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Soft Palate Variation in Oral Submucous Fibrosis

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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Review Article

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ABSTRACT

One among the most prevalent precancerous disorders affecting oral cavity in those who consume arecanut and gutka is oral submucous fibrosis (OSMF). The anatomy of the soft palate alters as this illness proceeds and can act as a marker for disease. OSMF prevalence varies by area and ethnicity, and is closely linked to behaviours, culture, and cuisine. People in South and Southeast Asia have the greatest frequency of OSMF.OSMF has afflicted 2.5 million individuals globally, with a total of five million in the Indian individuals. The percentage of OSMF patients with dysplasia might range from 12 to 15 percent. Malignant changes occurs at a rate of 4–13 percent around world, but 7.6 percent in the Indian subcontinent. The anatomy of the soft palate in OSMF patients has been studied in a number of ways. Cephalometric analysis is highly used methods for measuring the soft palate in both healthy and OSMF patient. On lateral cephalometry, the soft palate shows a variety of radiographic appearances. Early cephalometry diagnosis of OSMF plays a vital role in treatment of disease. Soft palate becomes thick and heavy as OSMF advances, and considerable changes in soft palate dimensions occur, which may be better assessed by CBCT. This review work compared studies from several researchers, and observed that Type 1soft palate is the most prevalent, while type 6 soft palate is the least common.

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1. INTRODUCTION

One among the most prevalent precancerous disorders affecting the oral cavity in those who consume arecanut and gutka is OSMF. OSMF is a well-known potentially neoplastic oral cavity disorder characterised by lamina propria and deeper connective tissue inflammation and fibrosis. Even before the OSMF manifests clinically, alterations in soft palate morphology will begin. Sleep apnea, difficulties speaking, swallowing, and breathing can all result from the changes occurring in soft palate. Schwartz proposed the term "Atrophica idiopathica mucosa oris" to characterise an oral fibrosing condition that he identified in five Indian women in Kenyain 1952 [1]. In 1953, Joshi used the term "oral submucous fibrosis" to describe the disorder [2].

2. SOFT PALATE

In mammals, the soft palate is also known as the, velum, or Muscular palate, is a muscle &connective tissue structure that forms the roof of the posterior (rear) section of the oral cavity. The palate, or roof of the mouth, is formed by the soft and hard palates, which divide the oral and nasal cavities. The soft palate and the hard palate, which develop in the anterior roof of the mouth, are connected Because it prevents food and other substances from entering the nasal passages after swallowing, the soft palate is essential for speech production. It also helps with the formation of certain sounds. This area is usually reddish pink in colour and has slightly less vascularity than the oropharynx. As the patient says "ah," look around the surroundings. During function, the tissue should seem loose, mobile, and symmetrical. On palpation, the tissue will have a homogeneous, spongy consistency.

The palatine aponeurosis is made up of a strong, thin, fibrous sheet as well as the glossopalatine and pharyngopalatine muscles. The uvula is a tiny protrusion that hangs freely at the back of the soft palate. The fibrous foundation of the palate is formed by the palatine aponeurosis, which is the flattened tendon of the tensor veli palatine. The aponeurosis separates along the median plane to encompass the musculus uvulae. The palatal muscles are a group of five paired muscles that are known as the muscles of soft palate The soft palate is a mucous membrane fold that has the following components. On the superior surface of the palatine aponeurosis, the levatorveli palatine and the palatopharyngeus are located.

The palatoglossus is located on the palatine aponeurosis' inferior or anterior side. There are many mucous glands and taste buds present.

Radiographic imaging is now used extensively in the first and second levels of dental diagnosis and treatment planning [3]. In recent years, there has been a growing focus on the use of non-invasive diagnostic radiology and its applications in every field of dentistry [4].

Various radiographs can be used to evaluate the soft palate, as well as any changes in anatomy of soft palate. Presently, cone beam computed tomography (CBCT), ultrasonography and magnetic resonance imaging (MRI) techniques are being used to get three-dimensional pictures of the head and neck region including soft palate. The advantages of CBCT in treatment planning over traditional two-dimensional radiography imaging are astounding [3].

The radiographic examination of the soft palate may reveal changes in the soft palate in addition to the clinical examination of oral cavity.

3. INCIDENCE OF OSMF

OSMF is an irreversible oral disease that causes scarring and, eventually, soft tissue fibrosis. OSMF is a neoplastic lesion of the oral cavity that may lead to the transformation in to oral carcinoma. Because of its high incidence of malignant change, the illness has a major impact on mortality (1.5-15%) [5]. OSMF prevalence varies by area and ethnicity, and is closely linked to behaviours, culture, and cuisine [6,7,8]. People in South and Southeast Asia have the greatest frequency of OSMF [7]. Furthermore, South Africa has a significant incidence of OSMF patients, with increase in number of Indian migrants. The incidence of OSMF differs by country in Southeast Asia. In India, China, and Vietnam, the illness prevalence was found to be 0.62-6.42 percent, 0.9-4.7 percent, and 0.15-14.6 percent, respectively [9,10,11]. According to WHO figures, there are more than 5 million OSMF sufferers globally [12,13]. The OSMF patients range in age from their early twenties to their late eighties, with a range of mean ages amongst studies [14]. OSMF has afflicted 2.5 million individuals globally, with a total of five million in the Indian individuals [15]. The OSMF patients with dysplasia might range from 12 to 15 percent. Malignant changes occurs at the rate of 4–13 percent around world, but 7.6 percent in the Indian subcontinent [15].

4. AETIOLOGY OF OSMF

Based on epidemiological and clinical research, causative factors such as nutritional inadequacies, areca nut consumption, chilly consumption, genetic susceptibility, autoimmune conditions, and collagen abnormalities can be regarded progressive variables in the pathogenic process of OSMF result. Areca nut / betel nut consumption is associated with an increased risk of OSMF [16]. Arecoline, an alkaloid present in the entire areca nut and betel nut, encourages fibroblasts to produce more collagen. Because the areca nut has a significant quantity of copper, it raises the amounts of dissolved copper in saliva, which might be the precursor to OSMF [17]. The oral mucosa is irritated more by frozen dry varieties of mawa, gutka, and pan masala than by self-made betel quid [18].

OSMF can also be caused by a lack of vitamin B complex. The healing of inflammatory oral mucosa is disrupted because of anaemia (Fe deficiency), vitamin B complex insufficiency, and poor nutrition, resulting in scarring and slowed healing [18,19]. Chilies, according to Rajendran et al. in 1994, have a significant role in the pathogenesis of OSF because its active ingredient Capsaicin, functions as a predisposing factor [20,21,22].

Because of usage of betel quid, the levels of TGF-beta and interferon-gamma are low in instances with oral submucous fibrosis. Other illnesses, such as rheumatoid arthritis, SLE, and scleroderma, have been linked to certain human leukocyte antigen -DR antigens, and OSMF has a similar link [23].

5. OSMF AND VARIANTS OF SOFT PALATE

“The anatomy of the palatal region is changed in OSMF for two reasons [24,25]:

1. Fibrosis causes alterations in the length, breadth, &angle of the soft palate.
2. The palatal uvula's orientation has changed.”

In 2008, YOU et al. used lateral cephalometry to examine the anatomy of soft palate in 200 normal persons aged five to fortyeight years. Research’s goal was to look at the differences in velar morphology. Six kinds of soft palate morphology have been identified. In terms of velar type, there was a considerable variation between the pre-adult and adult population, as well as between male and female groups. Apart from Type 6, Type 3 has a much shorter velar length than the other varieties. There was no discernible difference between any two of the other five categories, though [26]. In 2014, Shankar et al used a digital lateral cephalogram to look for soft palate. A total of 70 patients were analysed, including a control group (35 patients) and a study group (35 OSMF patients). The soft palate's anterior-posterior and superior-inferior lengths were measured. 62.9% of the patients in the research group (35 individuals) had Stage II OSMF. Stage II OSF was characterised by a leaf-shaped soft palate, and stage III OSF was characterised by a butt-shaped palate. The length of the palate in OSF patients was gradually reduced in an anterior-posterior direction, according to the study [27].

In 2014, Mohan et al performed similar study in 100 patients splitting them into 2 groups of equal size. Group I contained 50 persons with OSMF who had been clinically diagnosed, and Group II included 50 healthy individuals. Type 1 soft palate was the most prevalent (56%) across the research groups, whereas type 5 soft palate was the least common. The majority of patients had stage II OSMF, which was characterised by type 1 soft palates, whereas stage III OSMF was characterised by butt-shaped soft palates (type 3) [28]. Patil et al in 2017 and Domir et al.in 2019 also found comparable results [29,30]. According to Domir et al, Leaf shaped soft palate was the most prevalent in OSMF group (51.14 %), followed by Rat-tail shaped (21.86 percentage), and Crook-shaped (13.64 percentage. The anatomy of the Soft palate in awake patients being "hooked or S-shaped" suggested a significant likelihood of obstructive sleep apnea syndrome, according to Pepin et al. [31].

Deshmukh et al separated sixty males in to 3 groups in 2015: Group I-20 participants (habit group), Group II-20 participants (OSMF group), and Group III-20 participants (individuals without a habit and/or OSMF group). With a significant difference between the habit and OSMF groups, the superoinferior measurement of soft palate was raised. The habit group had a smaller anteroposterior measurement than normal people, while the OSMF group had a statistically significant difference. Types 1 and 2 Soft palate were more prevalent in normal people and habit groups, however type 6 was more common in OSMF patients [32]. Khaitan et al. conducted a research in 2015 to look at the morphology of soft palate in 200 people. Soft palate morphology was divided into eight categories. The most prevalent kind was Type 1. Soft palate length was longer in group V. (46-55 years). Males have a longer soft palate than females [33].

6. MORPHOLOGICAL CLASSIFICATION [15,26,34,35]

Type (1)-Leaf-shaped.
Type (2)-Rat-tail shaped
Type (3)-Butt-like shaped
Type (4)-Straight line.
Type (5)-Distorted
Type (6)-Crook shaped
Type (7)-Triangular shaped
Type (8)-Bifid-shaped

You et al. were the first to classify the structure of soft palate into six different type [26]. Along with the six varieties stated above, Guttal et al. described two more types: Type 7 is a U-shaped soft palate, which is a version of the Rat-tail form, while type 8 is a Bifid-shaped soft palate [34]. In that investigation, the U-shaped soft palate reported by Guttal et al. was not found [34]. Instead, they discovered an entirely new form, triangular-shaped soft palate, which has yet to be reported in the literature. In a research done by Khaitan et al in 2015, type 1 soft palate was the most prevalent kind found when comparing the soft palate among various age groups [33]. Rathore et al, 2019 demonstrated most prevalent kind of soft palate as leaf shape, which was detected in 21 instances (42.0 %) [35]; These findings were similar as Raja Lakshmi et al. [36]; Shankar et al. [27]; Mohan et al. [28] and Tekchandani et al. [37] Tripathy et al. [38]. In addition, the most common shape of soft palate in the normal individual was leaf shape, which was seen in 19 case (38.0 percent), which was common with You et al. [26], Kumar and Gopal, [39], and Verma et al. [40] However, according to Raja Lakshmi et al. [36] and Praveen et al. [41], Rat-tail shaped was the most common type in the control group.

Moreover, Shah et al. [24] in 2021examine soft palate shape and dimensions at different phases of oral submucous fibrosis, using radiographic control. A lateral cephalogram and CBCT were used to analyse and compare 60 individuals (CBCT) [42-44]. Leaf shaped soft palates is shown to be the most prevalent in both groups and by both radiography modalities. With higher grades of OSMF group, there was a significant drop in length and a breadth was increased. According to the p value, CBCT provided a more precise result [45-47].

7. CONCLUSION

Considering that soft palate becomes thick and heavy as OSMF advances, and changes in soft palate dimensions occur, the examination of soft palate in OSMF cases may be done using CBCT or lateral cephalometry. Radiographs are utilised as the diagnostic tools in oral submucous fibrosis patients since changes of soft palate is the first alteration to be seen. Cephalometry may analyse the alteration of the soft palate in those who have the habit even before they develop oral submucous fibrosis. As a result, cephalometry can be useful in detecting fibrosis in those who smoke, which can aid prognosis. Type 1 soft palate is the most prevalent as shown in both radiographic techniques, while type 6 soft palate is the least common, as demonstrated in previous studies. S-shaped and hooked-shaped soft palates are more likely to develop obstructive sleep disorder and velopharyngeal insufficiency. Early radiographic diagnosis of OSMF may play an important role in diagnosis, progression and treatment of disease.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Schwartz J. AtrophiaIdiopathica Mucosae Oris. London: Demonstrated at the 11th Int Dent Congress; 1952.
2. Joshi SG. Fibrosis of the palate and pillars. Indian J Otolaryngol. 1953;4:1.

3. Reda R, Zanza A, Mazzoni A, Cicconetti A, Testarelli L, Di Nardo D. An Update of the Possible Applications of Magnetic Resonance Imaging (MRI) in Dentistry: A Literature Review. J Imaging. 2021 Apr 21;7(5):75.
DOI: 10.3390/jimaging7050075
4. Reda R, Zanza A, Cicconetti A, Bhandi S, Miccoli G, Gambarini G, Di Nardo D. Ultrasound Imaging in Dentistry: A Literature Overview. J Imaging. 2021 Nov 14;7(11):238.
DOI: 10.3390/jimaging7110238
5. Wang YY, Tail YH, Wang WC, et al. Malignant transformation in 5071 Southern Taiwanese patients with potentially malignant oral mucosal disorders. BMC Oral Health. 2014;14:99.
6. Zhang X, Reichart PA. A review of betel quid chewing, oral cancer and precancer in Mainland China. Oral Oncol. 2007;43(5): 424-30.
7. Tilakaratne WM, Ekanayaka RP, Warnakulasuriya S. Oral submucous fibrosis: A historical perspective and a review on etiology and pathogenesis. Oral Surg Oral Med Oral Pathol Oral Radiol. 2016;122(2):178-91.
8. Chattopadhyay A, Ray JG. Molecular pathology of malignant transformation of oral submucous fibrosis. J Environ PatholToxicol Oncol. 2016;35(3):193-205.
9. Liu B, Shen M, Xiong J, et al. Synergistic effects of betel quid chewing, tobacco use (in the form of cigarette smoking) and alcohol consumption on the risk of malignant transformation of oral submucous fibrosis (OSF): A case-control study in hunan province, China. Oral Surg Oral Med Oral Pathol Oral Radiol. 2015;120(3):337-45.
10. Reichart PA, Nguyen XH. Betel quid chewing, oral cancer and other oral mucosal diseases in Vietnam: a review. J Oral Pathol Med 2008;37(9):511-4.
11. Yang SF, Wang YH, Su NY, et al. Changes in prevalence of precancerous oral submucous fibrosis from 1996 to 2013 in Taiwan: a nationwide population-based retrospective study. J Med Assoc. 2018;117(2):147-52.
12. Nigam NK, Aravinda K, Dhillon M, et al. Prevalence of oral submucous fibrosis among habitual gutkha and areca nut chewers in Moradabad district. J Oral Biol Craniofac Res. 2014;4(1):8-13.
13. Gottipamula S, Sundarrajan S, Moorthy A, et al. Buccal mucosal epithelial cells downregulate CTGF expression in buccal submucosal fibrosis fibroblasts. J Maxillofac Oral Surg. 2018;17(2): 254-9.
14. Maher R, Lee AJ, Warnakulasuriya KA, et al. Role of areca nut in the causation of oral submucous fibrosis: A case-control study in Pakistan. J Oral Pathol Med 1994;23(2):65-9.
15. SK Domir A, Gargava A, Deoghare R, Agrawal Morphometric. Evaluation of Soft Palate in OSMF Patients Using Cephalometrics Indian J Otolaryngol Head Neck Surg. 2019;71S1101822.
DOI: 10.1007/s12070-019-01702-1
16. Patel F, Shah SN, James C. Oral submucous fibrosis - a review. J Evolution Med Dent Sci 2021;10(32):2665-2671.
DOI: 10.14260/jemds/2021/544
17. Gupta S, Reddy MVR, Harinath BC. Role of oxidative stress and anti-oxidants in aetiopathogenesis and management of oral submucous fibrosis. Indian J Clin Biochem. 2004;19(1):138-41.
18. Gupta MK, Mhaske S, Ragavendra S, et al. Review article: Oral submucous fibrosis-current concepts in etiopathogenesis. People's J Sci Res. 2008;40:39-44.
19. Aziz SR. Oral submucous fibrosis: An unusual disease. J N J Dent Assoc. 1997;68(2):17-9.
20. Rajendran R. Oral submucous fibrosis: Etiology, pathogenesis and future research. Bull World Health Organ. 1994;72(6):985-96.
21. McGurg M, Craig GT. Oral submucous fibrosis: Two cases of malignant transformation in Asian immigrants to the United Kingdom. Br J Oral Maxillofac Surg. 1984;22(1):56-64.
22. Shiau YY, Kwan HW. Submucous fibrosis in tiwan. Oral Surg. 1979;47(5):453-7.
23. Binnie WH, Cawson RA. A new ultrastructural finding in oral submucous fibrosis. Br J Dermatol. 1972;86(3):286-90.
24. Shah JS, Shah HA, Soft palate morphology in OSMF patients: Radiographic evaluation. IP Int J Maxillofac Imaging. 2021;7(2):74-79.
25. Khare P, Reddy R, Gupta A, Sharva V, Gupta M, Singh P. Morphometric assessment of soft palate in oral submucous fibrosis using cone beam computed tomography: A cross-sectional

studyJ Indian Acad Oral Med Radiol. 2019;3123.
DOI: 10.4103/jiaomr.jiaomr_121_19
26. You M, Li X, Wang H, Zhang J, Wu H, Liu Y, Miao J, Zhu Z. Morphological variety of the soft palate in normal individuals: a digital cephalometric study. Dentomaxillofac Radiol. 2008 Sep;37(6): 344-9.
DOI: 10.1259/dmfr/55898096. PMID: 18757720
27. Shankar VN, Hegde K, Ashwini NS, Parveena V, Prakash SMR. Morphometric evaluation of soft palate in orsl submucous fibrosis. A digital cephalometric study. J Cranio Maxillofac Surg. 2014;42:48-52.
28. Mohan RP, Verma S, Singh U, Agarwal N. Morphometric evaluation of soft palate in oral submucous fibrosis—a digital cephalometric analysis. West Afri J Radiol. 2014;21:7-11.
29. Patil BM Ara SA, Katti G Ashraf S, Roohi U. Velar morphological variants in oral submucous fibrosis: A comparative digital cephalometric study. Indian J Dent Res. 2017;28:623-8.
30. Kaur Domir, S., Gargava, A., Deoghare, A. et al. Morphometric Evaluation of Soft Palate in OSMF Patients Using Cephalometrics. Indian J Otolaryngol Head Neck Surg. 2019;71:1018–1022.
Available:https://doi.org/10.1007/s12070-019-01702-1
31. Pepin JL, Veale D, Ferretti GR, Mayer P, Levy PA. Obstructive sleep apnea syndrome: Hooked appearance of the soft palate in awake patients - cephalometric and CT findings. Radiology. 1999;210:163–170.
32. Deshmukh RA, Bagewadi AS. Morphometric evaluation and comparison of soft palate in individuals with and without oral submucous fibrosis: A digital cephalometric study. SRM J Res Dent Sci 2015;6:220-4.
33. Khaitan T, Pachigolla R, Uday G, Balmuri PK, Chennouju SK, Pattipati S. Digital cephalometric analysis illustrating morphological variation of the Soft palate. J Indian Acad Oral Med Radiol. 2015;27:532-8
34. Guttal KS, Breh R, Bhat R, Burde KN, Naikmasur VG. Diverse morphologies of soft palate in normal individuals: A cephalometric perspective. J Indian Acad Oral Med Radiol. 2012;24:15-9.
35. S Rathore N Patil M Sareen M Meena P Baghla N Tyagi Morphological evaluation of soft palate in various stages of oral submucous fibrosis and normal individuals: A digital cephalometric studyJ Indian Acad Oral Med Radiol. 2019;3151.
36. Raja Lakshmi C, Ayesha Thabusum D, Bhavana SM. An innovative approach to evaluate the morphological patterns of soft palate in oral submucous fibrosis patients: A digital cephalometric study. Int J Chronic Dis. 2016;2016:5428581.
DOI: 10.1155/2016/5428581
37. Tekchandani V, Thakur M, Palve D, Mohale D, Gupta R. Co-relation of clinical and histologic grade with soft palate morphology in oral submucous fibrosis patients: A histologic and cephalometric study. J Dent Specialities. 2015;3:68-75.
38. Tripathy M, Anekar J, Ac R, NC S, Nappllі D, Lokanath P, et al. A Digital Cephalometric Study on The Morphometric Evaluation of Soft Palate in Oral Submucous Fibrosis. Asian Pacific Journal of Cancer Prevention: APJCP. 2020;21(7):2169–2176.
Available:https://doi.org/10.31557/APJCP.2020.21.7.2169
39. Kumar DK, Gopal KS. Morphological variants of soft palate in normal individuals: A digital cephalometric study. J Clin Diagn Res. 2011;5:10-3.
40. Verma P, Gupta Verma K, Kumaraswam KL, Basavaraju S, Sachdeva SK, Juneja S. Correlation of morphological variant of soft palate and need's ratio in normal individuals: A digital cephalometric study. Imaging Sci Dent. 2014;44:193-8.
41. Praveen BN, Amrutesh S, Pal S, ShubasiniAr, Vaseemuddin S. Various shapes of soft palate: A lateral cephalometric study. World J Dent. 2011;2:207-10.
42. A Nerkar R GadgilABhoosreddy C Bhadage P Vedpathak Comparative morphometric analysis of soft palate between OSMF and normal individuals: A digital cephalometric studyInt J Maxillofac Imaging. 2017;3117.
43. Panchbhai A. Effect of Oral Submucous Fibrosis on Jaw Dimensions. Turkish Journal of Orthodontics. 2019a;32:105–109.
Available:https://doi.org/10.5152/TurkJOrthod.2019.18061
44. Gadbail AR, Chaudhary M, Sarode SC, Gondivkar S, Tekade SA, Zade P, et al.

Ki67, CD105, and alpha-SMA expression supports the transformation relevant dysplastic features in the atrophic epithelium of oral submucous fibrosis. Plos One. 2018;13.
Available:https://doi.org/10.1371/journal.pone.0200171

45. Gadbail AR, Chaudhary MS, Sarode SC, Gondivkar SM, Belekar L, Mankar-Gadbail MP, et al. Ki67, CD105 and alpha-smooth muscle actin expression in disease progression model of oral submucous fibrosis. Journal of Investigative and Clinical Dentistry. 2019;10.
Available:https://doi.org/10.1111/jicd.12443
46. Gondivkar SM, Bhowate RR, Gadbail AR, Gaikwad RN, Gondivkar RS, et al. Development and validation of oral health-related quality of life measure in oral submucous fibrosis. Oral Diseases. 2018;24:1020–1028.
Available:https://doi.org/10.1111/odi.12857
47. Gondivkar SM, Bhowate RR, Gadbail AR, Gondivkar RS, Sarode SC. Impact of socioeconomic inequalities on quality of life in oral submucous fibrosis patients. Future Oncology. 2019a;15:875–884.
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