



INCIDENCE OF MALIGNANT TRANSFORMATION OF ORAL SUBMUCOUS FIBROSIS IN SOUTH INDIAN POPULATION-A RETROSPECTIVE STUDY

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Abstract

Aim: To evaluate the incidence of malignant transformation of OSMF and to correlate precipitating factors associated with oral submucous fibrosis turning into Oral Squamous Cell Carcinoma. This paper also aims to study the association of OSMF & OSCC.

Materials and methods: The study was carried out in the Chennai population reported to the department of Oral Medicine and Radiology, Saveetha Dental College. Data extraction was done through electronic data recording device from the year 2018-2022. A total of 560 patients of OSMF were included in the study. The OSMF cases diagnosed clinically and histopathologically was included in the study. The clinical diagnosis of OSMF was based on difficulty in opening the mouth and associated blanched oral mucosa, with palpable fibrous bands. Other diagnostic features included burning sensation, salivation, tongue protrusion, habits, and associated malignant changes. Study was done on the basis of age group, habit duration, frequency of habit, and type of habit. Simple correlation analysis was performed.

Results: Of the 560 cases of OSMF studied, 18% cases were stage I, 27% were stage II, 44% stage III, and 11% stage IV. Based upon age group, group II (20--40 years) showed more prevalence than the others. Based upon gender, incidence of OSMF is more in males when compared to females with 62% and 38% respectively.

Conclusion: It is necessary to highlight the malignant potential of OSMF and take all the necessary steps towards prevention of the disease through public awareness rather than waiting for futile effort to treat the same ineffectively. The caption "prevention is better than cure" becomes more relevant for such complicated clinical premalignant conditions.

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1. Introduction

Oral submucous fibrosis (OSMF) is a chronic progressive condition affecting the oral cavity, oropharynx and upper two-thirds of the oesophagus. It is a potentially malignant disorder, whose malignant potential was first described by Paymaster. (1) The global incidence of OSMF has been estimated at 2.5 million individuals. The prevalence in Indian populations is 5% for women and 2% for men. (2)

There is substantial evidence that supports the critical role of areca nuts in the aetiology behind OSMF. Areca nuts contain alkaloids, of which arecoline seems to be a primary etiological factor. Arecoline modulates matrix metalloproteinases, lysyl oxidases and collagenases, all affecting the metabolism of collagen, leading to increased fibrosis. (3) During the development of fibrosis, a decrease in water-retaining proteoglycans will occur in favour of increased collagen type 1 production. Transforming growth factor β and interferon- γ leads to increased production and decreased degradation of collagen. (4)

The diagnosis of OSMF is based on clinical characteristics and on the patient's report of a betel chewing habit. An international consensus has been made where at least one of the following characteristics should be present: 1) Palpable fibrous bands. 2) Mucosal texture that is tough and leathery. 3) Blanching of mucosa along with histopathologic features consistent with OSMF that includes atrophic epithelium with loss of rete ridges and juxta epithelial hyalinization of lamina propria. Our team has extensive knowledge and research experience that has translate into high quality publications (5-14)

Of all the histologic variants of oral cancer, oral squamous cell carcinoma is the fifth most common cancer worldwide. Of all the histologic variants of oral cancer, oral squamous cell carcinoma is the fifth most common cancer worldwide. OSCC is also a major cause of morbidity and mortality in the Indian subcontinent. (15) The high incidence of oral carcinomas in India can be contributed in part by the habit of tobacco and betel quid chewing Pindborg et al. (16) reported a malignant transformation rate (MTR) of 2.8%, whilst another study in 1984 reported a higher MTR of 4.5% over a median follow-up period of 8 years. (17) Murti et al. in 1985 reported an MTR of 7.6% over a 15-year period. The exact risk of malignant change of oral submucous fibrosis (OSF) is unknown and may be compounded by variable figures reported in the literature, which may impact on patient management and prognosis.

2. Materials and Methods

The present study was undertaken by the department of Oral medicine and Radiology, Saveetha Dental College. Five hundred and sixty case details of patients with OSMF were retrieved from the electronic database from January 2018- July 2022 and included in the study. All the included cases were clinically and histopathologically diagnosed OSMF cases.

The selected patients were divided into four groups according to their clinical stage:

Stage I: Interincisal mouth opening up to or greater than 35 mm, stomatitis, and blanching of oral mucosa.

Stage II: Interincisal mouth opening between 25 and 35 mm, presence of palpable fibrous band in buccal mucosa and/or oropharynx, with/without stomatitis.

Stage III: Interincisal mouth opening between 15 and 25 mm; presence of palpable fibrous bands in buccal mucosa and/or oropharynx, and in any other parts of the oral cavity.

Stage IV: Interincisal mouth opening less than 15 mm.

A. Any other stage along with other potentially malignant disorders, for example, oral leukoplakia, oral erythroplakia, etc.

B. Any other stage along with oral carcinoma.

The OSMF patients were divided in four categories on the basis of age groups:

- Group I: < 20 years
- Group II: 20-40 years
- Group III: >40 years

Patients suffering from systemic diseases are included in the study. Data was analysed using IBM SPSS Statistics version 23. Descriptive statistics included calculation of means and standard deviation. Data distribution was assessed for normality using Shapiro-Wilk test. Chi-square test was used for comparing the categorical data. All values were considered statistically significant for a value of $P < 0.05$.

3. Results

Of the 560 cases of OSMF studied, 18% cases were stage I, 27% were stage II, 44% stage III, and 11% stage IV. Based upon age group, group II (20-40 years) showed more prevalence than the others. Based upon gender, incidence of OSMF is more in males when compared to females with 62% and 38% respectively.

Age Distribution

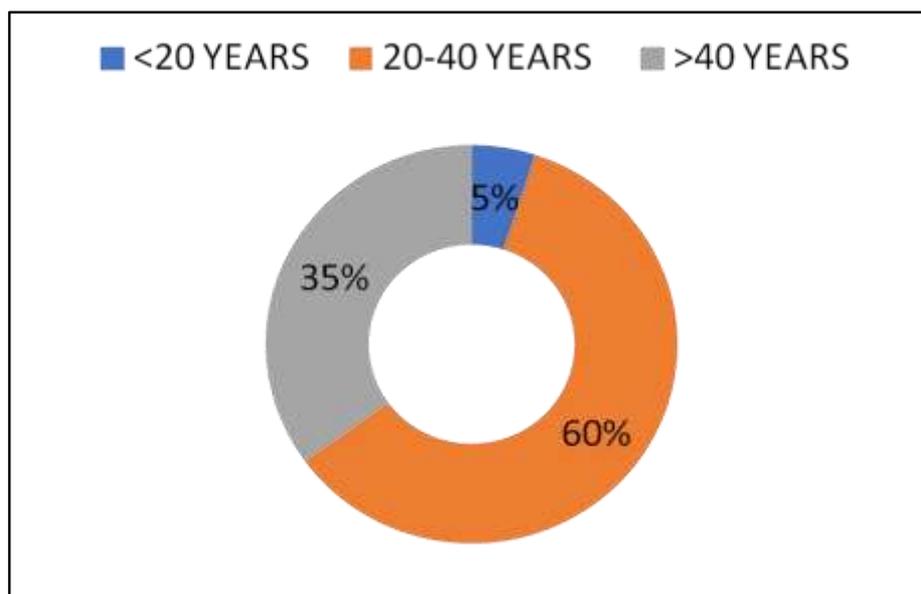


FIGURE 1: Shows the age distribution of OSMF which showed that the incidence is more in 20-40 years of age

GENDER DISTRIBUTION

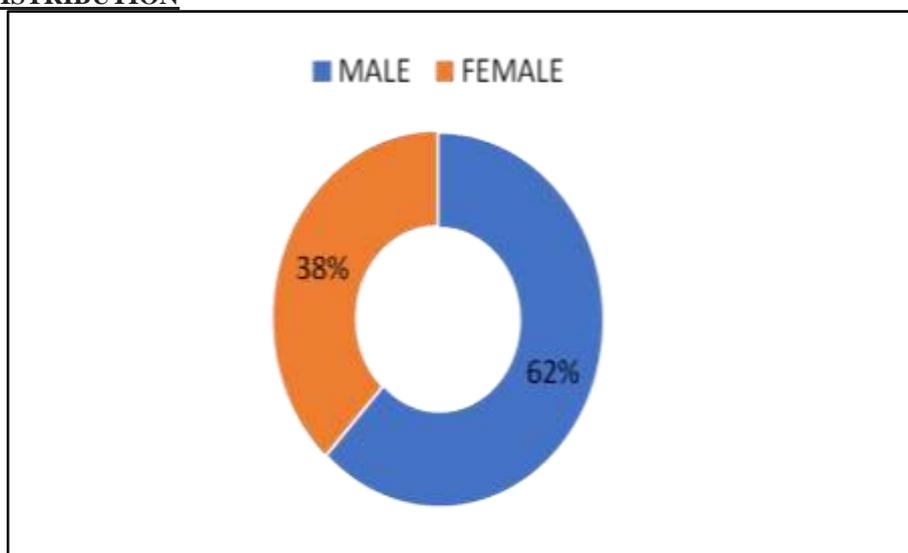
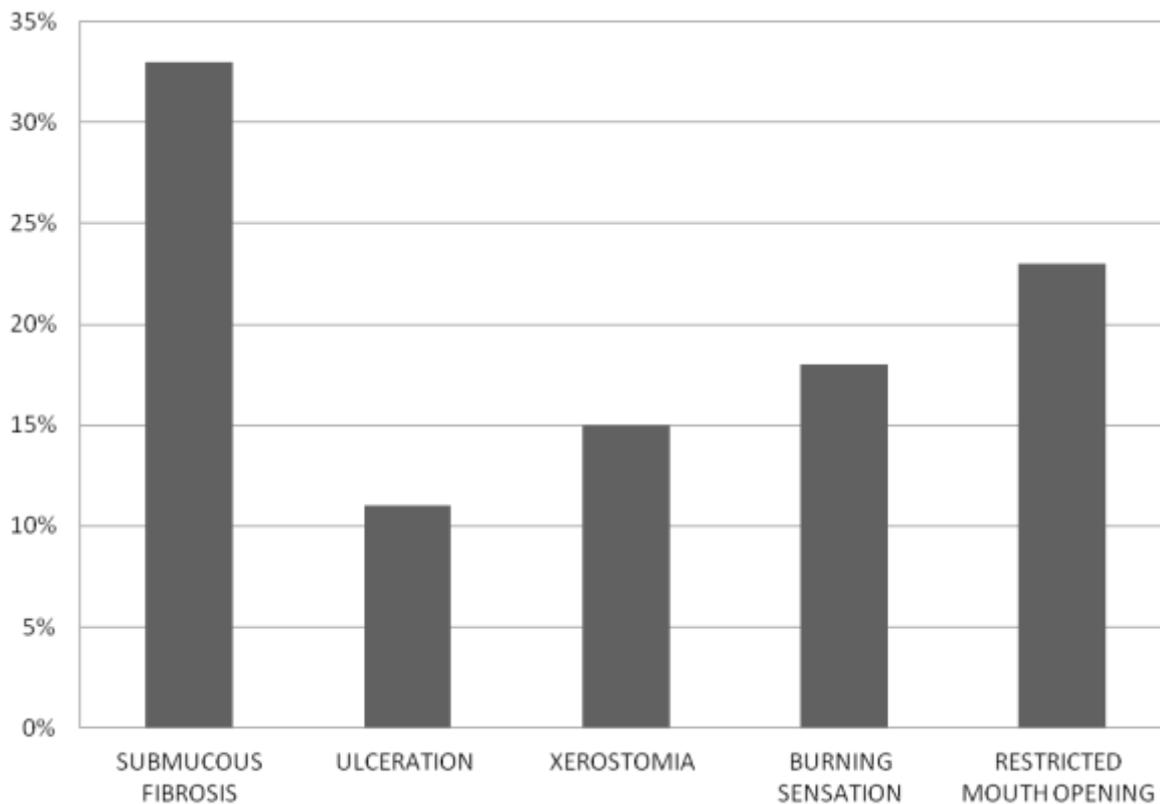


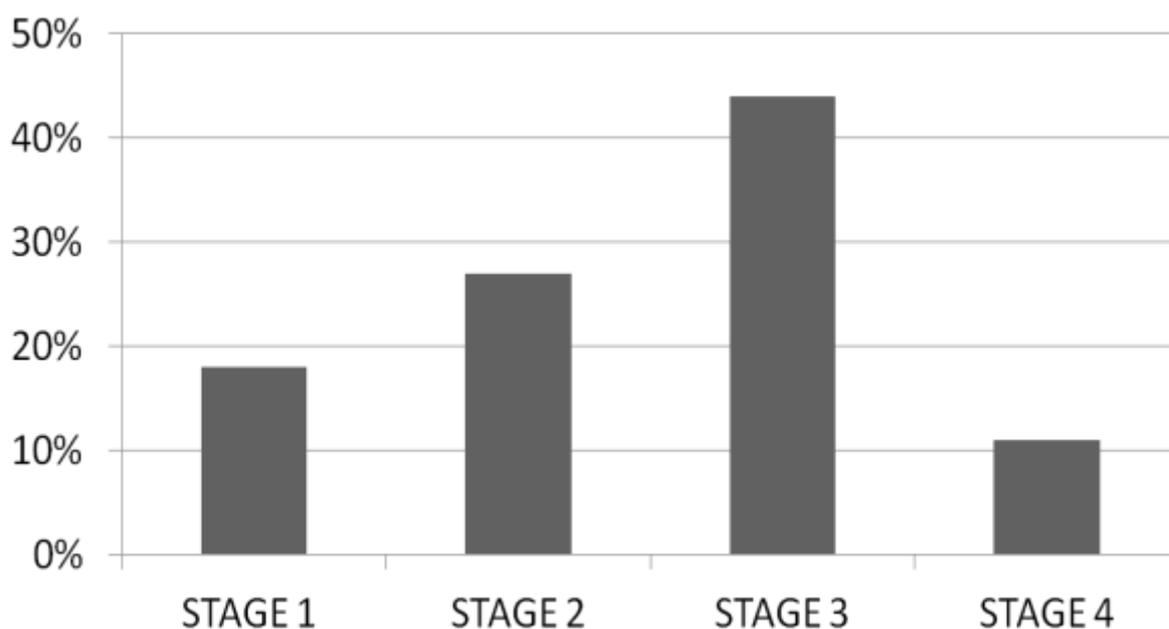
FIGURE 2: Shows the incidence of OSMF among male and female population among which 62% were male & 38% female

Common Symptoms Associated With Osmf



GRAPH 1: Shows that symptom most commonly seen in OSMF is fibrosis & Restricted mouth opening which is 33% & 23% respectively

Clinical Staging



GRAPH 2: Shows stage 3 OSMF is most commonly encountered and accounts for about 44% followed by Stage 2 which accounts for 27%

Systematic Condition Associated

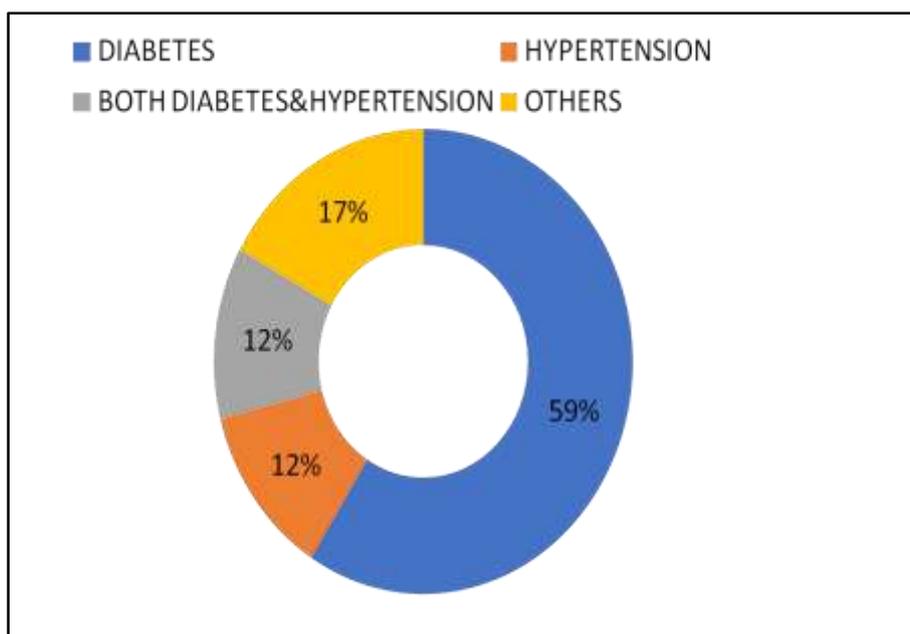
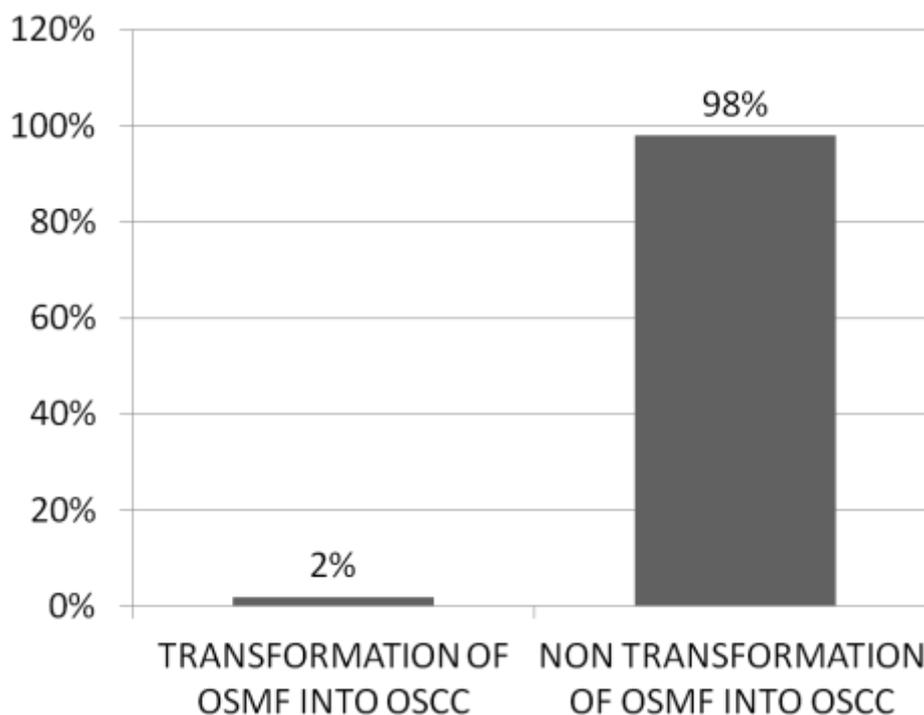


FIGURE 3:Shows the common systemic condition encountered in OSMF patients which is diabetes accounting 59%

Malignant Transformation Rate



GRAPH 3:Shows that malignant transformation rate of OSMF into OSCC is 2%

4. Discussion

Rahul et al,assessed 860 cases of OSMF among which, 390 (46.42%) cases were stage II, 290 (34.52%) were stage III, 90 (10.73%) stage I, and 70 (8.33%) stage IV. Based upon age group, group

III (30--40 years) showed more prevalence than the others.(18) Areca nut (gutkha) was a significant etiological factor (55.8%) as compared with other etiological factors.Yang assessed the prevalence, gender distribution, age, income, and urbanisation status of OSF patients in Taiwan. Patients were

diagnosed with OSMF during the period between January 1, 1996 and December 31, 2013. It showed that the prevalence of OSMF increased significantly from 8.3 (per 10 (5)) in 1996 to 16.2 (per 10 (5)) in 2013 ($P < 0.0001$).⁽¹⁹⁾ Men had a significantly higher OSMF prevalence than women. Sinor *et al.* in India found male predominance in OSMF cases.⁽²⁰⁾

In present study, male predominance can be due to easy accessibility for males to use areca nut and its products more frequently than females. Male patients were more in comparison to females, with a prevalence of OSMF 62% compared with 38% in females. Mehrotra conducted a study to evaluate the prevalence rates of oral mucosal lesions in this hospital from 1990 to 2001 in Allahabad, North India. Data was collected year wise with reference to age, sex, site involved, and histopathological findings. It showed that potentially malignant and malignant oral lesions were widespread in the patients visiting the hospital in this region. Similarly, in a population-based case control study in rural and urban Lucknow, it was found that patients who use pan masala were at higher risk of developing OSMF.

The findings of Babu *et al.*, among OSF patients in Hyderabad, showed that people were more addicted to gutkha than any other related areca nut and tobacco products such as pan, pan masala, and raw areca nut. They found a strong association between gutkha chewing and OSMF and pointed that gutkha consumption led to OSMF. Nigam *et al.* determined the prevalence and severity of OSMF among habitual gutkha, areca nut, and pan chewers of Moradabad, India. The prevalence of OSF was 6.3% and gutkha chewing was the most common abusive habit among OSF patients in the study. Similarly, in the present study, habitual gutkha chewing was more prevalent than gutkha with tobacco.

In the study by Nishant *et al.*, the 860 patients were in the age range of 15–60 years, with a peak incidence in 30–40 years (34.88%), followed by 20–30 years (30.23%), it is concluded that the occurrence of OSMF is seen most commonly in age group 30–40 years followed by 20–30 years. The youngest patient was 16-year-old, and the eldest was 60-year-old. The observation of study was similar to study conducted by Nigam, who reported the maximum number of OSMF cases were in the age group of 36–40 years. This could be because of increased social encounters and economic liberty they get at this age in a rapidly developing nation like India. Therefore, during this age, they indulge in various chewing habits such as betel nut, gutkha, pan masala, smoking, alcohol, etc., either to relieve stress, as a fashion or due to peer pressure.

Shah found the relationship between OSMF to various chewing and smoking habits. It was found

that chewing of areca nut/quid or pan masala (a commercial preparation of areca nuts, lime, catechu and undisclosed coloring, flavoring, and sweetening agents) was directly related to OSMF and frequency of chewing rather than the total duration of the habit was directly correlated to OSMF. Ali *et al.* evaluated the effect of frequency, duration, and type of areca nut products on the incidence and severity of OSMF. It showed that the duration and frequency of its use and type of areca nut product has effect on the incidence and severity of OSMF. Gutkha and pan masala have more deleterious and faster effects on oral mucosa. The gutkha-chewing habit along with the other habits does not have any significant effect on the rate of occurrence and incidence and severity of the OSMF. This study showed significant effect of duration and frequency of use of areca nut products on the incidence and severity of OSMF.

The present study showed a malignant transformation rate of OSMF to OSCC is 2% and most common symptoms seen in OSMF is fibrosis & Restricted mouth opening which accounts for 33% & 23% respectively. Epidemiological data accumulated over a wide geographical area will help to determine the overall incidence and prevalence rates and formulate appropriate prevention and control measures. High risk individuals and populations for tobacco usages needs to be targeted and intervention should be done at community level. Policies need to be laid down by concerned policy makers to curb this ever progressing menace. Dentist should play an active role in prevention and control of tobacco induced lesions as they are generally the first point of contact with patients who are at increased risk.

5. Conclusion

From the current study, it is evident that the malignant potential of Oral submucous fibrosis is underestimated. The easy availability and promotions of the areca nut products especially gutkha and pan masala in social places has impacted general population in India which has led to the increased occurrence this premalignant condition. It is necessary to highlight the malignant potential of OSMF and take all the necessary steps towards prevention of the disease through awareness programs. An early diagnosis of OSMF is required considering its progressive nature. Hence, dentists should be knowledgeable and familiar with the etiopathogenesis, clinical presentation, diagnosis, and management of this lesion.

6. Bibliography

Paymaster JC. Cancer of the buccal mucosa. A clinical study of 650 cases in Indian patients

- [Internet]. Vol. 9, Cancer. 1956. p. 431–5. Available from: [http://dx.doi.org/10.1002/1097-0142\(195605/06\)9:3<431::aid-cncr2820090302>3.0.co;2-t](http://dx.doi.org/10.1002/1097-0142(195605/06)9:3<431::aid-cncr2820090302>3.0.co;2-t)
- Inserm, INSERM. Oral submucous fibrosis [Internet]. Definitions. 2020. Available from: <http://dx.doi.org/10.32388/dao8i9>
- Anila Namboodiripad PC. Cystatin C: Its role in pathogenesis of OSMF. *J Oral Biol Craniofac Res*. 2014 Jan;4(1):42–6.
- Khan S, Chatra L, Prashanth SK, Veena KM, Rao PK. Pathogenesis of oral submucous fibrosis. *J Cancer Res Ther*. 2012 Apr;8(2):199–203.
- Ramesh A, Varghese S, Jayakumar ND, Malaiappan S. Comparative estimation of sulfiredoxin levels between chronic periodontitis and healthy patients - A case-control study. *J Periodontol*. 2018 Oct;89(10):1241–8.
- Vijayashree Priyadharsini J. In silico validation of the non-antibiotic drugs acetaminophen and ibuprofen as antibacterial agents against red complex pathogens. *J Periodontol*. 2019 Dec;90(12):1441–8.
- Priyadharsini JV, Vijayashree Priyadharsini J, Smiline Girija AS, Paramasivam A. In silico analysis of virulence genes in an emerging dental pathogen *A. baumannii* and related species [Internet]. Vol. 94, *Archives of Oral Biology*. 2018. p. 93–8. Available from: <http://dx.doi.org/10.1016/j.archoralbio.2018.07.001>
- Teja KV, Ramesh S, Priya V. Regulation of matrix metalloproteinase-3 gene expression in inflammation: A molecular study. *J Conserv Dent*. 2018 Nov-Dec;21(6):592–6.
- Manohar MP, Sharma S. A survey of the knowledge, attitude, and awareness about the principal choice of intracanal medicaments among the general dental practitioners and nonendodontic specialists. *Indian J Dent Res*. 2018 Nov-Dec;29(6):716–20.
- Nandakumar M, Nasim I. Comparative evaluation of grape seed and cranberry extracts in preventing enamel erosion: An optical emission spectrometric analysis. *J Conserv Dent*. 2018 Sep-Oct;21(5):516–20.
- Varghese SS, Ramesh A, Veeraiyan DN. Blended Module-Based Teaching in Biostatistics and Research Methodology: A Retrospective Study with Postgraduate Dental Students. *J Dent Educ*. 2019 Apr;83(4):445–50.
- Panchal V, Jeevanandan G, Subramanian E. Comparison of instrumentation time and obturation quality between hand K-file, H-files, and rotary Kedo-S in root canal treatment of primary teeth: A randomized controlled trial. *J Indian Soc Pedod Prev Dent*. 2019 Jan-Mar;37(1):75–9.
- Nair M, Jeevanandan G, Vignesh R. Comparative evaluation of post-operative pain after pulpectomy with k-files, kedo-s files and mtwo files in deciduous molars-a randomized clinical trial. *Braz Dent J* [Internet]. 2018; Available from: <https://bds.ict.unesp.br/index.php/cob/article/view/1617>
- Felicita AS. Orthodontic extrusion of Ellis Class VIII fracture of maxillary lateral incisor - The sling shot method. *Saudi Dent J*. 2018 Jul;30(3):265–9.
- Sankaranarayanan R. Oral cancer in India: An epidemiologic and clinical review [Internet]. Vol. 69, *Oral Surgery, Oral Medicine, Oral Pathology*. 1990. p. 325–30. Available from: [http://dx.doi.org/10.1016/0030-4220\(90\)90294-3](http://dx.doi.org/10.1016/0030-4220(90)90294-3)
- Pindborg JJ, Chawla TN, Srivastava AN, Gupta D, Mehrotra ML. Clinical Aspects of Oral Submucous Fibrosis [Internet]. Vol. 22, *Acta Odontologica Scandinavica*. 1964. p. 679–91. Available from: <http://dx.doi.org/10.3109/00016356409058581>
- Murti PR, Bhonsle RB, Pindborg JJ, Daftary DK, Gupta PC, Mehta FS. Malignant transformation rate in oral submucous fibrosis over a 17-year period [Internet]. Vol. 13, *Community Dentistry and Oral Epidemiology*. 1985. p. 340–1. Available from: <http://dx.doi.org/10.1111/j.1600-0528.1985.tb00468.x>
- Srivastava R, Jyoti B, Pradhan D, Siddiqui Z. Prevalence of oral submucous fibrosis in patients visiting dental OPD of a dental college in Kanpur: A demographic study [Internet]. Vol. 8, *Journal of Family Medicine and Primary Care*. 2019. p. 2612. Available from: http://dx.doi.org/10.4103/jfmpe.jfmpe_465_19
- Yang SF, Wang YH, Su NY, Yu HC, Wei CY, Yu CH, et al. Changes in prevalence of precancerous oral submucous fibrosis from 1996 to 2013 in Taiwan: A nationwide population-based retrospective study. *J Formos Med Assoc*. 2018 Feb;117(2):147–52.
- Deena, S. R., Kumar, G., Vickram, A. S., Singhaniam, R. R., Dong, C. D., Rohini, K., ... & Ponnusamy, V. K. (2022). Efficiency of various biofilm carriers and microbial interactions with substrate in moving bed-biofilm reactor for wastewater treatment: A review. *Bioresource Technology*, 127421.
- Sinor PN, Gupta PC, Murti PR, Bhonsle RB, Daftary DK, Mehta FS, et al. A case-control

study of oral submucous fibrosis with special reference to the etiologic role of areca nut [Internet]. Vol. 19, Journal of Oral Pathology and Medicine. 1990. p. 94–8. Available from:

<http://dx.doi.org/10.1111/j.1600-0714.1990.tb00804.x>