International Journal of Science and Research (IJSR)
ISSN (Online): 2319-7064

Classification System for Oral Submucous Grading - A Review

B. Priyadharshni

Final Year BDS, Saveetha Dental College

Abstract: ***Oral sub mucous fibrosis is a chronic, complex, irreversible, highly potent pre-cancerous condition characterized by juxta epithelial inflammatory reaction and progressive fibrosis of the submucosal tissues such as lamina propira and deeper connective tissues. The condition is linked to oral cancers and is associated with areca nut chewing which is the main component of betel quid. The causes of these diseases are excessive consumption of red chilies, prolonged deficiency to iron & vitamins in diet, extreme climatic conditions, immunological diseases& consumption of dried products such as pan masala and gutkha which have higher concentrations of areca nut. Here classification is done based on clinical, functional and physiological diagnosis.***

Keywords: Oral Submucous Fibrosis, Grading, Classifcation, Histopathalogical, Colour.

1. Introduction

Oral sub mucous fibrosis is a chronic disease and a well recognized potentially malingnant condition of the oral cavity characterized by inflammation and a progressive fibrosis of the lamina propira and deeper connective tissues. [23,24]. Oral submucous fibrosis (OSMF) is also called as "diffuse oral submucous fibrosis', 'idiopathic scleroderma of mouth', 'idiopathic palatal fibrosis', sclerosing stomatitis', juxta-epithelial fibrosis', etc.[9]. OSMF is a chronic insidious scarring disease of oral cavity, pharynx and upper digestive tract, characterized by sunken cheeks, progressive inability to open the mouth, due to loss of elasticity and development of vertical fibrous bands in labial and buccal tissues and shrunken uvula. of Oral submucous fibrosis is preceded by symptoms like burning sensation of the oral mucosa, ulceration and pain.[3]The characteristic features of OSMF are reduced movement and depapillation of tongue , blanching and leathery texture of oral mucosa , loss of pigmentation of oral mucosa and progressive reduction of mouth opening.[1,10,11].The oral submucous fibrosis occurs at any age but is most commonly seen in people at the age of 16 to 35.The etiology is multifactorial but chewing is main causative agent[10,13]. To precede the treatment diagnosis and staging is important [10, 12].

2. Classification Based on Clinical and Histologic Features

2.1 Classification Based On Clinical Features

JV Desa (1957) divided OSMF into three stages as follows: [3]
STAGE 1: Stomatitis and vesiculation
STAGE 2: Fibrosis.
STAGE 3: As its sequelae.

Pindborg JJ (1989) divided OSMF into three stage: [4]
Stage 1: Stomatitis includes erythematous mucosa, vesicles, mucosal ulcers, melanotic mucosal pigmentation and mucosal petechiae.
Stage 2: Fibrosis occurs in healing vesicles and ulcers, which is the hallmark of this stage.
Stage 3: Sequelae of OSMF are as follows:
Leukoplakia is found in more than 25% of individuals with OSMF. Speech and hearing deficit may occur because of involvement of tongue and the Eustachian tube.

Sk Kathaiia et al (1992) have given different scores assigned to the patients on the basis of mouth opening between upper and lower central incisors as follows:[5]

Score 0: Mouth opening is 41 mm or more.
Score 1: Mouth opening is 37 to 40 mm.
Score 2: Mouth opening is 33 to 36 mm.
Score 3: Mouth opening is 29 to 32 mm.
Score 4: Mouth opening is 25 to 28 mm.
Score 5: Mouth opening is 21 to 24 mm.
Score 6: Mouth opening is 17 to 20 mm.
Score 7: Mouth opening is 13 to 16 mm.
Score 8: Mouth opening is 09 to 12 mm.
Score 9: Mouth opening is 05 to 08 mm
Score 10: Mouth opening is 0 to 04 mm.

Figure 1: Restricted mouth opening

Lai Dr (1995) divided OSMF based on the inter-incisal distance as follows: [4]

- Group A: >35 mm
- Group B: Between 30 and 35 mm
- Group C: Between 20 and 30 mm
- Group D: <20 mm

R Maher et al (1996) had given criteria for evaluation of interincisal distance as an objective criterion of the severity of OSMF in Karachi, Pakistan divided into 3 catagories [6]

- Involvement of one-third or less of the oral cavity (if three or less of the above sites are involved).
- Involvement of one to two-thirds of the oral cavity (if four to six intraoral sited are involved).
- Involvement of more than two-thirds of the oral cavity (if more than six intraoral sites are involved).

Ranganathan K et al (2001) divided OSMF based on mouth opening as follows: [4, 7]

- Group I: Only symptoms, with no demonstrable restriction of mouth opening.
- Group II: Limited mouth opening 20 mm and above.
- Group III*:* Mouth opening less than 20 mm.
- Group IV*:* OSMF advanced with limited mouth opening. Precancerous or cancerous changes seen throughout the mucosa.

Rajendran R (2003) reported the clinical features of OSMF as follows [4]

- Early OSF: Burning sensation in the mouth. Blisters especially on the palate, ulceration or recurrent generalized inflammation of oral mucosa, excessive salivation, defective gustatory sensation and diyness of mouth.
- Advanced OSF: Blanched and slightly opaque mucosa, fibrous bands in buccal mucosa running in vertical direction. Palate and faucial pillars are the areas first involved. Gradual impairment of tongue movement and difficulty in mouth openi

Nagesh and Bailoor (1993) based on diagnosis : [2]

- Stage I early OSMF*:* Mild blanching, no restriction in mouth opening (normal distance between central incisor tips: Males 35 to 45 mm, females 30 to 42 mm), no restriction tongue protrusion. Stage II moderate OSMF*:* Moderate to severe blanching, mouth opening reduced by 33%, cheek flexibility also demonstrably reduced, burning sensation also in absence of stimuli, palpable bands felt. Lymphadenopathy either unilateral or bilateral and demonstrable anemia on hematological examination.
- Stage III severe OSMF*:* Burning sensation is very severe patient unable to do day-to-day work, more than 66% reduction in the mouth opening, cheek flexibility and tongue protrusion. Tongue may appear fixed. Ulcerative lesions may appear on the cheek, thick palpable bands and lymphadenopathy bilaterally evident.

Wahi P N et al (1996) classified osmf based on clinical severity and extent of involvement into three groups : [16]

- Group 1: No symptoms referable to buccal mucosa, focal pallor/whitish discolouration of mucosa.
- Group 2: Symptoms of soreness of mucosa increased sensitivity to chilli, lesions diffuse, white, extensive, indurated involving one or anatomical sites.
- Group 3: Trismus, stretching at angles of mouth and altered pronunciation. Firm mucosal bands. Surface might me fissured or ulcerated.

Ahuja SS and Agarwal GD (1971) classified depending on extent and type of fibrosis:[17]

- CLASS 1- Localized fibrous bands in the cheek extending from the superior to inferior vestibular fornise of one both sides. in bands are usually located on the lips in the premolar region and the 2nd molar region.
- CLASS 2- Genarlized diffuse hardening of the subepithelial tissues. Thus hardening usually extends from the cheek and hard palate to soft palate,uvula and the pillars of the fauces. In occasional cases, the hardening might extend to the lining mucous membrane of the pharynx.
- CLASS 3- Combination of above 2 types where the fibrous bands are associated with a generalized diffuse form of sub mucous fibrosis.

Racher SK classified osmf based on Habits: the patients can be grouped into 3 stages:[20, 21]

Stage I: Stage of Stomatitis and Vesiculation:

- Characterized by recurrent stomatitis and vesiculation. Patient complains of burning sensation in the mouth and inability to eat pungent food.
- The examination reveals vesicle on the palate. They may rupture and a superficial ulceration may be seen. Some amount of fibrosis can be seen.

Stage-II: Stage of Fibrosis:

There is inability to open the mouth completely and stiffness in mastication. As disease advances there is difficulty in blowing out cheek and difficulty in protruding the tongue. On examination, there is increasing fibrosis in the submucosa. Mucosa is blanched and white, lips and cheeks are stiff. The salivary glands are normal. Dorsum of tongue may show atrophy of papillae. Blanching and stiffness of the mucosa of the floor of the mouth is less marked than that seen in the lips, cheek and palate. Larynx is free from disease and respiration is not affected.

Stage-III: Stage of sequele and complications:

Leukoplakia changes in the mucosa. An ulcerating malignant lesion may be seen involving the cheek, oropharynx, tongue. There is evidence to suggest that OSMF is a precancerous condition. The mechanism involved in the development of oral cancer in patients with OSMF is not yet understood. It is generally accepted that atrophic epithelium is more likely to undergo malignant changes than epithelium of normal thickness. Thus, the patient with OSMF may be predisposed to develop oral cancer under the influence of carcinogens.

Bhatt AP and Dholaksha LM (1971), clinically grouped the patients into 3 grades[18]:

GRADE 1: Comprised of mild and early cases with a very slight fibrous bands and little close the mouth.

GRADE 2: Moderately pronounced symptoms of the diseases with fibrous banding extending from cheek to palate area.

GRADE 3: Markedly excessive amount of fibrous band involving cheek,palate,uvula,tongue and lips and restrict mouth opening.

Gupta DS et al (1980): clinically classified four stages of submucosal fibrosis as per the increasing intensity of trismus:[2]

1. Very early stage: the patients complained by burning sensation in the mouth or ulceration without difficulty in opening the mouth.
2. Early stage : along with symptoms of burning the patient complained of slight difficulty in opening the mouth.

3. Moderately advanced stage: the trismus is marked to such an extent that patient cannot open his mouth more than two fingers. Patient therefore experience difficulty in mastication.
4. Advanced stage: patient is undernourished,anaemic and has a marked degree of trismus .

Haider et al (2011) study based on severity of the disease with functional staging and objective measures inter-incisal opening:[15]

Clinical Staging:
Stage 1: facial bands only.
Stage 2: facial and buccal bands
Stage 3: facial and labial bands

Functional Stage:
Stage A: Mouth opening 13 to 20 mm
Stage B:Mouth opening 10 to 11mm
Stage C:Mouth opening <10mm

Divya Mehota: CLINICAL GRADING OF THE DISEASE: [25]
GRADE 1: Stomatitis, burning sensation in the buccal mucosa & with no detection of fibres.
GRADE 2: Symptoms of grade 1,palpable fibrous bands,involvement of soft palate,maximum mouth opening 26-35mm.
GRADE 3: Symptoms of grade 2,blanched oral mucosa, involvement of tongue & maximal mouth opening 6-25mm.
GRADE 4: Symptoms of grade 3,fibrosis of lips & mouth opening 0-5mm.

Tinky Bose and Anita Balan (2007) had given clinical classification, categorized the patients into three groups based on their clinical presentations:[8]

- Group A—mild cases*:* Only occasional symptoms, pallor, vesicle formation, presence of one or two solitary palpable bands, loss of elasticity of mucosa, variable tongue involvement with protrusion beyond vermillion border. Mouth opening >3 cm Group B—moderate cases: Symptoms of soreness of mucosa or increased sensitivity to chilies, diffuse involvement of the inucosa, blanched appearance, buccal in mucosa tough and inelastic fibrous bands palpable, considerable restriction of mouth opening (1.5 to 3 cm) and variable tongue movement.
- Group C—severe cases; Symptoms more severe, broad fibrous bands palpable, blanched opaque mucosa, rigidity of mucosa, very little opening of mouth (less than 1.5 cm), depapillated tongue and protrusion of tongue very much restricted.

Kiran Kumar et al (2007) categorized three clinical stages of OSMF on the basis of mouth opening as follows:[9]

- Stage I: Mouth opening >45 mm
- Stage II: Restricted mouth opening 20 to 44 mm
- Stage III: Mouth opening <20 mm

Chandramam More et al (2011): [10]
Clinical staging:

- Stage 1 (SI): Stomatitis and/or blanching of oral mucosa.
- Stage 2 (S2): Presence of palpable fibrous bands in buccal inucosa and/or oropharynx, with /without stomatitis.
- Stage 3 (S3): Presence of palpable fibrous bands in buccal inucosa and/or oropharyiix, and in any other parts of oral cavity, with/without stomatitis.
- Stage 4 (S4) as follows:
- A.Any one of the above stage along with other potentially malignant disorders, e.g. oral leukoplakia, oral erythroplakia, etc.
- B.Any one of the above stage along with oral carcinoma.
- Functional staging:
  - Ml: Interiucisal mouth opening up to or greater than 35 mm.
  - M2: Interincisal mouth opening between 25 and 35 mm.
  - M3: Interincisal mouth opening between 15 and 25 mm.
  - M4: Interincisal mouth opening less than IS mm.

2.2 Classifications Based on Histopathological Features of OSMF:

Pindborg JJ and Sirsat SM (1966) were the first to divide OSMF depending only on histopathological features alone are as follows [4]

- **Very early stage:** Finely fibrillar collagen dispersed with marked edema. Plump young fibroblast containing abundant cytoplasm. Blood vessels are dilated and congested. Inflammatory cells, mainly polymorphonuclear leukocytes with occasional eosinophils are found.
- **Early stage:** Juxla-epitheliai area shows early hyalinization. Collagen still in separate thick bundles. Moderate number of plump young fibroblasts is present. Dilated and congested blood vessels. Inflammatory cells are primarily lymphocytes, eosinophils and occasional plasma cells.
- **Moderately advanced stage:** Collagen is moderately hyalinized. Thickened collagen bundles are separated by slight residual edema.Fibroblastic response is less marked. Bloodvessels are either normal or compressed. Inflammatory exudate consists of lymphocytes and plasma cells.
- **Advanced stage:** Collagen is completely hyalinized. A smooth sheet with no separate bundles of collagen is seen. Edema is absent. Hyalinized area is devoid of fibroblasts. Blood vessels are completely obliterated or narrowed. Inflammatory cells are lymphocytes and plasma cells.

Utsimomiya H, Tilakratne Wm, Oshiro K et al (2005) histologically divided OSMF based on the concept of Pindborg and Sirsat and modified it as follows [4].

- **Early stage:** Large number of lymphocytes in subepithelial, connective tissue, zone along with myxedematous changes.
- **Intermediate stage**: Granulation changes close to the muscle layer and hyalinization appears in subepithelial zone where blood vessels are compressed by fibrous bundles. Reduced inflammatory cells in subepithelial layer.
- **Advanced stage:** inflammatory cell infiltrate hardly seen. Number of blood vessels dramatically small in subepithelial zone/Marked fibrous areas with hyaline changes extending from subepithelial to superficial muscle layers. Atrophic, degenerative changes start in muscle

fibers.

Kiran Kumar et al (2007) proposed histological grading as follows:'

- Grade 1: Loose, thick and thin fibers
- Grade II: Loose or thick fibers with partial hyalinization.
- Grade III: Complete hyalinization

2.3 Classification based on clinical and Histopathological Features:

Khanna JN and Andrade NN (1995) developed a group classification system for the surgical management of OSMF.[4]

- **Group I:** Very early cases: Common symptom is burning sensation in the mouth, acute ulceration and recurrent stomatitis and not associated with mouth opening limitation.
- **Histology:** Fine fibrillar collagen network interspersed with marked edema, blood vessels dilated and congested, large aggregate of plump young fibroblasts present with abundant cytoplasm, inflammatory cells mainly consist of polymorphonuclear leukocytes with few eosinophils. The epithelium is normal.
- **Group II:** Early cases—Buccal mucosa appears mottled and marble like, widespread sheets of fibrosis palpable, interincisal distance of 26 to 35 mm.
- **Histology:** Juxta-epithelial hyalinizalion present, collagen present as thickened but separate bundles, blood vessels dilated and congested, young fibroblasts seen in moderate number, inflammatory cells mainly consist of polymorphonuclear leukocytes with few eosinophils and occasional plasma cells, flattening or shortening of epithelial rete-pegs evident with varying degree of keratinization.
- **Group III:** Moderately advanced cases—Trismus, interincisal distance of 15 to 25 mm, buccal mucosa appeal's pale firmly attached to underlying tissues, atrophy of vermilion border, vertical fibrous bands palpable at the soft palate, pterygomandibular raphe and anterior faucial pillars.
- **Histology:** juxta-epithelial hyalinization present, thickened collagen bundles, residual edema, constricted blood vessels, mature fibroblasts with scanty cytoplasm and spindle-shaped nuclei, inflammatory exudates which consists of lymphocytes and plasma cells, epithelium markedly atrophic with loss of rete pegs, muscle fibers seen with thickened and dense collagen fibers.
- **Group IVA:** Advanced cases—severe trismus, interincisal distance of less than 15 mm, thickened faucial pillars, shrunken uvula, restricted tongue movement, presence of circular band around entire lip and mouth.
- **Group IVB:** Advanced cases—presence of hyperkeratotic leukoplakia and/or squamous cell carcinoma.
- **Histology:** Collagen hyalinized smooth sheet, extensive fibrosis, obliterated the mucosal blood vessels, eliminated melanocytes, absent fibroblasts within the hyalinized zones, total loss of epithelial rete pegs, presence of mild to moderate atypia and extensive degeneration of muscle fibers

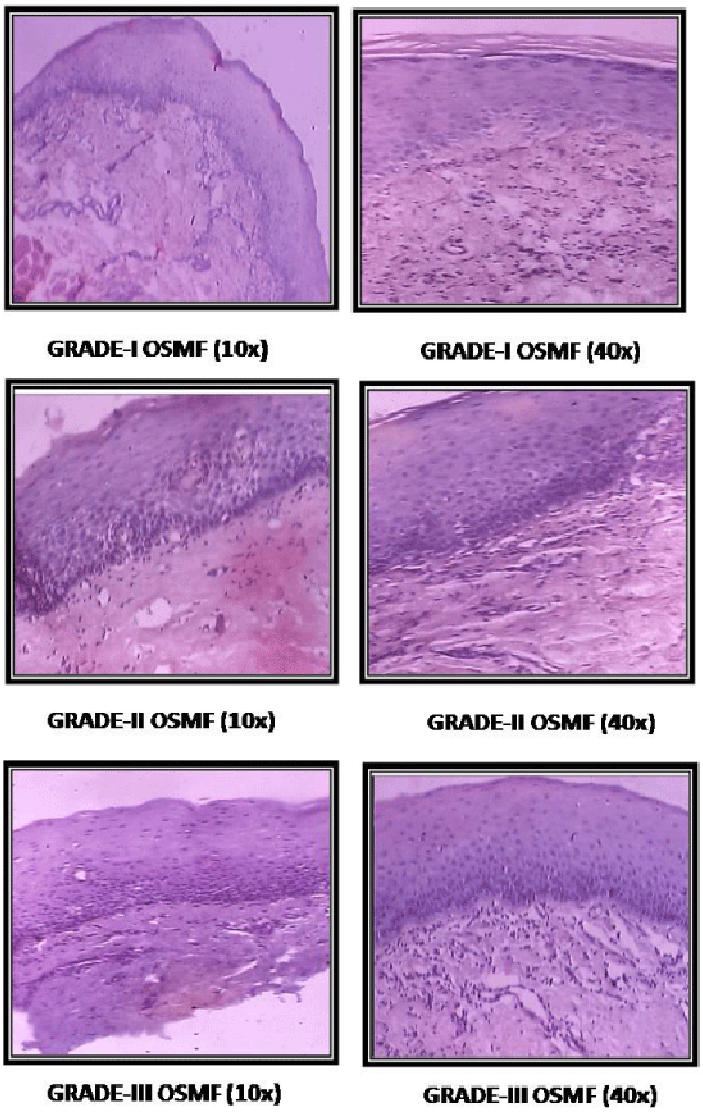

Figure 1: grade 1 OSMF 10X & 40X
Figure 2: grade 2 OSMF 10X & 40X
Figure 3: grade 3 OSMF 10X & 40X

3. Conclusion

An attempt is made to provide and update the knowledge of classification system on OSMF so as to assist the clinician, researches & academics in the categorization of these potentially malignant disorders in order to help in early detection & subsequent management thus reducing the mortality of oral cancer. As paan masala are the major risk factors of OSMF causes trismus and fibrotic bands which causes precancerous condition. So treatment should be done as per the grading.

References

[1] Dyavanagoudar Sunita N. Oral submucous fibrosis: Review on etiopathogenesis. CancerSciTher 20G9; l(2):72-77.
[2] Gupta d, Gupta m, Golher B. Oral submucous fibrosis:clinical study and management by physiofibrolysis. Journal of Indian dental association 1980;52(375-378)
[3] Tupakri JV,Bhavathankar JD,Mandale MS. Oral submucous fibrosis. A study of 100 cases. journal of

Indian academy of oral medicine and radiology 2007:19(2):311-318.
[4] Ranganathan k, gauri mishra. An overview of classification schemes of osmf. Journal of oral and maxillofacial pathology,2006 jul-dec;10(2);55-58.
[5] Katharia SK, singh SP, kulshresthra VK. The effects of placenta extract in management of osmf. Indian journal of pharmacology 1992:24;181-183.
[6] Maher R, Sankaranarayanan , R.Johnson nw et al. Evaluation of inter incisor distance as an objective criterion of the severity of osmf in Karachi ; pakisthan. Oral oncology eur journal of cancer 1996;32(5);362-64.
[7] George Antony , sreenivasan BS, S Sunil et al. Potentially malignant disorders of oral cavity , journal of oral and maxilla facial pathology 2011;(2);95-100.
[8] Bose Tinky, balan anita . osmf a changing scenario. Journal of Indian academy of oral medicine & radiology 2007;19(2);334-40.
[9] Kumar Kiran. Sarasvvathi TR, Rangnathan K. Devi Lima M, Elizabeth Joshua. Oral submucous fibrosis: A clinico- histopathological study in Chennai. Indian Journal of Denial Research 2007:18(3): 106-11
[10] More Chandramani, Das Sunanda, Paiel Hetul, el al. Proposed clinical classification for oral submucous fibrosis. Oral Oncology: In Press.
[11] Lee Cheng-Kuang. Tsai Meng-Tsan, Lee Hsiang-Chieh, et al. Diagnosis of oral submucous fibrosis with optical coherence tomography. Journal of Biomedical Optics 2009;14(5);l-7
[12] Kerr AR. Warnakulasuriya S, Mighell AJ, et al. A systematic review of medical interventions for oral submucous fibrosis and future research opportunities. Oral Diseases 2011:17(1):42-57.
[13] More C. Asrani M, Patel H, Adalja C. Oral submucous fibrosis-A hospital-based retrospective study. Pearldent 2010:1(4):25-31.
[14] Pindborg JJ, odont,sirsat SM :osmf. Oral surgery,oral medicine,ora pathology 1966,22:764-79
[15] Haider S M ,Merchant AT,pikra FF,Rahbar MH: clinical and functional staging of osmf. Br. journal of oral and maxillofacial surgery 38,12-15.
[16] Wahi PM et al .submucous fibrosis of the oral cavity. Histopathalogical studies. British journal of cancer;1966;vol 4:676-682.
[17] Ahuja SS & Agarwal GD. submucous fibrosis of the oral mucosa. Journal of oral medicine 1971;26(1);35-36.
[18] Bhatt AP & Dholakia HM. Mast cell density in osmf. Journal of Indian dental association:1977;49:187-191.
[19] Aziz Shahid R. Coming to America: Betel nut and oral submucous fibrosis. J Am Dent Assoc 2010:141:423-28
[20] Fali S, Mehta & James & Hammer iii. Text book of tobacco related oral mucous lesions & conditions in india published by basic c dental research unit. Tata institute of fundamental research Bombay,1993.
[21] Daftary DK & Johnson NW. Oral diseases of the trpics by prabhu SR& Wilson df:417-422.
[22] Warnakulasuriya S, Johnson Newell VV, Waal I" van der. Nomenclature and classification of potentially malignant disorders of the oral mucosa. J Oral Pathol Med 2007:36:575-80
[23] Pillai R,balaram p, reddiar KS. Pathogenesis of osmf, relationship to risk factors associated with oral cancer 1992:69:2011-2012.
[24] Auluck A, Rosin MP, Zhang L, Sumanth KN. Osmf a clinically beningn but potentially malignant diseases. Report of 3 cases & review literature. J.canadian association 2008:74(8):735-40.
[25] Divya Mehrotra,R.Prandhan,shalini gupta: retrospective comparison of surgical treatment modalities in 100 patients with osmf , oral surgery ,oral med, oral pathol, oral radio, endol 2009:107;e1-e10.