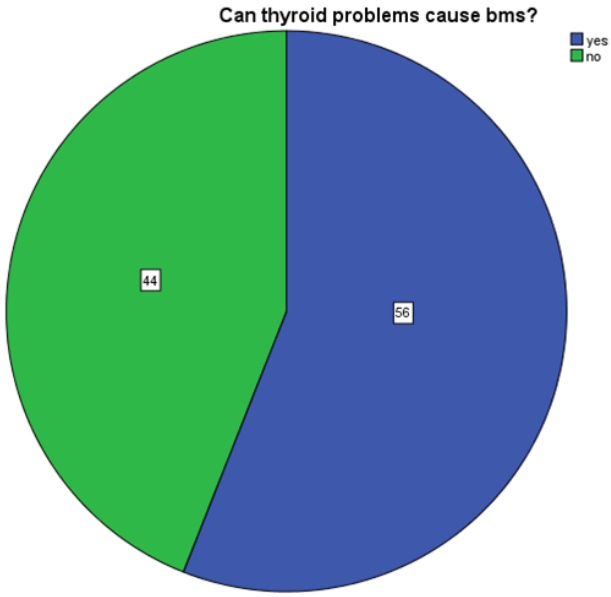

Figure 12: Pie chart showing the responses whether thyroid problems can cause BMS. 56% of the participants said that thyroid problems can cause bms and 44% of the participants said that thyroid problems does not cause BMS.

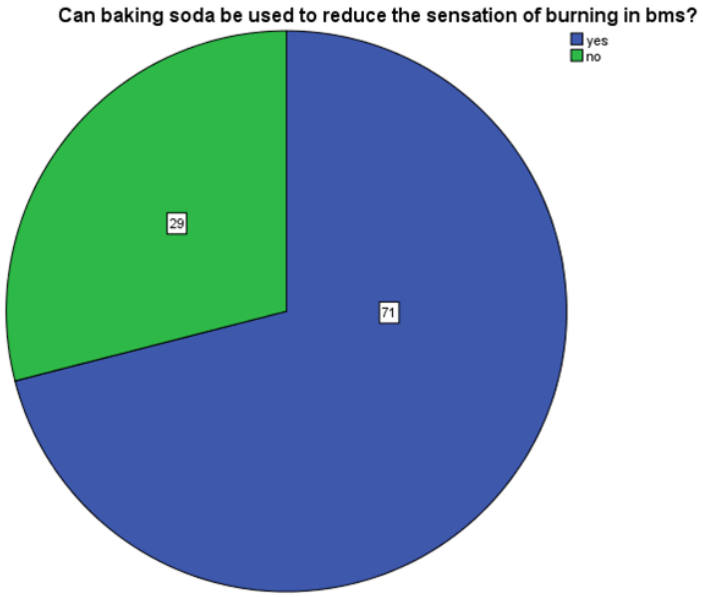

Figure 13: Pie chart showing responses whether baking soda can be used to reduce the sensation of burning in BMS. 71% of the participants agreed that baking soda can be used to reduce the sensation of burning in BMS and 29% of the participants disagreed.

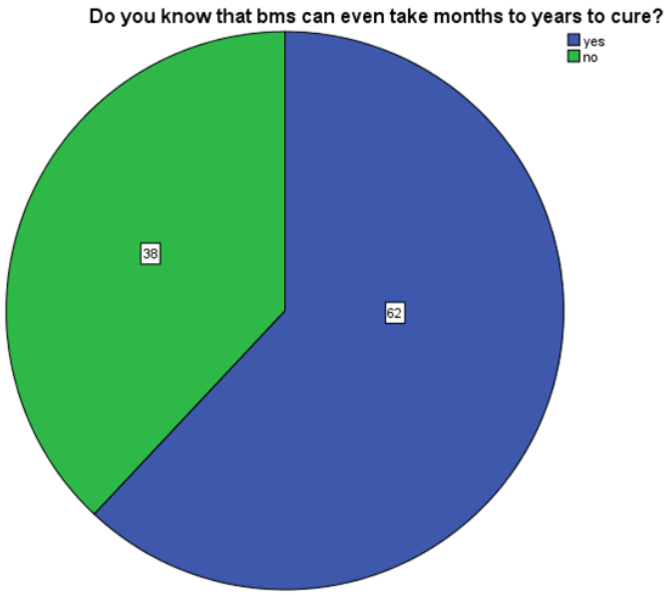

Figure 14: Pie chart showing the awareness about BMS can take months to years to cure. 62% of the participants were aware that bms can even take months to years to cure and 38% of the participants were not aware.

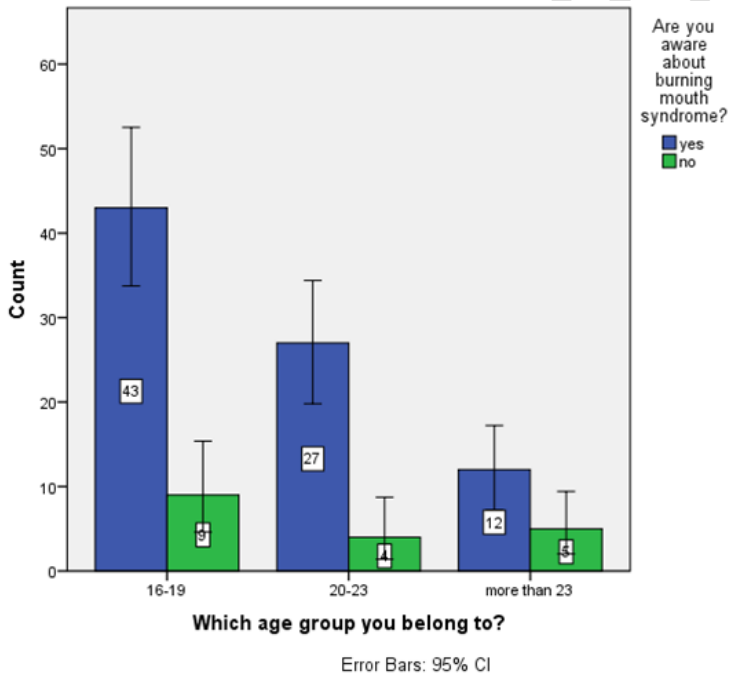

Figure 15:Bar graph represents the association between age group and awareness of burning mouth syndrome. X axis represents the age group and Y axis represents awareness about burning

mouth syndrome. Blue denotes the participants who were aware of the burning mouth syndrome. Green denotes the participants who were not aware. Chi square test was done and the association was found to be statistically not significant. Pearson's chi square value: 0.357(>0.05)

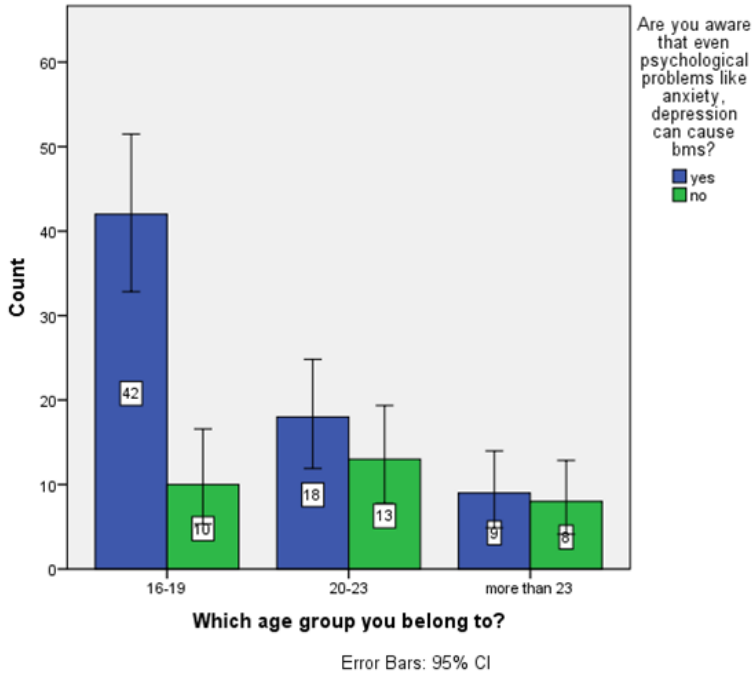

Figure 16: Bar graph represents the association between age group and awareness about psychological problems causing BMS. X axis represents the age group and Y axis represents the awareness of psychological problems causing BMS. Blue denotes the participants who were aware that psychological problems can cause burning mouth syndrome. Green denotes the participants who were not aware. Chi square test was done and the association was found to be statistically significant. Pearson's chi square value: 0.028(<0.05)

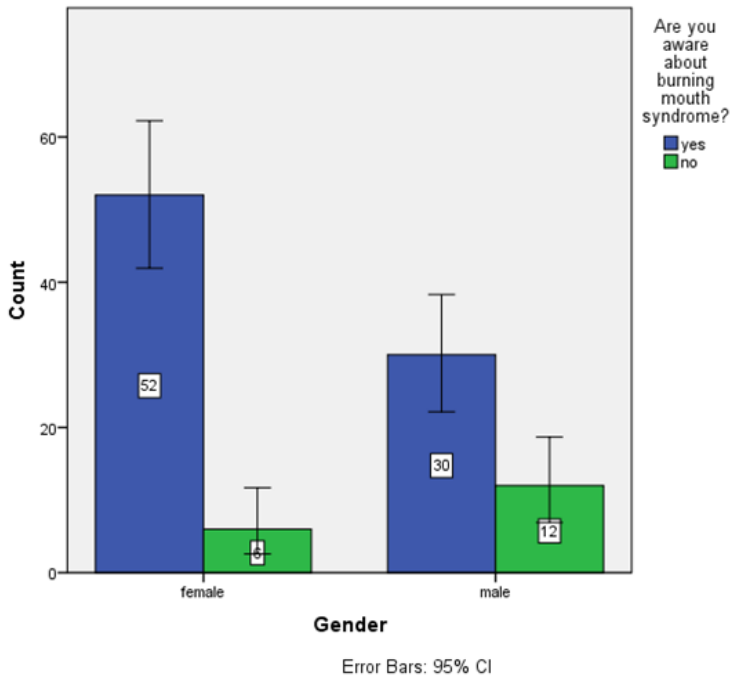

Figure 17: Bar graph represents the association between gender and awareness of burning mouth syndrome. X axis represents the gender and Y axis represents awareness about burning mouth syndrome. Blue denotes the participants who were aware of the burning mouth syndrome. Green denotes the participants who were not aware. Chi square test was done and the association was found to be statistically significant. Pearson's chi square value: 0.019(<0.05)

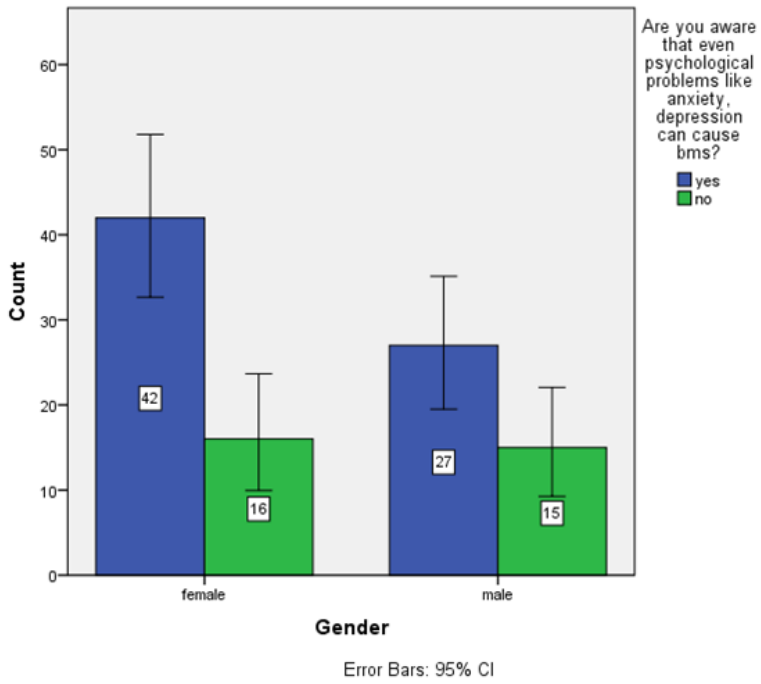

Figure 18: Bar graph represents the association between gender and awareness about psychological problems causing BMS. X axis represents gender and Y axis represents the awareness of psychological problems causing BMS. Blue denotes the participants who were aware that psychological problems can cause burning mouth syndrome. Green denotes the participants who were not aware. Chi square test was done and the association was found to be statistically not significant. Pearson's chi square value: 0.386(>0.05)

DISCUSSION

In a study, 195 patients diagnosed with BMS and 95 stable patients without BMS were recruited. Menopause, candidiasis, psychiatric problems, and dry mouth were all prevalent among BMS patients. In BMS, age and gender were the most important predictors. BMS was shown to be strongly correlated with psychological conditions and candidiasis (37). There is only limited evidence in the literature to guide physicians in the treatment of patients with BMS. Before diagnosing primary BMS, secondary causes should be investigated (38).

Following the latest preliminary diagnosis procedure for BMS, a sample of 123 patients originally diagnosed with BMS was chosen in a study. A control group of 123 patients with

dental complications but no oral burning was also chosen as a control group. All patients were subjected to further protocol following their thyroid function and echography. In comparison to eighty five patients in the research population, thirteen control patients had certain thyroid abnormalities. The study discovered that hypothyroidism is also responsible for oral burning and dysgeusia. Hence, thyroid function testing could be used in the diagnosis process for BMS patients (39). Hormones, whether it be in excess or deficiency, have a negative impact on the oral cavity. A patient with thyroid dysfunction, as well as a patient taking thyroid medications, requires proper risk management before considering dental treatment (40).

Some of the limitation in this study include, the smaller samples size of 100. Larger sample size will give more accurate data. Wide variety of population can be included, our study only dental students. In the future, studies can be done with larger sample sizes.

CONCLUSION

From the results obtained, we can conclude that dental students have a moderate level of awareness about burning mouth syndrome. Most of the dental students were aware about burning mouth syndrome but there was still a group of dental students who were not aware. More awareness and better understanding will result in better management and better treatment plans. The survey has created an awareness about Burning mouth syndrome.

REFERENCES

1. Pedersen AML. Burning mouth syndrome [Internet]. Vol. 46, Aktuel Nordisk Odontologi. 2021. p. 71–90. Available from: http://dx.doi.org/10.18261/issn.2058-7538-2021-01-06
2. Lamey P-J, Freeman R, Eddie S-A, Pankhurst C, Rees T. Vulnerability and presenting symptoms in burning mouth syndrome. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2005 Jan;99(1):48–54.
3. Feller L, Fourie J, Bouckaert M, Khammissa RAG, Ballyram R, Lemmer J. Burning Mouth Syndrome: Aetiopathogenesis and Principles of Management. Pain Res Manag. 2017 Oct 18;2017:1926269.

4. Jääskeläinen SK. Pathophysiology of primary burning mouth syndrome. Clin Neurophysiol. 2012 Jan;123(1):71–7.

5. Teruel A, Patel S. Burning mouth syndrome: a review of etiology, diagnosis, and management. Gen Dent. 2019 Mar;67(2):24–9.

6. Talattof Z, Dabbaghmanesh MH, Parvizi Y, Esnaashari N, Azad A. The Association between Burning Mouth Syndrome and Level of Thyroid Hormones in Hashimotos Thyroiditis in Public Hospitals in Shiraz, 2016. J Dent. 2019 Mar;20(1):42–7.

7. Castells X. Drug points: Dysgeusia and burning mouth syndrome by eprosartan [Internet]. Vol. 325, BMJ. 2002. p. 1277–1277. Available from: http://dx.doi.org/10.1136/bmj.325.7375.1277

8. Aravindhan R, Vidyalakshmi S, Kumar MS, Satheesh C, Balasubramanium AM, Prasad VS. Burning mouth syndrome: A review on its diagnostic and therapeutic approach. J Pharm Bioallied Sci. 2014 Jul;6(Suppl 1):S21–5.

9. Kohorst JJ, Bruce AJ, Torgerson RR, Schenck LA, Davis MDP. A population-based study of the incidence of burning mouth syndrome. Mayo Clin Proc. 2014 Nov;89(11):1545–52.

10. Kamala KA, Sankethguddad S, Sujith SG, Tantradi P. Burning mouth syndrome [Internet]. Vol. 22, Indian Journal of Palliative Care. 2016. p. 74. Available from: http://dx.doi.org/10.4103/0973-1075.173942

11. Bookout GP, Ladd M, Short RE. Burning Mouth Syndrome. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2021.

12. Schiavone V, Adamo D, Ventrella G, Morlino M, De Notaris EB, Ravel MG, et al. Anxiety, depression, and pain in burning mouth syndrome: first chicken or egg? Headache. 2012 Jun;52(6):1019–25.

13. Nasri-Heir C, Zagury JG, Thomas D, Ananthan S. Burning mouth syndrome: Current concepts. J Indian Prosthodont Soc. 2015 Oct;15(4):300–7.

14. Wu F, Zhu J, Li G, Wang J, Veeraraghavan VP, Krishna Mohan S, et al. Biologically synthesized green gold nanoparticles from Siberian ginseng induce growth-inhibitory effect on melanoma cells (B16). Artif Cells Nanomed Biotechnol. 2019 Dec;47(1):3297–305.

15. Chen F, Tang Y, Sun Y, Veeraraghavan VP, Mohan SK, Cui C. 6-shogaol, a active constiuents of ginger prevents UVB radiation mediated inflammation and oxidative stress through modulating NrF2 signaling in human epidermal keratinocytes (HaCaT cells). J Photochem Photobiol B. 2019 Aug;197:111518.

16. Li Z, Veeraraghavan VP, Mohan SK, Bolla SR, Lakshmanan H, Kumaran S, et al. Apoptotic induction and anti-metastatic activity of eugenol encapsulated chitosan nanopolymer on rat glioma C6 cells via alleviating the MMP signaling pathway [Internet]. Vol. 203, Journal of Photochemistry and Photobiology B: Biology. 2020. p. 111773.

Available from: http://dx.doi.org/10.1016/j.jphotobiol.2019.111773

17. Babu S, Jayaraman S. An update on β-sitosterol: A potential herbal nutraceutical for diabetic management. Biomed Pharmacother. 2020 Nov;131:110702.

18. Malaikolundhan H, Mookkan G, Krishnamoorthi G, Matheswaran N, Alsawalha M, Veeraraghavan VP, et al. Anticarcinogenic effect of gold nanoparticles synthesized from Albizia lebbeck on HCT-116 colon cancer cell lines. Artif Cells Nanomed Biotechnol. 2020 Dec;48(1):1206–13.

19. Han X, Jiang X, Guo L, Wang Y, Veeraraghavan VP, Krishna Mohan S, et al. Anticarcinogenic potential of gold nanoparticles synthesized from Trichosanthes kirilowii in colon cancer cells through the induction of apoptotic pathway. Artif Cells Nanomed Biotechnol. 2019 Dec;47(1):3577–84.

20. Gothai S, Muniandy K, Gnanaraj C, Ibrahim IAA, Shahzad N, Al-Ghamdi SS, et al. Pharmacological insights into antioxidants against colorectal cancer: A detailed review of the possible mechanisms. Biomed Pharmacother. 2018 Nov;107:1514–22.

21. Veeraraghavan VP, Hussain S, Balakrishna JP, Dhawale L, Kullappan M, Ambrose JM, et al. A Comprehensive and Critical Review on Ethnopharmacological Importance of Desert Truffles: Terfezia claveryi, Terfezia boudieri, and Tirmania nivea [Internet]. Food Reviews International. 2021. p. 1–20. Available from: http://dx.doi.org/10.1080/87559129.2021.1889581

22. Sathya S, Ragul V, Veeraraghavan VP, Singh L, Niyas Ahamed MI. An in vitro study on hexavalent chromium [Cr(VI)] remediation using iron oxide nanoparticles based beads. Environmental Nanotechnology, Monitoring & Management. 2020 Dec 1;14:100333.

23. Yang Z, Pu M, Dong X, Ji F, Priya Veeraraghavan V, Yang H. Piperine loaded zinc oxide nanocomposite inhibits the PI3K/AKT/mTOR signaling pathway via attenuating the development of gastric carcinoma: In vitroandin vivostudies. Arabian Journal of Chemistry. 2020 May 1;13(5):5501–16.

24. Rajendran P, Alzahrani AM, Rengarajan T, Veeraraghavan VP, Krishna Mohan S. Consumption of reused vegetable oil intensifies BRCA1 mutations. Crit Rev Food Sci Nutr. 2020 Oct 27;1–8.

25. Barma MD, Muthupandiyan I, Samuel SR, Amaechi BT. Inhibition of Streptococcus mutans, antioxidant property and cytotoxicity of novel nano-zinc oxide varnish. Arch Oral Biol. 2021 Jun;126:105132.

26. Samuel SR. Can 5-year-olds sensibly self-report the impact of developmental enamel defects on their quality of life? Int J Paediatr Dent. 2021 Mar;31(2):285–6.

27. Samuel SR, Kuduruthullah S, Khair AMB, Shayeb MA, Elkaseh A, Varma SR. Dental pain, parental SARS-CoV-2 fear and distress on quality of life of 2 to 6 year-old children during COVID-19. Int J Paediatr Dent. 2021 May;31(3):436–41.

28. Tang Y, Rajendran P, Veeraraghavan VP, Hussain S, Balakrishna JP, Chinnathambi A, et al. Osteogenic differentiation and mineralization potential of zinc oxide nanoparticles from Scutellaria baicalensis on human osteoblast-like MG-63 cells [Internet]. Vol. 119, Materials Science and Engineering: C. 2021. p. 111656. Available from: http://dx.doi.org/10.1016/j.msec.2020.111656

29. Yin Z, Yang Y, Guo T, Veeraraghavan VP, Wang X. Potential chemotherapeutic effect of betalain against human non-small cell lung cancer through PI3K/Akt/mTOR signaling pathway. Environ Toxicol. 2021 Jun;36(6):1011–20.

30. Veeraraghavan VP, Periadurai ND, Karunakaran T, Hussain S, Surapaneni KM, Jiao X. Green synthesis of silver nanoparticles from aqueous extract of Scutellaria barbata and coating on the cotton fabric for antimicrobial applications and wound healing activity in fibroblast cells (L929). Saudi J Biol Sci. 2021 Jul;28(7):3633–40.

31. Mickymaray S, Alfaiz FA, Paramasivam A, Veeraraghavan VP, Periadurai ND, Surapaneni KM, et al. Rhaponticin suppresses osteosarcoma through the inhibition of PI3K-Akt-mTOR pathway. Saudi J Biol Sci. 2021 Jul;28(7):3641–9.

32. Teja KV, Ramesh S. Is a filled lateral canal – A sign of superiority? [Internet]. Vol. 15, Journal of Dental Sciences. 2020. p. 562–3. Available from: http://dx.doi.org/10.1016/j.jds.2020.02.009

33. Kadanakuppe S, Hiremath S. Social and Behavioural Factors Associated with Dental Caries Experience among Adolescent School Children in Bengaluru City, India [Internet]. Vol. 14, British Journal of Medicine and Medical Research. 2016. p. 1–10. Available from: http://dx.doi.org/10.9734/bjmmr/2016/24021

34. Ali SJ, Jayaraj G. PSYCHOSOCIAL IMPACT OF LOCKDOWN AMONG STUDENTS. European Journal of Molecular & Clinical Medicine. 2020 Nov 22;7(1):686–96.

35. Ali SJ, K YB, Jayaraj G. Awareness of importance of research in undergraduate dental students [Internet]. Vol. 11, International Journal of Research in Pharmaceutical Sciences. 2020. p. 1677–84. Available from: http://dx.doi.org/10.26452/ijrps.v11ispl3.3494

36. Ali SJ, Sasanka LK, Ramanadhan V, Ganapathy D. Orthodontics and Smile Correction in Teenagers-A Survey. Indian J Forensic Med Toxicol [Internet]. 2020;14(4). Available from: http://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=09739122&AN=148409989&h=4qexZ6FDanVwn%2F6JVq%2Bqi%2F9lWpeKqI4h%2FtGpekn5qChqFv6ZFoq%2Bqo9Aq8UME0VrD46riivwSSGS2LOmKHONCQ%3D%3D&crl=c

37. Rabiei M, Leili EK, Alizadeh L. Burning Mouth Syndrome: A Comparative Cross-sectional Study. Contemp Clin Dent. 2018 Sep;9(Suppl 2):S256–60.

38. Patton LL, Siegel MA, Benoliel R, De Laat A. Management of burning mouth syndrome: systematic review and management recommendations. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2007 Mar;103 Suppl:S39.e1–13.

39. Femiano F, Lanza A, Buonaiuto C, Gombos F, Nunziata M, Cuccurullo L, et al. Burning mouth syndrome and burning mouth in hypothyroidism: proposal for a diagnostic and therapeutic protocol. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2008 Jan;105(1):e22–7.

40. Chandna S, Bathla M. Oral manifestations of thyroid disorders and its management. Indian J Endocrinol Metab. 2011 Jul;15(Suppl 2):S113–6.