



World Literature: Bibliography

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22.1 Bibliography

22.1.1 Reviews

1. Chaudhry K, Khatana S, Bali R, Kaur A, Dutt N. Quality of life in oral submucous fibrosis: a systematic review. *J Maxillofac Oral Surg.* 2022;21(1):14–24.
2. Sarode SC, Sarode GS, Yuwanati M, Gadabail A, Gondivkar S. A brief overview of 100 best-cited papers on oral submucous fibrosis in Oral Oncology. *Oral Oncol.* 2022;126:105769.
3. Xu H, Lyu FY, Song JY, Xu YM, Jiang EH, Shang ZJ, et al. Research achievements of oral submucous fibrosis: progress and prospect. *Biomed Res Int.* 2021;2021:1–10.
4. Gupta S, Jawanda MK. Oral submucous fibrosis: an overview of a challenging entity. *Indian J Dermatol Venereol Leprol.* 2021;87(6):768–77.
5. Rao NR, Villa A, More CB, Jayasinghe RD, Kerr AR, Johnson NW. Oral submucous fibrosis: a contemporary narrative review with a proposed inter-professional approach for an early diagnosis and clinical management. *J Otolaryngol Head Neck Surg.* 2020;49(1):1–11.
6. More CB, Patila DJ, Rao NR. Medicinal management of oral submucous fibrosis in the past decade - a systematic review. *J Oral Biol Craniofac Res.* 2020;10:552–68.
7. Shen YW, Shih YH, Fuh LJ, Shieh TM. Oral submucous fibrosis: a review on biomarkers, pathogenic mechanisms, and treatments. *Int J Mol Sci.* 2020;21(19):1–19.
8. Hande AH, Chaudhary MS, Gawande MN, Gadabail AR, Zade PR, Bajaj S, et al. Oral submucous fibrosis: an enigmatic morpho-insight. *J Can Res Ther.* 2019;15:463–9.
9. Ray JG, Chatterjee R, Chaudhuri K. Oral submucous fibrosis: A global challenge. Rising incidence, risk factors, management, and research priorities. *Periodontol 2000.* 2019;80(1):200–12. ► <https://doi.org/10.1111/prd.12277>.
10. Shih YH, Wang TH, Shieh TM, Tseng YH. Oral submucous fibrosis: a review on etiopathogenesis, diagnosis, and therapy. *Int J Mol Sci.* 2019;20:1–22.
11. Bari S, Metgud R, Vyas Z, Tak A. An update on studies on etiological factors, disease progression, and malignant transformation in oral submucous fibrosis. *J Cancer Res Ther.* 2017;13(3):399–405.
12. Ekanayaka RP, Tilakaratne WM. Oral submucous fibrosis: review on mechanisms of malignant transformation. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2016;122(2):192–9.
13. Dionne KR, Warnakulasuriya S, Zain RB, Cheong SC. Potentially malignant disorders of the oral cavity: current practice and future directions in the clinic and laboratory. *Int J Cancer.* 2015;136:503–15.
14. Arakeri G, Brennan PA. Oral submucous fibrosis: an overview of the aetiology, pathogenesis, classification, and principles of management. *Br J Oral Maxillofac Surg.* 2013;51:587–93.
15. Kerr AR, Warnakulasuriya S, Mighell AJ, Dietrich T, Nasser M, Rimal J, et al. A systematic review of medical interventions for oral submucous fibrosis and future research opportunities. *Oral Dis.* 2011;17(1):42–57.
16. Zhang X, Reichart PA. A review of betel quid chewing, oral cancer and precancer in Mainland China. *Oral Oncol.* 2007;43:424–30.
17. Tilakaratne WM, Klinikowski MF, Saku T, Peters TJ, Warnakulasuriya S. Oral submucous fibrosis: review on aetiology and pathogenesis. *Oral Oncol.* 2006;42(6):561–8.
18. Gupta PC, Sinor PN, Bhonsle RB, Pawar VS, Mehta HC. Oral submucous fibrosis in India: a new epidemic? *Natl Med J India.* 1998;11(3):113–6.
19. VanWyk CW. Oral submucous fibrosis. The South African experience. *Indian J Dent Res.* 1997;8(2):39–45.
20. Cox SC, Walker DM. Oral submucous fibrosis. A review. *Aust Dent J.* 1996;41:294–9.
21. Rajendran R. Oral submucous fibrosis: etiology, pathogenesis, and future research. *Bull World Health Organ.* 1994;72(6):985–96.
22. Paissat DK. Oral submucous fibrosis. *Int J Oral Surg.* 1981;10:307–12.
23. Pindborg JJ, Sirsat SM. Oral submucous fibrosis. *Oral Surg Oral Med Oral Pathol.* 1966;22(6):764–79.

22.1.2 Epidemiology of OSF Worldwide

1. Peng Q, Li H, Chen J, Wang Y, Tang Z. Oral submucous fibrosis in Asian countries. *J Oral Pathol Med.* 2020;49(4):294–304.
2. 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 Med Assoc.* 2018;117:147–52.
3. Aishwarya KM, Reddy MP, Kulkarni S, Doshi D, Reddy BS, Satyanarayana D. Effect of frequency and duration of tobacco use on oral mucosal lesions—a cross-sectional study among tobacco

- users in Hyderabad, India. *Asian Pac J Cancer Prev*. 2017;18(8):2233–8.
4. Yang PY, Chen YT, Wang YH, Su NY, Yu HC, Chang YC. Malignant transformation of oral submucous fibrosis in Taiwan: a nationwide population-based retrospective cohort study. *J Oral Pathol Med*. 2017;46:1040–5.
 5. Aishwarya KM, Reddy MP, Kulkarni S, Doshi D, Reddy BS, Satyanarayana D. Effect of frequency and duration of tobacco use on oral mucosal lesions—a cross-sectional study among tobacco users in Hyderabad, India. *Asian Pac J Cancer Prev*. 2017;18(8):2233–8.
 6. Singhvi A, Joshi A, Bagul N, Bhatia S, Singh G, Gupta R. The insight for initiation and maintenance of areca nut chewing habit and its effects on oral health status among school age population in Western Rajasthan, India. *J Clin Diagn Res*. 2016;10(11):ZC15–8.
 7. Yongxiu D, Dongye S, Xinchun J, Qiu Hua M, Yanan C, Pu X. Epidemiological investigation of chewing fresh or dried betel nut and oral mucosal disease. *Hua Xi Kou Qiang Yi Xue Za Zhi*. 2016;34(4):391–4.
 8. Holla VA, Chatra LK, Shenai P, Shetty D, Baliga A. A study to analyze different patterns of quid usage among subjects with oral submucous fibrosis in mangalore population. *Adv Med*. 2016;2016:1–6. ► <https://doi.org/10.1155/2016/6124059>.
 9. Wang YY, Tail YH, Wang WC, Chen CY, Kao YH, et al. Malignant transformation in 5071 southern Taiwanese patients with potentially malignant oral mucosal disorders. *BMC Oral Health*. 2014;14:1–9.
 10. Lian Ie B, Tseng YT, Su CC, Tsai KY. Progression of precancerous lesions to oral cancer: results based on the Taiwan National Health Insurance Database. *Oral Oncol*. 2013;49:427–30.
 11. Heck JE, Marcotte EL, Argos M, Parvez F, Ahmed A, Islam T, et al. Betel quid chewing in rural Bangladesh: prevalence, predictors and relationship to blood pressure. *Int J Epidemiol*. 2012;41(2):462–71.
 12. Angadi PV, Rekha KP. Oral submucous fibrosis: a clinicopathologic review of 205 cases in Indians. *Oral Maxillofac Surg*. 2011;15(1):15–9.
 13. Jalouli J, Ibrahim SO, Mehrotra R, Jalouli MM, Sapkota D, Larsson PA, et al. Prevalence of viral (HPV, EBV, HSV) infections in oral submucous fibrosis and oral cancer from India. *Acta Otolaryngol*. 2010;130:1306–11.
 14. Auluck A, Hislop G, Poh C, Zhang L, Rosin MP. Areca nut and betel quid chewing among South Asian immigrants to Western countries and its implications for oral cancer screening. *Rural Remote Health*. 2009;9(2):1–8.
 15. Mathew AL, Pai KM, Sholapurkar AA, Vengal M. The prevalence of oral mucosal lesions in patients visiting a dental school in Southern India. *Indian J Dent Res*. 2008;19(2):99–103.
 16. Lee CH, Ko YC, Huang HL, Chao YY, Tsai CC, Shieh TY, et al. The precancer risk of betel quid chewing, tobacco use and alcohol consumption in oral leukoplakia and oral submucous fibrosis in Southern Taiwan. *Br J Cancer*. 2003;88:366–72.
 17. Yang YH, Lee HY, Tung S, Shieh TY. Epidemiological survey of oral submucous fibrosis and leukoplakia in aborigines of Taiwan. *J Oral Pathol Med*. 2001;30(4):213–9.
 18. Tang JG, Jian XF, Gao ML, Ling TY, Zhang KH. Epidemiological survey of oral submucous fibrosis in Xiangtan City, Hunan Province, China. *Community Dent Oral Epidemiol*. 1997;25:177–80.
 19. Babu S, Bhat RV, Kumar PU, Sesikaran B, Rao KV, Aruna P, et al. A comparative clinico-pathological study of oral submucous fibrosis in habitual chewers of pan masala and betelquid. *J Toxicol Clin Toxicol*. 1996;34(3):317–22.

22.1.3 Clinical Presentation and Evaluation: Paediatric and Adult Patients of OSF

1. Rai A, Jain A, Arora A, Motiwale T. Oral submucous fibrosis in children: an alarming condition and challenges in management. *BMJ Case Rep*. 2021;14(3):1–4.
2. Sachdev R, Garg K, Shwetam S, Srivastava A. Non-specific chief complaints among oral submucous fibrosis patients at outpatient department and pan shop at rural region in India. *J Int Soc Prev Community Dent*. 2021;11(4):382–8.
3. Kariya P, Khobragade V, Sura S, Singh S. No age predilection for a disease like OSMF. A case report of 5-year-old child. *J Oral Biol Craniofac Res*. 2020;10(2):153–7.
4. Shah JS, Lunagariya N. Hearing efficiency in oral submucous fibrosis: a clinical study. *Indian J Otolaryngol Head Neck Surg*. 2020;1:1–5.
5. Tripathy M, Anekar J, Raj AC, Sandeepa NC, Nappalli D, Lokanath P, et al. Cephalometric study on the morphometric evaluation of soft palate in oral submucous fibrosis. *Asian Pac J Cancer Prev*. 2020;21(7):2169–76.
6. Cai X, Yao Z, Liu G, Cui L, Li H, Huang J. Oral submucous fibrosis: a clinicopathological study of 674 cases in China. *J Oral Pathol Med*. 2019;48(4):321–5.

7. Chaudhry K, Bali R, Patnana AK, Bindra S, Jain G, Sharma PP. Impact of oral submucous fibrosis on quality of life: a cross-sectional study. *J Maxillofac Oral Surg.* 2019;18(2):260–5.
8. Gondivkar SM, Bhowate RR, Gadbail AR, Sarode SC, Gondivkar RS. Assessment of oral health-related quality of life instruments for oral submucous fibrosis: a systematic review using the CONsensus-based Standards for the selection of health Measurement Instruments (COSMIN) checklist. *Oral Oncol.* 2019 Jun;93:39–45.
9. Talla H, Reddy PR, Mudavath M, Bathina T. Oral submucous fibrosis in a 5 year old child. *Contemp Clin Dent.* 2019;10:679–81.
10. Jain A, Taneja S. Oral submucous fibrosis in pediatric patients: a systematic review and protocol for management. *Int J Surg Oncol.* 2019;2019:1–6. ► <https://doi.org/10.1155/2019/3497136>.
11. Bangi BB, Ginjupally U, Nadendla LK, Mekala MR. Evaluation of gustatory function in oral submucous fibrosis patients and Gutka chewers. *Asian Pac J Cancer Prev.* 2019;20(2):569–73.
12. Domir SK, Gargava A, Deoghare A, Agrawal R. Morphometric evaluation of soft palate in OSMF patients using cephalometrics. *Indian J Otolaryngol Head Neck Surg.* 2019;71(Suppl. 1):1018–102.
13. Gondivkar SM, Bhowate RR, Gadbail AR, Gaikwad RN, Gondivkar RS, Sarode SC, Sarode GS. Development and validation of oral health-related quality of life measure in oral submucous fibrosis. *Oral Dis.* 2018 Sep;24(6):1020–8.
14. Tadakamadla J, Kumar S, Lalloo R, Gandhi Babu DB, Johnson NW. Impact of oral potentially malignant disorders on quality of life. *J Oral Pathol Med.* 2018;47(1):60–5.
15. Kanodia S, Giri VP, Giri OP, Devi MP, Garima Y. Assessment of anxiety, depression, and serum cortisol level in oral submucous fibrosis patients: a controlled clinical trial. *Eur J Dent.* 2017;11(3):293–8.
16. Chandran A, Aswath N. Assessment of function of eustachian tube in oral submucous fibrosis—a tympanometric study. *J Clin Diagn Res.* 2016;10(9):ZC13–5.
17. Wollina U, Verma SB, Ali FM, Patil K. Oral submucous fibrosis: an update. *Clin Cosmetic Investig Dermatol.* 2015;8:193–204.
18. Ankita C, Panat SR, Sangamesh NC, Aggarwal A, Jha PC. Evaluation of masseter muscle hypertrophy in OSF patients: an ultrasonographic study. *J Clin Diagn Res.* 2014;8(9):ZC45–7.
19. Siddiqui SN, Saawarn N, Nair PP, Singh P, Gharote HP, Hegde K. Eustachian tube dysfunction in OSMF—often present seldom discovered. *J Clin Exp Dent.* 2014;6(4):e369–73.
20. Ali FM, Patil A, Patil K, Prasant MC. Oral submucous fibrosis and its dermatological relation. *Indian Dermatol Online J.* 2014;5(3):260–5.
21. Gupta VK, Malhotra S, Patil R, Tripathi A. Oral submucous fibrosis at pediatric age, now time to think: series of two cases. *Indian J Med Paediatr Oncol.* 2013;34(2):107–10.
22. Deshpande A, Kiran S, Dhillon S, Mallikarjuna R. Oral submucous fibrosis: a premalignant condition in a 14-year-old Indian girl. *BMJ Case Rep.* 2013;2013:1–4. ► <https://doi.org/10.1136/bcr-2013-200786>.
23. Agrawal A, Sarkar PA, Shigli A. Oral submucous fibrosis in a 9-year-old Indian girl. *BMJ Case Rep.* 2011;2011:1–3. ► <https://doi.org/10.1136/bcr.08.2011.4588>.
24. Chaturvedi P. Uvular abnormalities in patients with submucous fibrosis. *Oral Dis.* 2009;15(7):516.
25. Aziz SR. Oral submucous fibrosis: case report and review of diagnosis and treatment. *J Oral Maxillofac Surg.* 2008;66:2386–9.
26. Auluck A, Rosin MP, Zhang L, Sumanth KN. Oral submucous fibrosis, a clinically benign but potentially malignant disease: report of 3 cases and review of the literature. *J Can Dent Assoc.* 2008;74(8):735–40.
27. Rajendra R, George B, Sivakaran S, Narendranathan N. Visceral organ involvement is infrequent in oral submucous fibrosis (OSF). *Indian J Dent Res.* 2001;12(1):7–20.
28. Misra SP, Misra V, Dwivedi M, Gupta SC. Oesophageal subepithelial fibrosis: an extension of oral submucosal fibrosis. *Postgrad Med J.* 1998;74(878):733–6.
29. Maher R, Sankaranarayanan R, Johnson NW, Warnakulasuriya KA. Evaluation of inter-incisor distance as an objective criterion of the severity of oral submucous fibrosis in Karachi, Pakistan. *Eur J Cancer B Oral Oncol.* 1996;32B(5):362–4.
30. Warnakulasuriya S. Semi-quantitative clinical description of oral submucous fibrosis. *Ann Dent.* 1987;46:18–21.

22.1.4 Classification, Grading and Staging Systems Used in OSF

1. Ingle Y, Sarode GS, Sarode SC. A novel histological grading system for minor salivary gland involvement in oral submucous fibrosis patients with clin-

- ico-pathological validation. *J Oral BiolCraniofac Res.* 2021;11(4):596–600.
2. Ramadoss R, Krishnan R, Vasanthi V, Bose D, Vijayalakshmi R, Padmanabhan R, et al. New insights for consummate diagnosis and management of oral submucous fibrosis using reactive and reparative fibrotic parameter derived algorithm. *J Pharm Bioali Sci.* 2021;13(5):323–32.
 3. More CB, Rao NR. Proposed clinical definition for oral submucous fibrosis. *J Oral BiolCraniofac Res.* 2019;9(4):311–4.
 4. Hameed S, Chatra L, Shenai P. Establishing a new staging system for oral submucous fibrosis and correlation of the proposed staging system to traditional histopathological grading: a clinico-histopathological study. *Saudi Dent J.* 2019;31(4):445–50.
 5. Zhou S, Zhu Y, He Z, Zhang D, Guo F, Jian X, Zhang C. Long non-coding RNA expression profile associated with malignant progression of oral submucous fibrosis. *J Oncol.* 2019;2019:1–12. ► <https://doi.org/10.1155/2019/6835176>.
 6. Arakeri G, Thomas D, Aljabab AS, Hunasgi S, Rai KK, Hale B, et al. TFM classification and staging of oral submucous fibrosis: a new proposal. *J Oral Pathol Med.* 2018;47(4):403–9.
 7. Gupta H, Grover N, Tyagi N, Misra A. Classification systems in oral submucous fibrosis patients: a review. *TMU J Dent.* 2018;5(2):13–9.
 8. Divyambika CV, Sathasivasubramanian S, Vani G, Vanishree AJ, Malathi N. Correlation of clinical and histopathological grades in oral submucous fibrosis patients with oxidative stress markers in saliva. *Indian J Clin Biochem.* 2018;33:348–55.
 9. Passi D, Bhanot P, Kacker D, Chahal D, Atri M, Panwar Y. Oral submucous fibrosis: newer proposed classification with critical updates in pathogenesis and management strategies. *Natl J Maxillofac Surg.* 2017;8(2):89–94.
 10. Lakshmi CR, Thabusum DA, 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;2016:1–6. ► <https://doi.org/10.1155/2016/5428581>.
 11. Patil S, Maheshwari S. Proposed new grading of oral submucous fibrosis based on cheek flexibility. *J Clin Exp Dent.* 2014;6(3):e255–8.
 12. More CB, Das S, Patel H, Adalja C, Kamatchi V, Venkatesh R. Proposed clinical classification for oral submucous fibrosis. *Oral Oncol.* 2012;48(3):200–2.
 13. Shivakumar GC, Sahana S. Clinical staging of oral submucous fibrosis: a review. *Int J Oral-Med Sci.* 2011;10(3):216–9.
 14. Krishnan MMR, Pal M, Bomminayuni SK, Chakraborty C, Paul RR, Chatterjee J, Ray AK. Automated classification of cells in sub-epithelial connective tissue of oral sub-mucous fibrosis-an SVM based approach. *Comput Biol Med.* 2009;39(12):1096–104.
 15. Ceena DE, Bastian TS, Ashok L, Annigeri RG. Comparative study of clinicofunctional staging of oral submucous fibrosis with qualitative analysis of collagen fibers under polarizing microscopy. *Indian J Dent Res.* 2009;20(3):271–6.
 16. Ranganathan K, Mishra G. An overview of classification schemes for oral submucous fibrosis. *J Oral MaxFac Pathol.* 2006;10:55–8.
 17. Paul RR, Mukherjee A, Dutta PK, Banerjee S, Pal M, Chatterjee J, et al. A novel wavelet neural network based pathological stage detection technique for an oral precancerous condition. *J Clin Pathol.* 2005;58:932–8.
 18. Haider SM, Merchant AT, Fikree FF, Rahbar MH. Clinical and functional staging of oral submucous fibrosis. *Br J Oral Maxillofac Surg.* 2000;38(1):12–5.

22.1.5 Etiopathogenesis of OSF as an OPMD

1. Venkatesh D, Puranik RS, Vanaki SS, Puranik SR. Study of salivary arecoline in areca nut chewers. *J Oral Maxillofac Pathol.* 2018;22(3):446. Coletta RD and Salo T. Myofibroblasts in oral potentially malignant disorders: Is it related to malignant transformation? *Oral Dis* 2018;24(1–2):84–88
2. Hsieh YP, Wu KJ, Chen HM, Deng YT. Arecoline activates latent transforming growth factor beta1 via mitochondrial reactive oxygen species in buccal fibroblasts: suppression by epigallocatechin-3-gallate. *J Formos Med Assoc.* 2018;117:527–34.
3. Ekanayaka RP, Tilakaratne WM. Oral submucous fibrosis: review on mechanisms of pathogenesis and malignant transformation. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2018;125(6):612–27.
4. Arakeri G, Rai KK, Hunasgi S, Merckx MA, Gao S, Brennan PA. Oral submucous fibrosis: an update on current theories of pathogenesis. *J Oral Pathol Med.* 2017;46(6):406–12.
5. Gandhi P, Prasad UC. Evaluation of myofibroblasts in oral submucous fibrosis and oral squamous cell carcinoma: the pathogenesis and correlation. *Dent Res J (Isfahan).* 2017;14(5):314–20.
6. Ho YC, Yang SF, Lee SS, Chang YC. Regulation of hypoxia-inducible factor-1alpha in human buccal

- mucosal fibroblasts stimulated with arecoline. *J Formos Med Assoc.* 2017;116:484–7.
7. Bari S, Metgud R, Vyas Z, Tak A. An update on studies on etiological factors, disease progression, and malignant transformation in oral submucous fibrosis. *J Cancer Res Ther.* 2017;13(3):399–405.
 8. Patel JB, Shah FD, Joshi GM, Patel PS. Clinical significance of inflammatory mediators in the pathogenesis of oral cancer. *J Cancer Res Ther.* 2016;12(2):447–57.
 9. 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.
 10. Lee YH, Yang LC, Hu FW, Peng CY, Yu CH, Yu CC. Elevation of Twist expression by arecoline contributes to the pathogenesis of oral submucous fibrosis. *J Formos Med Assoc.* 2016;115(5):311–7.
 11. Wang YP, Wu YC, Cheng SJ, Chen H, Sun A, Chang JY. High frequencies of vitamin B12 and folic acid deficiencies and gastric parietal cell antibody positivity in oral submucous fibrosis patients. *J Formos Med Assoc.* 2015;114(9):813–9.
 12. Ratheesh AV, Kumar B, Mehta H, Sujatha GP, Shankarmurthy SP. Etiopathogenesis of oral submucous fibrosis. *J Med Radiol Pathol Surg.* 2015;1:16–21.
 13. Shakunthala GK, Annigeri RG, Arunkumar S. Role of oxidative stress in the pathogenesis of oral submucous fibrosis: a preliminary prospective study. *Contemp Clin Dent.* 2015;6:S172–4.
 14. Illeperuma RP, Kim DK, Park YJ, Son HK, Kim JY, Kim J, et al. Areca nut exposure increases secretion of tumor-promoting cytokines in gingival fibroblasts that trigger DNA damage in oral keratinocytes. *Int J Cancer.* 2015;137:2545–57.
 15. Liu B, Shen M, Xiong J, Yuan Y, Wu X, Gao X, 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;120:337–45.
 16. Pant I, Kumar N, Khan I, Rao SG, Kondaiah P. Role of areca nut induced TGF-beta and epithelial-mesenchymal interaction in the pathogenesis of oral submucous fibrosis. *PLoS ONE.* 2015;10(6):e0129252. ► <https://doi.org/10.1371/journal.pone.0129252>.
 17. Namboodiripad PA. Cystatin C: its role in pathogenesis of OSMF. *J Oral Biol Craniofac Res.* 2014;4(1):42–6.
 18. Arakeri G, Patil SG, Ramesh DN, Hunasgi S, Brennan PA. Evaluation of the possible role of copper ions in drinking water in the pathogenesis of oral submucous fibrosis: a pilot study. *Br J Oral Maxillofac Surg.* 2014;52(1):24–8.
 19. Prasad AS. Zinc is an antioxidant and anti-inflammatory agent: its role in human health. *Front Nutr.* 2014;1:14.
 20. Nigam NK, Aravinda K, Dhillon M, Gupta S, Reddy S, Srinivas RM. Prevalence of oral submucous fibrosis among habitual gutkha and areca nut chewers in Moradabad district. *J Oral Biol Craniofac Res.* 2014;4:8–13.
 21. Prabhu RV, Prabhu V, Chatra L, Shenai P, Suvarna N, Dandekeri S. Areca nut and its role in oral submucous fibrosis. *J Clin Exp Dent.* 2014;6:e569–75.
 22. Ullah M, Cox S, Kelly E, Boadle R, Zoellner H. Arecoline is cytotoxic for human endothelial cells. *J Oral Pathol Med.* 2014;43:761–9.
 23. Kiran G, Sekhar MM, Hunasgi S, Ahmed SA, Suri C, Krishna A. Plasma fibrinogen degradation products in betel nut chewers-with and without oral submucous fibrosis. *J Oral Maxillofac Pathol.* 2013;17(3):324–8.
 24. Das RK, Anura A, Pal M, Bag S, Majumdar S, Barui A, et al. Epithelio-mesenchymal transitional attributes in oral sub-mucous fibrosis. *Exp Mol Pathol.* 2013;95:259–69.
 25. Chang MC, Lin LD, Wu HL, Ho YS, Hsien HC, Wang TM, et al. Areca nut-induced buccal mucosa fibroblast contraction and its signaling: a potential role in oral submucous fibrosis—a precancer condition. *Carcinogenesis.* 2013;34:1096–104.
 26. Chang JZ, Yang WH, Deng YT, Chen HM, Kuo MY. EGCG blocks TGF β 1-induced CCN2 by suppressing JNK and p38 in buccal fibroblasts. *Clin Oral Investig.* 2013;17(2):455–61.
 27. Zhang SS, Li WH, Gao YJ, Liu ZW, Liu L, Tang JQ, et al. Betel-quid and oral submucous fibrosis: a cross-sectional study in Hunan Province, China. *J Oral Pathol Med.* 2012;41:748–54.
 28. Lipson KE, Wong C, Teng Y, Spong S. CTGF is a central mediator of tissue remodeling and fibrosis and its inhibition can reverse the process of fibrosis. *Fibrogenesis Tissue Repair.* 2012;5:1–8.
 29. Hu CW, Chao MR. Direct-acting DNA alkylating agents present in aqueous extracts of arecanut and its products. *Chem Res Toxicol.* 2012;25:2386–92.
 30. Khan I, Kumar N, Pant I, Narra S, Kondaiah P. Activation of TGF- β 1 pathway by areca nut constituents: a possible cause of oral submucous fibrosis. *PLoS ONE.* 2012;7(12):1–12.
 31. Shafique K, Mirza SS, Vart P, Memon AR, Arain MI, Tareen MF, et al. Areca nut chewing and sys-

- temic inflammation: evidence of a common pathway for systemic diseases. *J Inflamm (Lond)*. 2012;9(1):1–8.
32. Tsai WC, Wu MT, Wang GJ, Lee KT, Lee CH, Lu YH, et al. Chewing areca nut increases the risk of coronary artery disease in Taiwanese men: a case-control study. *BMC Public Health*. 2012;12:1–7.
 33. Javed F, Al-Hezaimi K, Warnakulasuriya S. Areca-nut chewing habit is a significant risk factor for metabolic syndrome: a systematic review. *J Nutr Health Aging*. 2012;16(5):445–8.
 34. Reichart PA, Warnakulasuriya S. Oral lichenoid contact lesions induced by areca nut and betel quid chewing: a mini review. *J Investig Clin Dent*. 2012;3(3):163–6.
 35. Tseng SK, Chang MC, Su CY, Chi LY, Chang JZ, Tsang WY, et al. Arecoline induced cell cycle arrest, apoptosis, and cytotoxicity to human endothelial cells. *Clin Oral Investig*. 2012;16(4):1267–73.
 36. Pitiyage GN, Lim KP, Gemenitzidis E, Teh MT, Waseem A, Prime SS, et al. Increased secretion of tissue inhibitors of metalloproteinases 1 and 2 (TIMPs-1 and -2) in fibroblasts are early indicators of oral sub-mucous fibrosis and ageing. *J Oral Pathol Med*. 2012;41(6):454–62.
 37. Khan S, Chatra L, Prashanth SK, Veena KM, Rao PK. Pathogenesis of oral submucous fibrosis. *J Cancer Res Ther*. 2012;8(2):199–203.
 38. Angadi PV, Rao SS. Areca nut in pathogenesis of oral submucous fibrosis: revisited. *Oral Maxillofac Surg*. 2011;15:1–9.
 39. Al-Rmalli SW, Jenkins RO, Haris PI. Betel quid chewing elevated human exposure to arsenic, cadmium and lead. *J Hazard Mater*. 2011;190(1–3):69–74.
 40. Moutasim Karwan A, Veronika J, Karen S, Daniel M, Weinreb Paul H, et al. Betel-derived alkaloid up-regulates keratinocyte alpha6 integrin expression and promotes oral submucous fibrosis. *J Pathol*. 2011;223(3):366–77.
 41. Campisi J, Andersen JK, Kapahi P, Melov S. Cellular senescence: a link between cancer and age-related degenerative disease? *Semin Cancer Biol*. 2011;21:354–9.
 42. Pitiyage GN, Slijepcevic P, Gabrni A, Chianea YG, Lim KP, Prime SS, et al. Senescent mesenchymal cells accumulate in human fibrosis by a telomere-independent mechanism and ameliorate fibrosis through matrix metalloproteinases. *J Pathol*. 2011;223:604–17.
 43. Anila K, Hallikeri K, Shubhada C, Naikmasur VG, Kulkarni RD. Comparative study of *Candida* in oral submucous fibrosis and healthy individuals. *Rev OdontoCiencia*. 2010;26(1):71–6.
 44. Zhang LN, Yang YM, Xu ZR, Gui QF, Hu QQ. Chewing substances with or without tobacco and risk of cardiovascular disease in Asia: a meta-analysis. *J Zhejiang Univ Sci B*. 2010;11(9):681–9.
 45. Raja KB, Hazarey VK, Peters TJ, Warnakulasuriya S. Effect of areca nut on salivary copper concentration in chronic chewers. *Biometals*. 2007;20:43–7.
 46. Hazarey VK, Erlewad DM, Mundhe KA, Ughade SN. Oral submucous fibrosis: study of 1000 cases from central India. *J Oral Pathol Med*. 2007;36(1):12–7. <https://doi.org/10.1111/j.1600-0714.2006.00485.x>
 47. Luo CW, Roan CH, Liu CJ. Human papillomaviruses in oral squamous cell carcinoma and pre-cancerous lesions detected by PCR-based gene-chip array. *Int J Oral Maxillofac Surg*. 2007;36:153–8.
 48. Rajalalitha P, Vali S. Molecular pathogenesis of oral submucous fibrosis—a collagen metabolic disorder. *Oral Pathol Med*. 2005;34:321–8.
 49. Chang MC, Chiang CP, Lin CL, Lee JJ, Hahn LJ, Jeng JH. Cell-mediated immunity and head and neck cancer: with special emphasis on betel quid chewing habit. *Oral Oncol*. 2005;41:757–75.
 50. IARC Working Group on the Evaluation of Carcinogenic Risks to Humans. Betel-quid and areca-nut chewing and some areca-nut derived nitrosamines. IARC Monogr Eval Carcinog Risks Hum No 85. Lyon: International Agency for Research on Cancer; 2004, pp:1–334.
 51. Jacob BJ, Straif K, Thomas G, Ramadas K, Mathew B, Zhang ZF, et al. Betel quid without tobacco as a risk factor for oral precancers. *Oral Oncol*. 2004;40(7):697–704.
 52. Nair U, Bartsch H, Nair J. Alert for an epidemic of oral cancer due to use of the betel quid substitutes gutkha and pan masala: a review of agents and causative mechanisms. *Mutagenesis*. 2004;19(4):251–62.
 53. Jeng JH, Wang YJ, Chiang BL, Lee PH, Chan CP, Ho YS, et al. Roles of keratinocyte inflammation in oral cancer: regulating the prostaglandin E2, interleukin-6 and TNF-alpha production of oral epithelial cells by areca nut extract and arecoline. *Carcinogenesis*. 2003;24:1301–15.
 54. Wollina U, Verma S, Parikh D, Parikh A. Oral and extraoral disease due to betel nut chewing. *Hautarzt*. 2002;53(12):795–7.
 55. Trivedy CR, Warnakulasuriya KA, Peters TJ, Senkus R, Hazarey VK, Johnson NW. Raised tissue copper levels in oral submucous fibrosis. *J Oral Pathol Med*. 2000;29(6):241–8.
 56. Kaur J, Rao M, Chakravarti N, Shukla NK, Mathur M, Sanwal BD, et al. Co-expression of colligin and

- collagen in oral submucous fibrosis: plausible role in pathogenesis. *Oral Oncol.* 2001;37(3):282–7.
57. Trivedy C, Meghji S, Warnakulasuriya KA, Johnson NW, Harris M. Copper stimulates human oral fibroblasts in vitro: a role in the pathogenesis of oral submucous fibrosis. *J Oral Pathol Med.* 2001;30(8):465–70.
 58. Tsai CC, Ma RH, Shieh TY. Deficiency in collagen and fibronectin phagocytosis by human buccal mucosa fibroblasts in vitro as a possible mechanism for oral submucous fibrosis. *J Oral Pathol Med.* 1999;28(2):59–63.
 59. Jeng JH, Tsai CL, Hahn LJ, Yang PJ, Kuo YS, Kuo MY. Arecoline cytotoxicity on human oral mucosal fibroblasts related to cellular thiol and esterase activities. *Food Chem Toxicol.* 1999;37(7):751–6.
 60. Norton SA. Betel: consumption and consequences. *J Am Acad Dermatol.* 1998;38(1):81–8.
 61. Hazare VK, Goel RR, Gupta PC. Oral submucous fibrosis, areca nut and pan masala use: a case-control study. *Natl Med J India.* 1998;11(6):299.
 62. Shah N, Sharma PP. Role of chewing and smoking habits in the etiology of oral submucous fibrosis (OSF): a case-control study. *J Oral Pathol Med.* 1998;27(10):475–9.
 63. Murti PR, Bhonsle RB, Gupta PC, Daftary DK, Pindborg JJ, Mehta FS. Etiology of oral submucous fibrosis with special reference to the role of areca nut chewing. *J Oral Pathol Med.* 1995;24(4):145–52.
- potentially malignant disorders and malignant lesions using special stains. *J Oral Maxillofac Pathol.* 2019;23:157–62.
6. Pammar C, Nayak RS, Kotrashetti VS, Hosmani J. Comparison of microvessel density using CD34 and CD105 in oral submucous fibrosis and its correlation with clinicopathological features: an immunohistochemical study. *J Cancer Res.* 2018;14:983–8.
 7. Rathod YG, Kulkarni SP, Khairnar MR, Joshi PN, Patle BK, Pagare JS. Estimation of serum beta-carotene level in patients suffering from oral submucous fibrosis. *J Exp Oncol.* 2018;2:267–71.
 8. Tekade SA, Chaudhary MS, Tekade SS, Sarode SC, Wanjari SP, Gadail AR, et al. Early stage oral submucous fibrosis is characterized by increased vascularity as opposed to advanced stages. *J Clin Diagn Res.* 2017;11(5):ZC92–6.
 9. Reshma V, Varsha BK, Rakesh P, Radhika MB, Soumya M, D'Mello S. Aggrandizing oral submucous fibrosis grading using an adjunct special stain: a pilot study. *J Oral Maxillofac Pathol.* 2016;20(1):36–46.
 10. Radhika T, Sekaran P, Narasimhan M. Qualitative analysis of collagen fibers in oral submucous fibrosis using picosirius red stain and polarising microscope. *J Clin Diagn Res.* 2016;10(2):ZC04–ZC7.
 11. Ray JG, Ranganathan K, Chattopadhyay A. Malignant transformation of oral submucous fibrosis: overview of histopathological aspects. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2016;122(2):200–9.
 12. Chawla H, Urs AB, Augustine J, Kumar P. Characterization of muscle alteration in oral submucous fibrosis-seeking new evidence. *Med Oral Patol Oral Cir Bucal.* 2015;20(6):670–7.
 13. Murgod VV, Kale AD, Angadi PV, Hallikerimath S. Morphometric analysis of the mucosal vasculature in oral submucous fibrosis and its comparison with oral squamous cell carcinoma. *J Oral Sci.* 2014;56:173–8.
 14. Jayasooriya PR, Nadeeka Jayasinghe KA, Tilakaratne WM. Relationship between thickness of fibrosis and epithelial dysplasia in oral submucous fibrosis. *J Investig Clin Dent.* 2011;2:171–5.
 15. Pandya S, Chaudhary AK, Singh M, Singh M, Mehrotra R. Correlation of histopathological diagnosis with habits and clinical findings in oral submucous fibrosis. *Head Neck Oncol.* 2009;1:1–10.
 16. Rajendran R, Paul S, Mathews PP, Raghul J, Mohanty M. Characterization and quantification of mucosal vasculature in oral submucous fibrosis. *Ind J Dent Res.* 2005;16:83–91.
 17. Haque MF, Harris M, Meghji S, Speight PM. An immunohistochemical study of oral submucous fibrosis. *J Oral Pathol Med.* 1997;26(2):75–82.

22.1.6 Histopathology and Special Stains in OSF, as OPMD

1. Abdul SN. Oral submucous fibrosis and its relation with stromal vascularity: a systematic review. *Eur J Med Health Sci.* 2020;2(2):1–3.
2. Kumar LB, Mathew P, Madhavan N, Siddique S, Kshetrimayum N, Iyer K. Evaluation of mast cells and burning sensation in various stages of Oral Submucous Fibrosis. *J Oral Biol Craniofac Res.* 2020;10(4):430–4.
3. Tamgadge S, Tamgadge A. Histopathology of oral submucous fibrosis in third dimension with an additional note on hypothesis of epithelial atrophy. *J Microsc Ultrastruct.* 2019;8(1):31–4.
4. Bhatt P, Manjunath M, Khakhla D, Gubrellay P, Bhargava R, Guruprasad L. Assessment and correlation between functional and histological staging of oral submucous fibrosis: a clinicohistopathologic study. *Natl J Maxillofac Surg.* 2019;10:27–32.
5. Gupta N, Rakshit A, Srivastava S, Suryawanshi H, Kumar P, Naik R. Comparative evaluation of micronuclei in exfoliated oral epithelial cells in

22.1.7 Molecular Biology and Genetics of OSF, and Malignant Transformation

1. James A, Jayan L, Ramadoss R, Arunachalam P. Leaving no stone unturned: role of profibrotic genes in oral submucous fibrosis - a systematic review. *J Oral Maxillofac Pathol.* 2022;26(2):228–35.
2. Singh AG, Roy S, Oza S, Singhavi H, Chatterjee K, Chaturvedi P. A contemporary narrative review to guide molecular epidemiology of oral submucous fibrosis. *Int J Mol Epidemiol Genet.* 2021;12(4):61–70.
3. Jian X, Jian Y, Wu X, Guo F, Hu Y, Gao X, Jiang C, Li N, Wu Y, Liu D. Oral submucous fibrosis transforming into squamous cell carcinoma: a prospective study over 31 years in mainland China. *Clin Oral Investig.* 2021;25(4):2249–56.
4. Kundu P, Pant JR, Rao SG, Kondaiah P. Genome-wide DNA methylation changes in oral submucous fibrosis. *Oral Dis.* 2021;00:1–10.
5. Zhang L, Tan J, Liu YP, Liu X, Luo M. Curcumin relieves the arecoline-induced fibrosis of oral mucosal fibroblasts via inhibiting HIF-1 α /TGF- β /CTGF signaling pathway: an in vitro study. *Toxicol Res (Camb).* 2021;10(3):631–8.
6. Gupta SR, Sharma A, Gupta N, Mani K. Single nucleotide polymorphisms and serologic levels of hypoxia-inducible factor1 α and vascular endothelial growth factor are associated with increased risk of oral submucous fibrosis in gutka users among a North Indian population. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2020;130(5):557–64.
7. Fang CY, Yu CC, Liao YW, Hsieh PL, Ohiro Y, Chu PM, et al. miR-10b regulated by Twist maintains myofibroblasts activities in oral submucous fibrosis. *J Formos Med Assoc.* 2020;119:1167–73.
8. Li J, Yao M, Zhu X, Li Q, He J, Chen L, et al. YAP-Induced endothelial-mesenchymal transition in oral submucous fibrosis. *J Dent Res.* 2019;98:920–9.
9. Tu HF, Chen MY, Lai JC, Chen YL, Wong YW, Yang CC, et al. Arecoline-regulated ataxia telangiectasia mutated expression level in oral cancer progression. *Head Neck.* 2019;41:2525–37.
10. Yuan Y, Li N, Zeng L, Shen Z, Jiang C. Pathogenesis investigation of miR-199-5p in oral submucous fibrosis based on bioinformatics analysis. *Oral Dis.* 2019;25:456–65.
11. Liu CM, Liao YW, Hsieh PL, Yu CH, Chueh PJ, Lin T, et al. miR-1246 as a therapeutic target in oral submucosa fibrosis pathogenesis. *J Formos Med Assoc.* 2019;118:1093–8.
12. Liao YW, Yu CC, Hsieh PL, Chang YC. miR-200b ameliorates myofibroblast transdifferentiation in precancerous oral submucous fibrosis through targeting ZEB2. *J Cell Mol Med.* 2018;22:4130–8.
13. Lu MY, Yu CC, Chen PY, Hsieh PL, Peng CY, Liao YW, et al. miR-200c inhibits the arecoline-associated myofibroblastictransdifferentiation in buccal mucosal fibroblasts. *J Med Assoc.* 2018;117:791–7.
14. Lin CY, Liao YW, Hsieh PL, Lu MY, Peng CY, Chu PM, et al. LncRNA GAS5-AS1 inhibits myofibroblasts activities in oral submucous fibrosis. *J Formos Med Assoc.* 2018;117:727–33.
15. Zade PR, Gosavi SR, Hazarey VK, Ganvir SM. Matrix metalloproteinases-3 gene-promoter polymorphism as a risk factor in oral submucous fibrosis in an Indian population: a pilot study. *J Investig Clin Dent.* 2017;8(3):1–6.
16. Bazarsad S, Zhang X, Kim KY, Illeperuma R, Jayasinghe RD, Tilakaratne WM, et al. Identification of a combined biomarker for malignant transformation in oral submucous fibrosis. *J Oral Pathol Med.* 2017;46:431–8.
17. Tang D, Tao D, Fang Y, Deng C, Xu Q, Zhou J. TNF-Alpha promotes invasion and metastasis via NF-Kappa B pathway in oral squamous cell carcinoma. *Med Sci Monit Basic Res.* 2017;23:141–9.
18. Hou X, Liu R, Huang C, Jiang L, Zhou Y, Chen Q. Cyclophilin A was revealed as a candidate marker for human oral submucous fibrosis by proteomic analysis. *Cancer Biomark.* 2017;20:345–56.
19. Jayasinghe RD, Manoja KGD, Gunasinghe MS, Gurusinghe SKB, Sitheequ MAM, Hettiarachchi RM, Kularathne MSM. An analysis of rate and factors affecting malignant transformation of oral submucous fibrosis in patients attending the Oral Medicine Clinic, Dental Hospital Peradeniya, Sri Lanka - a retrospective study. *SLJM.* 2016;24
20. Dalmia A, Hazarey V, Talkal R, Ganvir S, Purohit HJ, Gupta S, Pimpale A. Role of Hypoxia Inducible Factor-1 α messenger RNA expression in malignant transformation of oral submucous fibrosis: a RT-PCR study. *Transl Res Oral Oncol.* 2016;1:1–5.
21. Chattopadhyay A, Ray JG. Molecular pathology of malignant transformation of oral submucous fibrosis. *J Environ Pathol Toxicol Oncol.* 2016;35(3):193–205.
22. Kallalli BN, Rawson K, Singh AM, Awati MA, Shivhare P. Lactate dehydrogenase as a biomarker in oral cancer and oral submucous fibrosis. *J Oral Pathol Med.* 2016;45:687–90.
23. Languino LR, Singh A, Prisco M, Inman GJ, Luginbuhl A, Curry JM, et al. Exosome-mediated transfer from the tumor microenvironment increases

- TGF β signaling in squamous cell carcinoma. *Am J Transl Res.* 2016;15;8(5):2432-2437
24. Kaliyaperumal S, Sankarapandian S. Evaluation of p16 hypermethylation in oral submucous fibrosis: a quantitative and comparative analysis in buccal cells and saliva using real-time methylation-specific polymerase chain reaction. *South Asian J Cancer.* 2016;5:73-9.
 25. Wang TH, Hsia SM, Shieh TM. Lysyl oxidase and the tumor microenvironment. *Int J Mol Sci.* 2016;18:1-12.
 26. Shridhar K, Walia GK, Aggarwal A, Gulati S, Geetha AV, Prabhakaran D, et al. DNA methylation markers for oral pre-cancer progression: a critical review. *Oral Oncol.* 2016;53:1-9.
 27. Chen J, Liu BJ, Du C, Cao Q, Li M, Feng H. Target regulation of micro-RNA-203 to the expression of collagen type alpha 4 and its role in oral submucous fibrosis. *Chin J Stomatol.* 2016;51:526-31.
 28. Yuan Y, Hou X, Feng H, Liu R, Xu H, Gong W, et al. Proteomic identification of cyclophilin A as a potential biomarker and therapeutic target in oral submucous fibrosis. *Oncotarget.* 2016;7:60348-65.
 29. Xie X, Jiang Y, Yuan Y, Wang P, Li X, Chen F, et al. MALDI imaging reveals NCOA7 as a potential biomarker in oral squamous cell carcinoma arising from oral submucous fibrosis. *Oncotarget.* 2016;7:59987-60004.
 30. Kallalli BN, Rawson K, Singh AM, Awati MA, Shivhare P. Lactate dehydrogenase as a biomarker in oral cancer and oral submucous fibrosis. *J Oral Pathol Med.* 2016;45:687-90.
 31. Davalli P, Mitic T, Caporali A, Lauriola A, D'Arca D. ROS, cell senescence, and novel molecular mechanisms in aging and age-related diseases. *Oxid MedCell Longev* 2016; 2016.1-19.
 32. Bautista-Nino PK, Portilla-Fernandez E, Vaughan DE, Danser AH, Roks AJ. DNA damage: a main determinant of vascular aging. *Int J Mol Sci.* 2016;17(5):1-26.
 33. Yuan Y, Hou X, Feng H, Liu R, Xu H, Gong W, et al. Proteomic identification of cyclophilin A as a potential biomarker and therapeutic target in oral submucous fibrosis. *Oncotarget.* 2016;7:60348-65.
 34. Anura A, Conjeti S, Das RK, Pal M, Paul RR, Bag S, et al. Computer-aided molecular pathology interpretation in exploring prospective markers for oral sub-mucous fibrosis progression. *Head Neck.* 2016;38(5):653-69.
 35. Zhou S, Chen L, Mashrah M, Zhu Y, Liu J, Yang X, et al. Deregulation of secreted frizzled-related proteins is associated with aberrant beta-catenin activation in the carcinogenesis of oral submucous fibrosis. *Onco Targets.* 2015;8:2923-31.
 36. Tsai CH, Lee SS, Chang YC. Hypoxic regulation of plasminogen activator inhibitor-1 expression in human buccal mucosa fibroblasts stimulated with arecoline. *J Oral Pathol Med.* 2015;44:669-73.
 37. Gupta S, Ghosh S, Gupta S, Sakhuja P. Effect of curcumin on the expression of p53, transforming growth factor- β , and inducible nitric oxide synthase in oral submucous fibrosis: a pilot study. *J Investig Clin Dent.* 2017;8(4):1-6.
 38. Chang YC, Tsai CH, Lai YL, Yu CC, Chi WY, Li JJ, et al. Arecoline-induced myofibroblast transdifferentiation from human buccal mucosal fibroblasts is mediated by ZEB 1. *J Cell Mol Med.* 2014;18(4):698-708.
 39. Udupa R, Hallikeri K, Trivedi DJ. The comet assay a method to measure DNA damage in oral submucous fibrosis patients: a case-control study. *Clin Cancer Investig J.* 2014;3:299-304.
 40. Chaudhuri SR, Mukherjee S, Paul RR, Haldar A, Chaudhuri K. CYP1A1 and CYP2E1 gene polymorphisms may increase susceptibility to Oral Submucous Fibrosis among betel quid chewers of Eastern India. *Gene.* 2013;513:268-71.
 41. Leight JL, Wozniak MA, Chen S, Lynch ML, Chen CS. Matrix rigidity regulates a switch between TGF-beta1-induced apoptosis and epithelial-mesenchymal transition. *Mol Biol Cell.* 2012;23:781-91.
 42. Ji WT, Yang SR, Chen JY, Chen YP, Lee YR, Chiang MK, et al. Arecoline downregulates levels of p21 and p27 through the reactive oxygen species/mTOR complex 1 pathway and may contribute to oral squamous cell carcinoma. *Cancer Sci.* 2012;103(7):1221-9.
 43. Ghosh T, Gupta S, Bajpai P, Agarwal D, Agarwal M, Gupta OP, et al. Association of CYP1A1, GSTM1, and GSTT1 gene polymorphism with risk of oral submucous fibrosis in a section of North Indian population. *Mol Biol Rep* 2012; 39: 9383-9389.
 44. Xie H, Liu J, Ling TY. Expression of cytochrome P450 related genes in oral submucous fibrosis tissue. *Zhonghua Kou Qiang Yi Xue Za Zhi.* 2012;47:743-7.
 45. Mukherjee S, Bhowmik AD, Roychoudhury P, Mukhopadhyay K, Ray JG, Chaudhuri K. Association of XRCC1, XRCC3, and NAT2 polymorphisms with the risk of oral submucous fibrosis among eastern Indian population. *J Oral Pathol Med.* 2012;41:292-302.
 46. Hu CW, Chao MR. Direct-acting DNA alkylating agents present in aqueous extracts of arecanut and its products. *Chem Res Toxicol.* 2012;25:2386-92.
 47. Xu C, Zhao J, Loo WT, Hao L, Wang M, Cheung MNB, et al. Correlation of epigenetic change and

- identification of risk factors for oral submucous fibrosis. *Int J Biol Markers*. 2012;27:e314–21.
48. Jeyapradha D, Saraswathi T, Ranganathan K, Wilson K. Comparison of the frequency of sister chromatid exchange in pan chewers and oral submucous fibrosis patients. *J Oral Maxillofac Pathol*. 2011;15:278–82.
 49. Joshi MS, Verma Y, Gautam AK, Parmar G, Lakkad BC, Kumar S. Cytogenetic alterations in buccal mucosa cells of chewers of areca nut and tobacco. *Arch Oral Biol*. 2011;56(1):63–7.
 50. Pitiyage GN, Slijepcevic P, Gabrni A, Chianea YG, Lim KP, Prime SS, et al. Senescent mesenchymal cells accumulate in human fibrosis by a telomere-independent mechanism and ameliorate fibrosis through matrix metalloproteinases. *J Pathol*. 2011;223:604–17.
 51. Li N, Hu Q, Jiang C, Hu Y, Yuan Y, Jian X, et al. Novel genetic biomarkers for susceptibility to oral submucous fibrosis: cytochrome P450 3A. *Med Hypotheses*. 2011;77:834–6.
 52. Choudhury Y, Sharan RN. Altered BRCA1 and BRCA2 responses and mutation of BRCA1 gene in mice exposed chronically and transgenerationally to aqueous extract of betel nut (AEBN). *Environ Toxicol Pharmacol*. 2011;31:57–69.
 53. Lee IT, Lin CC, Wu YC, Yang CM. TNF- α induces matrix metalloproteinase-9 expression in A549 cells: role of TNFR1/TRAF2/PKC α -dependent signaling pathways. *J Cell Physiol*. 2010;224:454–64.
 54. Yin X, Wen C, Han Y, Gao Y, Tang Z. Expression of FHIT and MDM2 in oral submucous fibrosis and canceration tissues. *Zhong Nan Da Xue Xue Bao Yi Xue Ban*. 2010;35:572–5.
 55. Rajendran R, Harish RK, Anil S, Vidyadharan R, Banerjee M. Transforming growth factor- β -1 polymorphisms are infrequent but exist at selected loci in oral submucous fibrosis. *Indian J Dent Res*. 2010;21:413–9.
 56. Chaudhary AK, Singh M, Bharti AC, Singh M, Shukla S, Singh AK, et al. Synergistic effect of stromelysin-1 (matrix metalloproteinase-3) promoter (-1171 5A->6A) polymorphism in oral submucous fibrosis and head and neck lesions. *BMC Cancer*. 2010;10:1–9. [▶ https://doi.org/10.1186/1471-2407-10-369](https://doi.org/10.1186/1471-2407-10-369).
 57. Shieh TM, Tu HF, Ku TH, Chang SS, Chang KW, Liu CJ. Association between lysyl oxidase polymorphisms and oral submucous fibrosis in older male areca chewers. *J Oral Pathol Med*. 2009;38:109–13.
 58. Li N, Jian XC, Xu CJ. Expression of loricrin and cytochrome P450 3A5 in oral submucous fibrosis and their significance. *Hua Xi Kou Qiang Yi Xue Za Zhi*. 2009;27:29–33.
 59. Teh MT, Tilakaratne WM, Chaplin T, Young BD, Ariyawardana A, Pitiyage G, et al. Fingerprinting genomic instability in oral submucous fibrosis. *J Oral Pathol Med*. 2008;37:430–6.
 60. Zhou S, Li L, Jian X, Ou X, Jiang H, Yao Z, et al. The phosphorylation of survivin Thr34 by p34cdc2 in carcinogenesis of oral submucous fibrosis. *Oncol Rep*. 2008;20:1085–91.
 61. Lin YC, Huang HI, Wang LH, Tsai CC, Lung O, Dai CY, et al. Polymorphisms of COX-2 -765G>C and p53 codon 72 and risks of oral squamous cell carcinoma in a Taiwan population. *Oral Oncol*. 2008;44:798–804.
 62. Lalli A, Tilakaratne WM, Ariyawardana A, Fitchett LIM, Hagi-Pavli E, et al. An altered keratinocyte phenotype in oral submucous fibrosis: correlation of keratin K17 expression with disease severity. *J Oral Pathol Med*. 2008;37:211–20.
 63. Hu Y, Jian X, Peng J, Jiang X, Li N, Zhou S. Gene expression profiling of oral submucous fibrosis using oligonucleotide microarray. *Oncol Rep*. 2008;20(2):287–94.
 64. Shieh TM, Lin SC, Liu J, Chang SS, Ku TH, Chang KW. Association of expression aberrances and genetic polymorphisms of lysyl oxidase with areca-associated oral tumorigenesis. *Clin Cancer Res*. 2007;13:4378–85.
 65. Shieh DH, Chiang LC, Shieh TY. Augmented mRNA expression of tissue inhibitor of metalloproteinase-1 in buccal mucosal fibroblasts by arecoline and safrole as a possible pathogenesis for oral submucous fibrosis. *Oral Oncol*. 2003;39:728–35.
 66. Chiu CJ, Chiang CP, Chang ML, Chen HM, Hahn LJ, Hsieh LL, et al. Association between genetic polymorphism of tumor necrosis factor- α and risk of oral submucous fibrosis, a pre-cancerous condition of oral cancer. *J Dent Res*. 2001;80:2055–9.
 67. Chang MC, Ho YS, Lee PH, Chan CP, Lee JJ, Hahn LJ, et al. Areca nut extract and arecoline induced the cell cycle arrest but not apoptosis of cultured oral KB epithelial cells: association of glutathione, reactive oxygen species and mitochondrial membrane potential. *Carcinogenesis*. 2001;22(9):1527–35.
 68. Hsieh LL, Wang PF, Chen IH, Liao CT, Wang HM, Chen MC, et al. Characteristics of mutations in the p53 gene in oral squamous cell carcinoma associated with betel quid chewing and cigarette smoking in Taiwanese. *Carcinogenesis*. 2001;22(9):1497–503.
 69. Jeng JH, Ho YS, Chan CP, Wang YJ, Hahn LJ, Lei D, et al. Areca nut extract up-regulates prostaglan-

din production, cyclooxygenase-2 mRNA and protein expression of human oral keratinocytes. *Carcinogenesis*. 2000;21:1365–70.

22.1.8 Immunohistochemistry in OSF

1. Kholakiya Y, Jose A, Rawat A, Nagori S.A, Jacob S, Roychoudhury A. Surgical management of oral submucous fibrosis with “Seagull-nasolabial flap” combined with short-term oral pentoxifylline for preventing relapse. *J Stomatol Oral Maxillofac Surg* 2020;121(5):512-516.
2. Singh I, Juneja S, Tandon A, Jain A, Shetty DC, Sethi A. Immunoeexpression of alpha smooth muscle actin correlates with serum transforming growth factor- β 1 levels in oral submucous fibrosis. *J Investig Clin Dent* 2019;10(4):1-8.
3. Lin CY, Hsieh PL, Liao YW, Peng CY, Yu CC, Lu MY. Arctigenin reduces myofibroblast activities in Oral Submucous Fibrosis by LINC00974 inhibition. *Int J Mol Sci* 2019; 20:1328-1339.
4. Fang CY, Yu CC, Liao YW, Hsieh PL, Lu MY, Lin KC et al. LncRNA LINC00974 activates TGF- β /Smad signaling to promote oral fibrogenesis. *J Oral Pathol Med* 2019; 48: 151–158.
5. Raffat MA, Hadi NI, Hosein M, Zubairi AM, Ikram S, Akram Z. Differential expression of salivary S100A7 in oral submucous fibrosis. *Saudi Dent J* 2019; 31:39–44.
6. Gadbaill AR, Chaudhary M, Sarode SC, Gondivkar S, Tekade SA, Zade P, et al. Ki67, CD105, and α -SMA expression supports the transformation relevant dysplastic features in the atrophic epithelium of oral submucous fibrosis. *PLoS One* 2018;13(7):1-12.
7. Malik SN, Vyas Z, Kotari H, Prabhu VD, Alam MK, Kumar BSK. Association of Histological Grading of Oral Submucous Fibrosis to Cytokeratin 19 Immunohistochemical Staining. *World J Dent* 2018; 9(2):117-121.
8. Gottipamula S, Sundarajan S, Moorthy A, Padmanabhan S, Sridhar KN. Buccal mucosal epithelial cells downregulate CTGF expression in buccal submucosal fibrosis fibroblasts. *J Maxillofac Oral Surg* 2018;17(2):254-259.
9. Shinde AV, Humeres C, Frangogiannis NG. The role of alpha-smooth muscle actin in fibroblast-mediated matrix contraction and remodeling. *Biochim Biophys Acta Mol Basis Dis* 2017;1863(1):298–309.
10. Daga D, Singh RK, Pal US, Gurung T, Gangwar S. Efficacy of oral colchicine with intralesional hyaluronidase or triamcinolone acetonide in the grade II oral submucous fibrosis. *Natl J Maxillofac Surg* 2017;8(1):50-54.
11. Keshav R, Narayanappa U. Expression of Proliferating Cell Nuclear Antigen (PCNA) in Oral Submucous Fibrosis: an immunohistochemical study. *J Clin Diagn Res* 2015;9: ZC20–ZC23.
12. Kaur J, Matta A, Kak I, Srivastava G, Assi J, Leong I, et al. S100A7 overexpression is a predictive marker for high risk of malignant transformation in oral dysplasia. *Int J Cancer* 2014;134: 1379–1388.
13. Krishnamurthy V.K.P.S.R. Transforming growth factor beta 1 in oral submucous fibrosis: an immunohistochemical study—understanding the pathogenesis. *J Dent Res Rev* 2014;1:75 -80.
14. Pandiar D, Shameena P. Immunohistochemical expression of CD34 and basic fibroblast growth factor(bFGF) in oral submucous fibrosis. *J Oral Maxillofac Pathol* 2014; 18:155–161.
15. Varun B.R, Ranganathan K, Rao UK, Joshua E. Immunohistochemical detection of p53 and p63 in oral squamous cell carcinoma, oral leukoplakia, and oral submucous fibrosis. *J Investig Clin Dent* 2014; 5:214–219.
16. Anura A, Das RK, Pal M, Paul RR, Ray AK, Chatterjee J. Correlated analysis of semiquantitative immunohistochemical features of E-cadherin, VEGF and CD105 in assessing malignant potentiality of oral submucous fibrosis. *Pathol Res Pract* 2014; 210:1054-1063.
17. Shrestha A, Carnelio S. Evaluation of matrix metalloproteinases-2 (MMP-2) and tissue inhibitors of metalloproteinases-2 (TIMP-2) in oral submucous fibrosis and their correlation with disease severity. *Kathmandu Univ Med J (Kumj)* 2013; 11:274–281.
18. Bag S, Conjeti S, Das RK, Pal M, Anura A, Paul RR, et al. Computational analysis of p63(+) nuclei distribution pattern by graph theoretic approach in an oral pre-cancer (sub-mucous fibrosis). *J Pathol Inform* 2013; 4:1-17.
19. Kale AD, Mane DR, Shukla D. Expression of transforming growth factor β and its correlation with lipodystrophy in oral submucous fibrosis: an immunohistochemical study. *Med Oral Patol Oral Cir Bucal* 2013;18(1):1-7.
20. Angadi PV, Krishnapillai R. Evaluation of PTEN immunoeexpression in oral submucous fibrosis: role in pathogenesis and malignant transformation. *Head Neck Pathol* 2012; 6:314-321.
21. Sabarinath B, Sriram G, Saraswathi TR, Sivapathasundharam B. Immunohistochemical evaluation of mast cells and vascular endothelial proliferation in oral submucous fibrosis. *Indian J Dent Res* 2011;22:116-121.

22. Ranganathan K and Kavitha R. Proliferation and apoptosis markers in oral submucous fibrosis. *J Oral MaxillofacPathol* 2011;15(2):148-53.
23. Khan I, Agarwal P, Thangjam GS, Radhesh R, Rao SG, Kondaiah P. Role of TGF- β 2 and BMP7 in the pathogenesis of oral submucous fibrosis. *Growth Factors* 2011;29(4):119-27.
24. Desai RS, Mamatha GS, Khatri MJ, Shetty SJ. Immunohistochemical expression of CD34 for characterization and quantification of mucosal vasculature and its probable role in malignant transformation of atrophic epithelium in oral submucous fibrosis. *Oral Oncol* 2010; 46:553–558.
25. Illeperuma RP, Ryu MH, Kim KY, Tilakaratne WM, Kim J. Relationship of fibrosis and the expression of TGF- β 1, MMP-1, and TIMP-1 with epithelial dysplasia in oral submucous fibrosis. *Oral Med Pathol* 2010; 15: 21-28.
26. Mishra G, Ranganathan K. Matrix metalloproteinase-1 expression in oral submucous fibrosis: an immunohistochemical study. *Indian J Dent Res* 2010;21(3):320-325.
27. Rajendran R, Rajeesh MP, Shaikh S, Pillai SMR. Expression of matrix metalloproteinases (MMP-1, MMP-2 and MMP-9) and their inhibitors (TIMP-1 and TIMP-2) in oral submucous fibrosis. *Indian J Dent Res* 2006; 17:161–166.
28. Utsunomiya H, Tilakaratne WM, Oshiro K, Maruyama S, Suzuki M, Ida-Yonemochi H, et al. Extracellular matrix remodeling in oral submucous fibrosis: its stagespecific modes revealed by immunohistochemistry and in situ hybridization. *J Oral Pathol Med* 2005;34(8):498-507.
29. Tsai CH, Yang SF, Chen YJ, Chou MY, Chang YC. Raised keratinocyte growth factor-1 expression in oral submucous fibrosis in vivo and upregulated by arecoline in human buccal mucosal fibroblasts in vitro. *J Oral Pathol Med* 2005;34(2):100–105.
30. Srinivasan M, Jewell SD. Evaluation of TGF- α and EGFR expression in oral leukoplakia and oral submucous fibrosis by quantitative immunohistochemistry. *Oncology* 2001;61(4):284–292.
31. Haque MF, Harris M, Meghji S, Barrett AW. Immunolocalization of cytokines and growth factors in oral submucous fibrosis. *Cytokine* 1998; 10:713–719.
32. Haque MF, Harris M, Meghji S, Speight PM. An immunohistochemical study of oral submucous fibrosis. *J Oral Pathol Med*. 1997;26(2):75-82
33. Reichart PA, Van Wyk CW, Becker J, Schuppan D. Distribution of procollagen type III, collagen type VI and tenascin in oral submucous fibrosis (OSF). *J Oral Pathol Med* 1994;23(9):394-8.

22.1.9 Diagnostic, Serology and Prognostic evaluation

1. Hande A, Bansod AV, Agrawal AG, Gadbail A, Reche AM. Estimation of serum copper and zinc in patients of oral submucous fibrosis in rural population. *World J Dent* 2020;11(6):478–481.
2. Mukul SK, Kumar S, Pandey S, Mokhtar EA, Kumar A. Ultrasound elastography as a potential diagnostic aid in oral submucous fibrosis. *Natl J Maxillofac Surg* 2019;10(2):129-133.
3. Alexander AJ, Ramani P, Sherlin HJ, Gheena S. Quantitative analysis of copper levels in areca nut plantation area—a role in increasing prevalence of oral submucous fibrosis: an in vitro study. *Indian J Dent Res* 2019;30(2):261-266.
4. Sachdev PK, Freeland-Graves J, Beretvas SN, Sanjeevi N. Zinc, copper, and iron in oral submucous fibrosis: a meta-analysis. *Int J Dent* 2018;2018:1-15.
5. Bag S, Dutta D, Chaudhary A, Sing BC, Pal M, Ray AK, et al. Identification of alpha-enolase as a prognostic and diagnostic precancer biomarker in oral submucous fibrosis. *J Clin Pathol* 2018;71:228–238.
6. Mishra S, Kritika C, Bajoria AA, Choudhury P, Sahoo SK, Sangamesh NC. Estimation of salivary and serum lactate dehydrogenase in oral submucous fibrosis. *J Int Soc Prev Community Dent* 2018; 8:289–295.
7. Rathod YG, Kulkarni SP, Khairnar MR, Joshi PN, Patle BK, Pagare JS. Estimation of serum beta-carotene level in patients suffering from oral submucous fibrosis. *J Exp Oncol* 2018; 2:267–271.
8. Jani YV, Chaudhary AR, Dudhia BB, Bhatia PV, Soni NC, Patel PS. Evaluation of role of trace elements in oral submucous fibrosis patients: a study on Gujarati population. *J Oral MaxillofacPathol* 2017;21(3):455.
9. Thakur M, Guttikonda VR. Estimation of hemoglobin, serum iron, total iron-binding capacity and serum ferritin levels in oral submucous fibrosis: a clinicopathological study. *J Oral MaxillofacPathol* 2017;21(1):30-35.
10. More CB, Shah PH, Venkatesh R. Estimation of Serum protein in oral potentially malignant disorders and oral malignancy—a cross-sectional study. *J Clin Diagn Res* 2017;11: ZC17–ZC19.
11. Prajapati KJ, Chawda JG. Estimation of major immunoglobulins in smokers and gutkha chewers. *J Oral MaxillofacPathol* 2016;20(2):219-23.
12. Kandasamy M, Jaisanghar N, Austin RD, Srivastava KC, Anusuya GS, Anisa N. Comparative evaluation

- of serum and salivary immunoglobulin G and A levels with total serum protein in oral submucous fibrosis patients: a case control study. *J Pharm Bioallied Sci* 2016;8(Suppl. 1):S126-S132.
13. Paulose S, Rangdhol V, Ramesh R, Jeelani SA, Brooklyin S. Estimation of serum malondialdehyde and assessment of DNA damage using comet assay in patients with oral submucous fibrosis. *J Investig Clin Dent* 2016; 7:286–293.
 14. Kaur J, Politis C, Jacobs R. Salivary 8-hydroxy-2-deoxyguanosine, malondialdehyde, vitamin C, and vitamin E in oral pre-cancer and cancer: diagnostic value and free radical mechanism of action. *Clin Oral Investig* 2016;20:315–319.
 15. Balakrishnan C, Aswath N. Estimation of serum, salivary immunoglobulin G, immunoglobulin A levels and total protein, hemoglobin in smokeless tobacco chewers and oral submucous fibrosis patients. *Contemp Clin Dent* 2015;6(Suppl 1):S157-62.
 16. Sivaramakrishnan M, Sivapathasundharam B, Jananni M. Evaluation of lactate dehydrogenase enzyme activity in saliva and serum of oral submucous fibrosis patients. *J Oral Pathol Med* 2015;44(6):449-52.
 17. Mohammed F, Manohar V, Jose M, Thapasum AF, Mohamed S, Shamaz BH, et al. Estimation of copper in saliva and areca nut products and its correlation with histological grades of oral submucous fibrosis. *J Oral Pathol Med* 2015; 44:208–213.
 18. Yadav A, Kumar L, Misra N, Deepak U, Shiv Kumar GC. Estimation of serum zinc, copper, and iron in the patients of oral submucous fibrosis. *Natl J Maxillofac Surg* 2015;6:190–193.
 19. Wang YP, Wu YC, Cheng SJ, Chen HM, Sun A, Chang JY. High frequencies of vitamin B12 and folic acid deficiencies and gastric parietal cell antibody positivity in oral submucous fibrosis patients. *J Formos. Med Assoc* 2015;114(9):813-819.
 20. Guruprasad R, Nair PP, Singh M, Singh M, Singh M, Jain A. Serum vitamin C and iron levels in oral submucous fibrosis. *Indian J Dent* 2014; 5:81–85.
 21. Hosthor SS, Mahesh P, Priya SA, Sharada P, Jyotsna M, Chitra S. Quantitative analysis of serum levels of trace elements in patients with oral submucous fibrosis and oral squamous cell carcinoma: a randomized cross-sectional study. *J Oral Maxillofac Pathol* 2014;18:46–51.
 22. Divya VC, Sathasivasubramanian S. Estimation of serum and salivary immunoglobulin G and immunoglobulin A in oral pre-cancer: a study in oral submucous fibrosis and oral lichen planus. *J Nat Sci Biol Med* 2014;5:90–94.
 23. Gharat L, Rathod GP, Kandalgaonkar S. Quantitative estimation of serum fibrinogen degradation product levels in oral premalignant and malignant lesions. *J Int Oral Health* 2013;5(5): 65–72.
 24. Khanna S, Udas AC, Kumar GK, Suvarna S, Karjodkar FR. Trace elements (copper, zinc, selenium and molybdenum) as markers in oral submucous fibrosis and oral squamous cell carcinoma. *J Trace Elem Med Biol* 2013; 27:307-311.
 25. Gurudath S, Ganapathy KS, Pai A, Ballal S, Asha ML. Estimation of superoxide dismutase and glutathione peroxidase in oral submucous fibrosis, oral leukoplakia and oral cancer—a comparative study. *Asian Pac J Cancer Prev* 2012;13:4409–4412.
 26. Ayinampudi BK, Narsimhan M. Salivary copper and zinc levels in oral pre-malignant and malignant lesions. *J Oral MaxillofacPathol* 2012; 16:178-182.
 27. Shetty SR, Babu SG, Kumari S, Rao V, Vijay R, Karikal A. Malondialdehyde levels in oral submucous fibrosis: a clinicopathological and biochemical study. *N Am J Med Sci* 2012;4(3):125-128.
 28. Tadakamadla J, Kumar S, Mamatha GP. Evaluation of serum copper and iron levels among oral submucous fibrosis patients. *Med Oral Patol Oral Cir Bucal.* 2011;16(7):1-4.
 29. Lee CK, Tsai MT, Lee HC, Chen HM, Chiang CP, Wang YM, et al. Diagnosis of oral submucous fibrosis with optical coherence tomography. *J Biomed Opt* 2009;14(5):1-7.
 30. Rajendran R, Varkey S. Inducible nitric oxide synthase expression is upregulated in oral submucous fibrosis. *Indian J Dent Res* 2007; 18:94-100.
 31. Chung-Hung T, Shun-Fa Y, Yu-Chao C. The upregulation of cystatin C in oral submucous fibrosis. *Oral Oncol* 2007;43(7):680–685.
 32. Khanna SS, Karjodkar FR. Circulating immune complexes and trace elements (copper, iron and selenium) as markers in oral precancer and cancer: a randomised, controlled clinical trial. *Head Face Med* 2006; 2:33:1-10.
 33. Pillai KG, Burde KN. Increased copper level in oral mucosal tissue of patients with submucous fibrosis and who chew areca nut products. *West Indian Med J* 2005;54(4):270-271.
 34. Chiang CP, Hsieh RP, Chen TH, Chang YF, Liu BY, Wang JT et al. High incidence of autoantibodies in Taiwanese patients with oral submucous fibrosis. *J Oral Pathol Med* 2002;31(7):402-9.
 35. Trivedy CR, Warnakulasuriya KA, Peters TJ, Senkus R, Hazarey VK, Johnson NW. Raised tissue copper levels in oral submucous fibrosis. *J Oral Pathol Med* 2000;29(6):241–248.
 36. Haque MF, Meghji S, Khitab U, Harris M. Oral submucous fibrosis patients have altered levels of

cytokine production. *J Oral Pathol Med* 2000;29(3):123–128

22.1.10 Therapeutics and Treatment of OSF

1. Gopinath D, Hui LM, Veettil SK, Balakrishnan Nair A, Maharajan MK. Comparative efficacy of interventions for the management of oral submucous fibrosis: a systematic review and network meta-analysis. *J Pers Med*. 2022;12(8):1272.
2. Gupta S, Jawanda MK. Laser as a promising non-invasive technique to treat oral submucous fibrosis: a systematic review of the literature. *Saudi Dent J*. 2021;33(7):413–23.
3. Gondivkar DSM, Gadbaile DAR, Sarode DSC, Gondivkar DRS, Patil S, Gaikwad DRN, et al. Treatment outcomes of laser therapy in oral submucous fibrosis—a systematic review. *J Oral Biol Craniofac Res*. 2020;10:253–8.
4. vander Geer SJ, Reintsema H, Kamstra JI, Roodenburg JLN, Dijkstra PU. The use of stretching devices for treatment of trismus in head and neck cancer patients: a randomized controlled trial. *Support Care Cancer*. 2020;28:9–11.
5. Kholakiya Y, Jose A, Rawat A, Nagori SA, Jacob S, Roychoudhury A. Surgical management of oral submucous fibrosis with Seagull-nasolabial flap combined with short-term oral pentoxifylline for preventing relapse. *J Stomatol Oral Maxillofac Surg*. 2020;121(5):512–6.
6. Thakkannavar SS, Naik VV. Histochemical and immunohistochemical analysis of collagen fibers and microvascular density in various grades of oral submucous fibrosis. *Iran J Pathol Spring*. 2019;14(2):127–34.
7. Xie H, Guo J, Tan B, Wu H. Efficacy of *Salvia miltiorrhiza* injection combined with steroids in the treatment of oral submucous fibrosis: a meta-analysis of randomized controlled trials. *Medicine (Baltimore)*. 2019;98(27):1–7.
8. Rai A, Kaur M, Gombra V, Hasan S, Kumar N. Comparative evaluation of curcumin and antioxidants in the management of oral submucous fibrosis. *J Investig Clin Dent*. 2019;10(4):1–9.
9. Lu C, Jian X. Efficacy for combined injection of salvianolic acid B with triamcinolone acetonide on the treatment of the soft palate with oral submucous fibrosis. *Zhong Nan Da Xue Xue Bao Yi Xue Ban*. 2019;44(7):801–4.
10. Li YH, Chang WC, Chiang TE, Lin CS, Chen YW. Mouth-opening device as a treatment modality in trismus patients with head and neck cancer and oral submucous fibrosis: a prospective study. *Clin Oral Investig*. 2019;23:469–76.
11. Maia AV, Furlan R, Moraes KO, Amaral MS, Medeiros AM, Motta AR. Tongue strength rehabilitation using biofeedback: a case report. *Codas*. 2019;31:1–7.
12. Khan S, Sinha A, Kumar S, Iqbal H. Oral submucous fibrosis: current concepts on aetiology and management—a review. *J Indian Acad Oral Med Radiol*. 2018;30:407–11.
13. Li YH, Liu CC, Chiang TE, Chen YW. EZBite open-mouth device: a new treatment option for oral submucous fibrosis-related trismus. *J Dent Sci*. 2018;13(1):80–1.
14. Saran G, Umamathy D, Misra N, Channaiah SG, Singh P, Srivastava S, et al. A comparative study to evaluate the efficacy of lycopene and curcumin in oral submucous fibrosis patients: a randomized clinical trial. *Indian J Dent Res*. 2018;29(3):303–12.
15. Qayyum MU, Janjua OS, Ul Haq E, Zahra R. Nasolabial and extended nasolabial flaps for reconstruction in oral submucous fibrosis. *J Korean Assoc Oral Maxillofac Surg*. 2018;44(4):191–7.
16. Thukral H, Chowdhury SKR, Nagori SA. Surgical management of oral submucous fibrosis using buccal fat pad: a retrospective study of 30 cases. *Oral Maxillofac Surg*. 2018;22(4):403–8.
17. Dani VB, Patel SH. The effectiveness of therapeutic ultrasound in patients with oral submucosal fibrosis. *Indian J Cancer*. 2018;55:248–50.
18. Kapre M, Sudhanshu K, editors. *Surgery of trismus in oral submucous fibrosis*. Singapore: Springer; 2018.
19. Jian XC, Zheng L, Zhu R, Wang BP, Zhou T, Du YX. Clinical effectiveness of salvianolic acid B and triamcinolone acetonide in treatment of oral submucous fibrosis. *Zhonghua Kou Qiang Yi Xue Za Zhi*. 2017;52(1):16–21.
20. Xiao YC, Jian XC, Zheng L, Zhou C, Du YX. Methods and effects of injection of salvianolic acid B combined with triamcinolone acetonide in the treatment of oral submucous fibrosis. *Shanghai Kou Qiang Yi Xue*. 2017;26(2):188–92.
21. Daga D, Singh RK, Pal US, Gurung T, Gangwar S. Efficacy of oral colchicine with intralesional hyaluronidase or triamcinolone acetonide in the grade II oral submucous fibrosis. *Natl J Maxillofac Surg*. 2017;8(1):50–4.
22. Gupta S, Ghosh S, Gupta SP. Effect of curcumin on the expression of p53, transforming growth factor- β , and inducible nitric oxide synthase in oral submucous fibrosis: a pilot study. *J Investig Clin Dent*. 2017;8(4):1–6.

23. Yeh MC, Chen KK, Chiang MH, Chen CH, Chen PH, Lee HE, et al. Low-power laser irradiation inhibits arecoline-induced fibrosis: an in vitro study. *Int J Oral Sci.* 2017;9:38–42.
24. Sadaksharam J, Mahalingam S. Evaluation of oral pentoxifylline in the management of oral submucous fibrosis—an ultrasonographic study. *Contemp Clin Dent.* 2017;8:200–4.
25. Patil P, Hazarey V, Chaudhari R, Nimbalkar-Patil S. Clinical efficacy of a mouth-exercising device adjunct to local ointment intra-lesional injections and surgical treatment for oral submucous fibrosis: a randomized controlled trial. *Asian Pac J Cancer Prev.* 2016;17(3):1255–9.
26. Patil PG, Hazarey V, Chaudhari R, Nimbalkar-Patil S. A randomized control trial measuring the effectiveness of a mouth-exercising device for mucosal burning in oral submucous fibrosis. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2016;122(6):713–8.
27. Kshirsagar R, Mohite A, Gupta S, Patankar A, Sane V, Raut P. Complications in the use of bilateral inferiorly based nasolabial flaps for advanced oral submucous fibrosis. *Natl J Maxillofac Surg.* 2016;7(2):115–21.
28. Balaji SM. Versatility of nasolabial flaps for the management of severe trismus in oral submucous fibrosis. *Indian J Dent Res.* 2016;27(5):492–7.
29. Shah PH, Venkatesh R, More CB, Vassandacoumara V. Comparison of therapeutic efficacy of placental extract with dexamethasone and hyaluronic acid with dexamethasone for oral submucous fibrosis—a retrospective analysis. *J Clin Diagn Res.* 2016;10(10):ZC63–6.
30. Pentapati KC, Gadicherla S, Smriti K. A randomized double-blind, multiple-arm trial comparing the efficacy of sub-mucosal injections of hyaluronidase, dexamethasone, and combination of dexamethasone and hyaluronidase in the management of oral submucous fibrosis—a commentary. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2016;122(6):784.
31. Tilakaratne WM ERP, Herath M, Jayasinghe RD, Sitheequ M, Amarasinghe H. Intralesional corticosteroids as a treatment for restricted mouth opening in oral submucous fibrosis. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2016;122:224–31.
32. Warnakulasuriya S, Kerr AR. Oral Submucous fibrosis: a review of current management and possible directions for novel therapies. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2016;122:232–41.
33. Hazarey VK, Sakrikar AR, Ganvir SM. Efficacy of curcumin in the treatment for oral submucous fibrosis—a randomized clinical trial. *J Oral Maxillofac Pathol.* 2015;19(2):145–52.
34. Goel S, Ahmed J. A comparative study on efficacy of different treatment modalities of oral submucous fibrosis evaluated by clinical staging in population of southern Rajasthan. *J Cancer Res Ther.* 2015;11(1):113–8.
35. Srivastava A, Agarwal R, Chaturvedi TP, ChandraASingh OP. Clinical evaluation of the role of tulsi and turmeric in the management of oral submucous fibrosis: a pilot, prospective observational study. *J Ayurveda Integr Med.* 2015;6(1):45–9.
36. Shah SB, Tauro DP. Clinical and histological basis for the use of nasolabial tissues in the surgical management of oral submucous fibrosis. *J Oral MaxillofacSurg.* 2015;73(11):2251.e1–2251.e12.
37. Suma GN, Arora MP, Lakhnopal M. Stem cell therapy: a novel treatment approach for oral mucosal lesions. *J Pharm Bioallied Sci* 2015;7(1):2-8.
38. Veedu RA, BalanA SSP. A randomized double-blind, multiple-arm trial comparing the efficacy of submucosal injections of hyaluronidase, dexamethasone, and combination of dexamethasone and hyaluronidase in the management of oral submucous fibrosis. *Oral Surg Oral Med Oral Pathol. Oral Radiol.* 2015;120(5):588–93.
39. James L, Shetty A, Rishi D, Abraham M. Management of oral submucous fibrosis with injection of hyaluronidase and dexamethasone in grade III oral submucous fibrosis: a retrospective study. *J Int Oral Health.* 2015;7(8):82–5.
40. Siddiqui IA, Sanna V, Ahmad N, Sechi M, Mukhtar H. Resveratrol nanoformulation for cancer prevention and therapy. *Ann N Y Acad Sci.* 2015;1348:20–31.
41. Rai A, Datarkar A, Rai M. Is buccal fat pad a better option than nasolabial flap for reconstruction of intraoral defects after surgical release of fibrous bands in patients with oral submucous fibrosis? A pilot study: a protocol for the management of oral submucous fibrosis. *J CraniomaxillofacSurg.* 2014;42(5):e111–6.
42. Zhang Y, Zhang JJ, Kang WY, Yan WY. Advances of chemical constituents and pharmacological activities of *Myristica* genus. *Zhongguo Zhong Yao Za Zhi.* 2014;39:2438–49.
43. Ye X, Zhang J, Lu R, Zhou G. HBO: a possible supplementary therapy for oral potentially malignant disorders. *Med Hypotheses.* 2014;83:131–6.
44. Patil S, Maheshwari S. Proposed new grading of oral submucous fibrosis based on cheek flexibility. *J Clin Exp Dent.* 2014;6(3):e255–8.
45. Krishnamoorthy B and M. Khan. Management of oral submucous fibrosis by two different drug regimens: a comparative study. *Dent Res J (Isfahan)* 2013 Jul;10(4):527-532.

46. Shetty P, Shenai P, Chatra L, Rao PK. Efficacy of spirulina as an antioxidant adjuvant to corticosteroid injection in management of oral submucous fibrosis. *Indian J Dent Res.* 2013;24:347–50.
47. Alam S, Ali I, Giri KY, Gokulkrishnan S, Natu SS, Faisal M, et al. Efficacy of aloe vera gel as an adjuvant treatment of oral submucous fibrosis. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2013;116(6):717–24.
48. Jiang XW, Zhang Y, Yang SK, Zhang H, Lu K, Sun GL. Efficacy of salvianolic acid B combined with triamcinolone acetonide in the treatment of oral submucous fibrosis. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2013;115(3):339–44.
49. Bhadage CJ, Umarji HR, Shah K, Välimaa H. Vasodilator isoxsuprine alleviates symptoms of oral submucous fibrosis. *Clin Oral Investig.* 2013;17(5):1375–82.
50. Patil PG, Patil SP. Novel mouth-exercising device for oral submucous fibrosis. *J. Prosthodont.* 2012;21:556–60.
51. Chole RH, Gondivkar SM, Gadibail AR, Balsaraf S, Chaudhary S, Dhore SV, et al. Review of drug treatment of oral submucous fibrosis. *Oral Oncol.* 2012;48(5):393–8.
52. Mehrotra R, Singh HP, Gupta SC, Singh M, Jain S. Pentoxifylline therapy in the management of oral submucous fibrosis. *Asian Pac J Cancer Prev.* 2011;12(4):971–4.
53. Singh M, Niranjan HS, Mehrotra R, Sharma D, Gupta SC. Efficacy of hydrocortisone acetate/hyaluronidase vs triamcinolone acetonide/hyaluronidase in the treatment of oral submucous fibrosis. *Indian J Med Res.* 2010;131:665–9.
54. Aziz SR. Lack of reliable evidence for oral submucous fibrosis treatments. *Evid Based Dent.* 2009;10(1):8–9.
55. Cox S, Zoellner H. Physiotherapeutic treatment improves oral opening in oral submucous fibrosis. *J Oral Pathol Med.* 2009;38(2):220–6.
56. Lin HJ, Lin JC. Treatment of oral submucous fibrosis by collagenase: effects on oral opening and eating function. *Oral Dis.* 2007;13(4):407–13.
57. Kumar A, Bagewadi A, Keluskar V, Singh M. Efficacy of lycopene in the management of oral submucous fibrosis. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2007;103(2):207–13.
58. Rajendran R, Rani V, Shaikh S. Pentoxifylline therapy: a new adjunct in the treatment of oral submucous fibrosis. *Indian J Dent Res.* 2006;17:190–8.
59. Haque MF, Meghji S, Nazir R, Harris M. Interferon gamma (IFN-gamma) may reverse oral submucous fibrosis. *J Oral Pathol Med.* 2001;30(1):12–21.
60. Maher R, Aga P, Johnson NW, Sankaranarayanan R, Warnakulasuriya S. Evaluation of multiple micronutrient supplementation in the management of oral submucous fibrosis in Karachi. Pakistan. *Nutr Cancer.* 1997;27(1):41–7.
61. Khanna JN, Andrade NN. Oral submucous fibrosis: a new concept in surgical management: report of 100 cases. *Int J Oral Maxillofac Surg.* 1995;24(6):433–9.
62. Gupta D, Sharma SC. Oral submucous fibrosis—a new treatment regimen. *J Oral Maxillofac Surg.* 1988;46(10):830–3.

22.1.11 Relation and Conversion of OSF to OSCC

1. Saalim M, Sansare K, Karjodkar FR, Johaley S, Ali IK, Sharma SR et al. The prevalence of oral squamous cell carcinoma with oral submucous fibrosis. *J Can Res Ther* 2021;17(6):1510-1514.
2. Shih YH, Chiu KC, Wang TH, Lan WC, Tsai BH, Wu LJ, et al. Effects of melatonin to arecoline-induced reactive oxygen species production and DNA damage in oral squamous cell carcinoma. *J Formos Med Assoc.* 2021;120:668–78.
3. Pereira T, Surve R, Shetty S, Gotmare S. Qualitative expression of hypoxia-inducible factor-1 α in malignant transformation of oral submucous fibrosis: an immunohistochemical study. *J Oral Maxillofac Pathol.* 2020;24:106–12.
4. Joseph I, Elizabeth J, Rao UK, Ranganathan K. Study of Hypoxia-inducible factor-2 α expression in the malignant transformation of Oral submucous fibrosis. *J Oral Maxillofac Pathol.* 2020;24(1):33–9.
5. Meera S, Sarangarajan R. Rajkumar K. 8-Isoprostane: a salivary oxidative stress biomarker for oral submucous fibrosis and oral squamous cell carcinoma. *J Oral Maxillofac Pathol.* 2020;24(2):279–84.
6. Kujan O, Mello FW, Warnakulasuriya S. Malignant transformation of oral submucous fibrosis: a systematic review and meta-analysis. *Ora Dis.* 2020;00:1–11.
7. Phulari RGS, Dave EJ. A systematic review on the mechanisms of malignant transformation of oral submucous fibrosis. *Eur J Cancer Prev.* 2020;29(5):470–3.
8. Wadhwan V, Venkatesh A, Reddy V, Malik S. The role of myofibroblasts in the progression of oral submucous fibrosis: a systematic review. *J Oral Maxillofac Pathol* 2019;23(2):257-266.

9. Rangaswamy S, Chikkalingaiah RG, Sanjeevarayappa PN, Govindraju P. Carcinoma arising in the background of oral submucous fibrosis. *Ann Maxillofac Surg.* 2019;9(2):247–52.
10. Hallikeri K, Burde K, Anehosur V, Kulkarni BB, Hiremath SV. p53 polymorphism and association of human papillomavirus in oral submucous fibrosis and oral squamous cell carcinoma: a case-control study. *J Oral Maxillofac Pathol.* 2019;23:97–103.
11. Siriwardena BS, Jayawardena KL, Senarath NH, Tilakaratne WM. An evaluation of clinical and histopathological aspects of patients with oral submucous fibrosis in the background of oral squamous cell carcinoma. *BioMed Res Int.* 2018;2018:1–7. ► <https://doi.org/10.1155/2018/4154165>.
12. Speight PM, Khurram SA, Kujan O. Oral potentially malignant disorders: risk of progression to malignancy. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2018;125(6):612–27.
13. Sharma M, Shetty SS, Radhakrishnan R. Oral submucous fibrosis as an overhealing wound: implications in malignant transformation. *Recent Pat Anticancer Drug Discov.* 2018;13(3):272–91.
14. Bari S, Metgud R, Vyas Z, Tak A. An update on studies on etiological factors, disease progression, and malignant transformation in oral submucous fibrosis. *J Cancer Res Ther.* 2017;13(3):399–405.
15. Gadbaail AR, Chaudhary M, Gawande M, Hande A, Sarode S, Tekade SA, et al. Oral squamous cell carcinoma in the background of oral submucous fibrosis is a distinct clinicopathological entity with better prognosis. *J Oral Pathol Med.* 2017;46(6):448–53.
16. Chaturvedi P, Malik A, Nair D, Nair S, Mishra A, Garg A, et al. Oral squamous cell carcinoma associated with oral submucous fibrosis have better oncologic outcome than those without. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2017;124(3):225–30.
17. Gandhi P, Prasad UC. Evaluation of myofibroblasts in oral submucous fibrosis and oral squamous cell carcinoma: the pathogenesis and correlation. *Dent Res J (Isfahan).* 2017;14(5):314–20.
18. Mohiuddin S, Fatima N, Hosein S, Hosein M. High risk of malignant transformation of oral submucous fibrosis in Pakistani females: a potential national disaster. *J Pak Med Assoc.* 2016;66(11):1362–6.
19. Xie X, Jiang Y, Yuan Y, Wang P, Li X, Chen F, et al. MALDI imaging reveals NCOA7 as a potential biomarker in oral squamous cell carcinoma arising from oral submucous fibrosis. *Oncotarget.* 2016;7:59987–60004.
20. Hegde S, Anuradha A, Asha V. Malignant transformation of oral submucous fibrosis. *J Med Radiol Pathol Surg.* 2015;1(5):32–6.
21. Chaudhary M, Bajaj S, Bohra S, Swastika N, Hande A. The domino effect: role of hypoxia in malignant transformation of oral submucous fibrosis. *J Oral Maxillofac Pathol.* 2015;19(2):122–7.
22. Liu B, Shen M, Xiong J, Yuan Y, Wu X, Gao X, 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;120:337–45.
23. MishevG DE, Hlushchuk R, Velinov N, Aebbersold D, Weinstein F, et al. Prognostic value of matrix metalloproteinases in oral squamous cell carcinoma. *BiotechnolBiotechnol Equip.* 2014;28:1138–49.
24. Arora R, Adwani D, Naphade M, Bhagat B, Qureshi AQ. Malignant conversion of oral submucous fibrosis in surgically treated case. *J Clin Diagn Res.* 2014;8:ZD31–2.
25. Shih YH, Chang KW, Chen MY, Yu CC, Lin DJ, Hsia SM, et al. Lysyl oxidase and enhancement of cell proliferation and angiogenesis in oral squamous cell carcinoma. *Head Neck.* 2013;35:250–6.
26. Chaturvedi P, Vaishampayan SS, Nair S, Nair D, Agarwal JP, Kane SV, et al. Oral squamous cell carcinoma arising in background of oral submucous fibrosis: a clinicopathologically distinct disease. *Head Neck.* 2013;35(10):1404–9.
27. Ekanayaka RP, Tilakaratne WM. Oral submucous fibrosis: review on mechanisms of pathogenesis and malignant transformation. *Oral Surg Oral Med Oral Pathol Oral Radiol.* 2016;122(2):192–9.
28. Muttagi SS, Chaturvedi P, Gaikwad R, Singh B, Pawar P. Head and neck squamous cell carcinoma in chronic areca nut chewing Indian women: Case series and review of literature. *Indian J Med Paediatr Oncol.* 2012;33:32–5.
29. Guo F, Jian XC, Zhou SH, Li N, Hu YJ, Tang ZG. A retrospective study of oral squamous cell carcinomas originated from oral submucous fibrosis. *Zhonghua Kou Qiang Yi Xue Za Zhi.* 2011;46(8):494–7.
30. Lin KH, Lin CY, Liu CC, Chou MY, Lin JK. Arecoline N-oxide: its mutagenicity and possible role as ultimate carcinogen in areca oral carcinogenesis. *J Agric Food Chem.* 2011;59:3420–8.
31. Chen PT, Kuan FC, Huang CE, Chen MF, Huang SH, Chen MC, et al. Incidence and patterns of second primary malignancies following oral cavity can-

- cers in a prevalent area of betel-nut chewing: a population-based cohort of 26,166 patients in Taiwan. *J Clin Oncol*. 2011;41(12):1336–43.
32. Chaudhary AK, Pandya S, Mehrotra R, Singh M, Singh M. Role of functional polymorphism of matrix metalloproteinase-2 (-1306 C/T and -168 G/T) and MMP-9 (-1562 C/T) promoter in oral submucous fibrosis and head and neck squamous cell carcinoma in an Indian population. *Biomarkers* 2011;16:577–586.
 33. Zhou S, Qu X, Yu Z, Zhong L, Ruan M, Ma C, et al. Survivin as a potential early marker in the carcinogenesis of oral submucous fibrosis. *Oral Surg Oral Med Oral Pathol Oral Radiol Endodontology*. 2010;109:575–81.
 34. Illeperuma RP, Ryu MH, Kim KY, Tilakaratne WM, Kim J. Relationship of fibrosis and the expression of TGF- β 1, MMP-1, and TIMP-1 with epithelial dysplasia in oral submucous fibrosis. *Oral Med Pathol*. 2010;15(1):21–8.
 35. Tilakaratne WM, Iqbal Z, Teh MT, Ariyawardana A, Pitiyage G, Cruchley A. Upregulation of HIF-1 α in malignant transformation of oral submucous fibrosis. *J Oral Pathol Med*. 2008;37:372–7.
 36. Zhou SH, Li LL, Jian XC, Wang Y, Chen XQ, Gao X. Molecules of G(2)/M phase and the phosphorylation of survivin in the carcinogenesis of oral submucosal fibrosis. *Chin J Stomatol*. 2008;43:709–12.
 37. Yanjia H, and Xinchun J. The role of epithelial-mesenchymal transition in oral squamous cell carcinoma and oral submucous fibrosis. *Clin Chim Acta*. 2007;383:51–6.
 38. Jeng JH, Chang MC, Hahn LJ. Role of areca nut in betel quid-associated chemical carcinogenesis: current awareness and future perspectives. *Oral Oncol*. 2001;37:477–92.
 39. Phukan RK, Ali MS, Chetia CK, Mahanta J. Betel nut and tobacco chewing; potential risk factors of cancer of oesophagus in Assam. India. *Br J Cancer*. 2001;85(5):661–7.
 40. Trivedy C, Warnakulasuriya KA, Tavassoli M, Steingrimsdottir H, Penhallow J, Maher R, Johnson NW. p53 aberrations in oral submucous fibrosis and oral squamous cell carcinoma detected by immunocytochemistry and PCR-SSCP. *J Oral Pathol Med*. 1998;27(2):72–7.
 41. Murti PR, Bhonsle RB, Pindborg JJ, Daftary DK, Gupta PC, Mehta FS. Malignant transformation rate in oral submucous fibrosis over a 17-year period. *Community Dent Oral Epidemiol*. 1985;13(6):340–1.
 42. Pindborg JJ, Murti PR, Bhonsle RB, Gupta PC, Daftary DK, Mehta FS. Oral submucous fibrosis as a precancerous condition. *Eur J Oral Sci*. 1984;92:224–9.
- ### 22.1.12 Research Associated with OSF
1. Xu H, Lyu FY, Song JY, Xu YM, Jiang EH, Shang ZJ, Chen LL, Xu Z. Research achievements of oral submucous fibrosis: progress and prospect. *Biomed Res Int*. 2021;2021
 2. Gosavi SR, and Torkadi AA. Serum C-reactive protein in oral submucous fibrosis and oral squamous cell carcinoma: a cross-sectional study. *J Oral Maxillofac Pathol*. 2020;24:46–51.
 3. Ray JG, Chatterjee R, Chaudhuri K. Oral submucous fibrosis: a global challenge. Rising incidence, risk factors, management, and research priorities. *Periodontol 2000* 2019;80(1):200–212.
 4. Mantri T, Thete SG, Male V, Yadav R, Grover I, Adsure GR, et al. Study of the role of salivary lactate dehydrogenase in habitual tobacco chewers, oral submucous fibrosis and oral cancer as a biomarker. *J Contemp Dent Pract*. 2019;20(8):970–3.
 5. Vallet SD, Ricard-Blum S. Lysyl oxidases: from enzyme activity to extracellular matrix cross-links. *Essays Biochem*. 2019;63:349–64.
 6. Tom A, Baghirath V, Krishna B, Ganepalli A, Kumar JV, Mohan SP. Ultrastructural Changes of Collagen in Different Histopathological Grades of Oral Submucous Fibrosis. *J Pharm Bioallied Sci*. 2019;11:S309–13.
 7. Ahmed S, Misra DP, Agarwal V. Interleukin-17 pathways in systemic sclerosis-associated fibrosis. *Rheumatol Int*. 2019;39(7):1135–43.
 8. Yang B, Fu MF, Tang ZG. Rat model with oral submucous fibrosis induced by arecoline and mechanical stimulation. *Hua Xi Kou Qiang Yi Xue Za Zhi*. 2019;37:260–4.
 9. Fang CY, Hsia SM, Hsieh PL, Liao YW, Peng CY, Wu CZ, et al. Slug mediates myofibroblastic differentiation to promote fibrogenesis in buccal mucosa. *J Cell Physiol*. 2019;234:6721–30.
 10. Liu CM, Liao YW, Hsieh PL, Yu CH, Chueh PJ, Lin T, et al. miR-1246 as a therapeutic target in oral submucosa fibrosis pathogenesis. *J Formos Med Assoc*. 2019;118:1093–8.
 11. Panta P, Sarode SC, Sarode GS, Patil S. New directions for oral submucous fibrosis research: whole evaluation for holistic rehabilitation! *J. Contemp Dent Pr*. 2018;19:901–3.
 12. Su TR, Liao YW, Hsieh PL, Tsai LL, Fang CY, Lin T, et al. Butylidene phthalide abrogates the myofibroblasts activation and mesenchymal transdifferentiation in oral submucous fibrosis. *Environ Toxicol*. 2018;33:686–94.
 13. Oscarsson N, Ny L, Molne J LF, Ricksten SE, Seeman-Lodding H, et al. Hyperbaric oxygen treatment reverses radiation induced pro-fibrotic and

- oxidative stress responses in a rat model. *Free Radic Biol Med.* 2017;103:248–55.
14. Wen QT, Wang T, Yu DH, Wang ZR, Sun Y, Liang CW. Development of a mouse model of arecoline-induced oral mucosal fibrosis. *Asian Pac J Trop Med.* 2017;10:1177–84.
 15. Colak S, Ten Dijke P. Targeting TGF-beta signaling in cancer. *Trends Cancer.* 2017;3:56–71.
 16. Chiang MH, Chen PH, Chen YK, Chen CH, Ho ML, Wang YH. Characterization of a Novel dermal fibrosis model induced by areca nut extract that mimics Oral Submucous Fibrosis. *PLoS ONE.* 2016;11:1–11.
 17. Mari S, Kamath VV, Satelur K, Rajkumar K. Evaluation of transforming growth factor beta1 gene in oral submucous fibrosis induced in Sprague-Dawley rats by injections of areca nut and pan masala (commercial areca nut product) extracts. *J Cancer Res.* 2016;12:379–85.
 18. Huang JL, Lu HH, Lu YN, Hung PS, Lin YJ, Lin CC, et al. Enhancement of the genotoxicity of benzo[a]pyrene by arecoline through suppression of DNA repair in HEP-2 cells. *ToxicolVitr.* 2016; 33:80–7.
 19. Erlewad DM, Mundhe KA, Hazarey VK. Dental Informatics tool “SOFPRO” for the study of oral submucous fibrosis. *J Oral MaxillofacPathol.* 2016;20(2):194–201.
 20. Tsai CH, Lee SS, Chang YC. Hypoxic regulation of plasminogen activator inhibitor-1 expression in human buccal mucosa fibroblasts stimulated with arecoline. *J Oral Pathol Med*2015; 44: 669–673.
 21. Ullah M, Cox S, Kelly E, Moore MA, Zoellner H. Arecoline increases basic fibroblast growth factor but reduces expression of IL-1, IL-6, G-CSF and GM-CSF in human umbilical vein endothelium. *J Oral Pathol Med.* 2015;44(8): 591–601.
 22. Gupta S, Manjunath SM, Jawanda MK, Bharti A. Quantification of Plasma Fibrinogen Degradation Products in Areca Nut Chewers with and without Oral Submucous Fibrosis. *J Clin of Diagn Res* 2014;8(11):ZC027-ZC030.
 23. Kadani M, Satish BN, Maharudrappa B, Prashant KM, Hugar D, Allad U et al. Evaluation of plasma fibrinogen degradation products and total serum protein concentration in oral submucous fibrosis. *J Clin Diagn Res* 2014;8(5):ZC54-ZC57.
 24. Chang NW, Pei RJ, Tseng HC, Yeh KT, Chan HC, Lee MR, et al. Co-treating with arecoline and 4-nitroquinoline 1-oxide to establish a mouse model mimicking oral tumorigenesis. *Chem Biol Interact.* 2010;183:231–7.
 25. Illeperuma RP, Park YJ, Kim J, Jung DW, Tilakaratne WM, et al. Cytokine expression by the treatment of areca nut extract in cultured fibroblasts: comparison between normal oral fibroblasts and hTERT transfected fibroblasts. 15th International Congress on Oral Pathology and Medicine; 2010; Seoul. Korea.
 26. Vedeswari CP, Jayachandran S, Ganesan S. In vivo autofluorescence characteristics of pre- and post-treated oral submucous fibrosis: a pilot study. *Indian J Dent Res.* 2009;20(3):261–7.
 27. Haris PS, Balan A, Jayasree RS, Gupta AK. Autofluorescence spectroscopy for the in vivo evaluation of oral submucous fibrosis. *Photomed Laser Surg.* 2009;27(5):757–61.
 28. Lee PH, Chang MC, Chang WH, Wang TM, Wang YJ, Hahn LJ, et al. Prolonged exposure to arecoline arrested human KB epithelial cell growth: regulatory mechanisms of cell cycle and apoptosis. *Toxicology.* 2006;220:81–9.
 29. Chang YC, Hu CC, Lii CK, Tai KW, Yang SH, Chou MY. Cytotoxicity and arecoline mechanisms in human gingival fibroblasts in vitro. *Clin Oral Investig.* 2001;5(1):51–6.
 30. Sharma AK, Gupta R, Gupta HP, Singh AK. Haemodynamic effects of pan masala in healthy volunteers. *J Assoc Physicians India.* 2000;48(4):400–1.
 31. Chang YC, Tai KW, Chou MY, Tseng TH. Synergistic effects of peroxynitrite on arecoline-induced cytotoxicity in human buccal mucosal fibroblasts. *Toxicol Lett.* 2000;118(1–2):61–8.
 32. Marques LJ, Zheng L, Poulakis N, Guzman J, Costabel U. Pentoxifylline inhibits TNF-alpha production from human alveolar macrophages. *Am J Respir Crit Care Med.* 1999;159:508–11.
 33. Kuo MY, Chen HM, Hahn LJ, Hsieh CC, Chiang CP. Collagen biosynthesis in human oral submucous fibrosis fibroblast cultures. *J Dent Res.* 1995;74:1783–8.