

COMPARATIVE EVALUATION OF CHEEK FLEXIBILITY USING CHEEK RETRACTOR AND MOUTH BLOWING METHOD AND CORRELATION WITH PINDBORG'S GRADING FOR ORAL FIBROSIS

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Abstract

Background: OSMF is a chronic debilitating but preventable and curable oral disease with potential of malignant transformation. It affects oral, oropharyngeal, and sometimes the oesophageal mucosa. The treatment of OSMF varies according to the stages and early detection is the key for appropriate management and prevention of progression of disease.

Aim: Comparative evaluation of cheek flexibility using cheek retractor method and mouth blowing method and its correlation with Pindborg's grading system for oral submucous fibrosis patient.

Material and method: The study included 118 patients who had been diagnosed with OSMF attending to the Department of Oral Medicine and Radiology. Patient who had diagnose with grade 4 OSMF are left out from the study. A detailed history and examination of the patients was performed with special emphasis on measuring cheek flexibility and mouth blowing method. Statistical analysis was done using Chi-square test and $p < 0.05$ was considered to be statistically significant.

Results: Values obtained by cheek retraction and blowing method are not in association with Pindborg et al grading system.

Conclusion: It is essential to diagnose and treat OSMF as per the stage of the disease. None of the methods fulfills all the criteria necessitating the need to further do the research in this direction.

Clinical significance: This method can be used under resource constraint setting to grade OSMF.

KEY WORDS: Cheek flexibility, Mouth blowing, Oral Submucous fibrosis, Pindborg's grading.

INTRODUCTION

Most invasive oral carcinomas are preceded by clinical premalignant conditions and lesions like oral lichen planus, leukoplakia, oral submucous fibrosis (OSMF) and erythroplakia. These remain in pre-invasive stage for years and the cancerous alterations remain indolent and not readily recognizable on clinical and histopathologic examination.⁽¹⁾ Among these OSMF is an insidious progressive and chronic oral mucosal disorder that mainly affects the oral cavity and is characterized by juxta epithelial inflammatory reaction. This is succeeded by progressive fibrosis of the lamina propria and the underlying submucosal layer, associated with epithelial atrophy.⁽²⁾ Its typical features are an increase in loss of tissue mobility, blanching and rigidity of the oral mucosa which leads to restricted mouth opening and prejudice to spicy and hot food.⁽³⁻⁴⁾

There are numerous causative factors for OSMF but pathogenesis of disease is still unknown.⁽⁵⁾ The predisposing factors are areca nut and chilies,⁽⁶⁻⁷⁾ pan (betel leaf with tobacco powder and other ingredients) and alcohol. Various study has revealed the association of routine practice of areca nut chewing with precancerous conditions, either alone or as an element of betel quid.⁽²⁾ Alcohol and tobacco smoking have been predicted as major risk factors.⁽⁸⁻⁹⁾ Various forms of tobacco usage are predominant in India, and several of them are definite to certain areas. The practice of placing tobacco mixed with lime; commonly seen in the canine-premolar region of the mandibular sulcus is widespread in the rural population of Central Maharashtra, India.⁽⁹⁾ It is equally essential to detect and control the premalignant conditions.⁽¹⁰⁾

Transition to oral cancer is high risk in OSMF. In an epidemiologic study in India, over a period of 17 years the conversion of OSMF into malignant form was 7.6% to 12% was noted.^(2,11) Inflammation is the initial presentation in OSMF and it is followed by hypovascularity and fibrosis which is visible as blanching of the oral mucosa.⁽¹²⁾

OSMF is a chronic debilitating but preventable and curable oral disease.⁽¹³⁾ Majorly affecting oral, oropharyngeal, and sometimes the oesophageal mucosa.^(1,14) The most frequently involved sites are buccal mucosa, retromolar region, faucial pillars and pharynx followed by palate.⁽⁴⁾ The periods of exacerbation manifested as vesiculation, ulceration, pigmentation changes, dryness of mouth, depapillation of tongue. Gingiva become depigmented, fibrotic with loss of stippling.⁽¹⁵⁾ As the blood supply decreased, muscle activity increased and simultaneously changes in connective tissue owing to extensive oral sub mucous fibrosis which leads to fibrosis and degeneration of muscle.⁽¹⁶⁾ Its distinguishing features are inability to open the mouth due to loss of elasticity, development of vertical fibrous bands in labial and buccal tissue and sunkening of cheeks.⁽¹⁷⁾ When soft palate is involved, it appears as a heavy curtain hanging from the hard palate and the uvula becomes shrunken which appears as bud shape.⁽¹⁵⁾ In advance stage of OSMF, fibrosis leads to difficulty in mouth opening, blowing out a candle and to whistle and also sometimes difficulty in deglutition.⁽¹⁸⁾

Various classifications stated based on histopathological and clinical aspects, have been put forward by various researchers based on different stages of OSMF.⁽¹⁹⁾ Lal (1953) classified OSMF based on the severity of clinical features.⁽²⁰⁾ Its staging system lacks specificity of criteria and also lacks symptoms such as burning sensation and mouth opening. Criteria of the staging were very subjective, causing variability in staging the disease, thus making it difficult to compare with the histological grades of the disease. Pindborg et al,⁽²¹⁾ gave clinical staging according to clinical features such as blanching, fibrosis, and precancerous lesions. However, it was subjective and not specifically related to the clinical features. It did not consider the alterations in the mouth opening (interincisal distance) of the patients, which is one of the essential features of OSMF. Pindborg JJ,⁽²²⁾ reviewed the first clinical classification of OSMF based on the physical findings of the disease. But this classification did not include the mouth opening of the patients. Patil S, Maheshwari S classified OSMF based on Cheek flexibility. Normally observed cheek flexibility in male was 35-45 mm and 30-40 mm in female.⁽²³⁾ But it is lacking with clinical features and mouth opening.

The advantages and disadvantages of these classifications supersede each other thus leading to confusion and difficulty in diagnosis.⁽¹⁹⁾ Yet a big lacunae is present in this scenario which correlates the clinical findings among each other. Pindborg's suggested the classification based on the clinical findings.⁽²⁴⁾ There are few researches done to grade OSMF on the basis of cheek flexibility using mouth blowing technique⁽¹³⁾ and Patil S, Maheshwari S proposed new grading of oral submucous fibrosis on the basis of cheek flexibility by using cheek retractor method.⁽²³⁾ But there is no grading to assess mouth blowing method.

Till date no research is done on Comparative evaluation of cheek flexibility using cheek retractor method and mouth blowing method and its correlation with Pindborg's grading system for oral submucous fibrosis patient.

MATERIALS AND METHOD

Ethical approval was given by Institutional Ethical Committee (DMIMS (DU)/ IEC/2018-19/7572). This study was conducted on the patients visiting private Dental College of Central India who were clinically screened and diagnosed with OSMF.

The inclusion criteria were clinically diagnosed cases of OSMF by Pindborg's grading system. The exclusion criteria were patients with any other systemic disorder, Patients with reduced mouth opening other than OSMF, Patient with grade-IV OSMF is not taken in the study due to severe pain and difficulty in performing both the method and also they are less co-operative for doing those method.

The study purpose was explained with a written consent taken from the patients who were willing to participate in the study. Brief detail of patient was recorded with interviewer's method and cheek flexibility was examined in patient using mouth blowing and cheek retractor method in a validated proforma by single investigator within 10 minutes.

Cheek retractor method was performed by placing cheek retractor in the patient's mouth and the distance was measured from maxillary incisal midline to the cheek retractor in both sides using a thread and that measurement is recorded in millimeters on a scale. OSMF can be graded as follows based on cheek flexibility by Patil S, Maheshwari S ⁽²³⁾

Where Grade 1- is an early stage which is cheek flexibility of 30 mm and above. Grade 2- is a mild stage which contains cheek flexibility between 20-30 mm. Grade 3- is a moderate stage which contains cheek flexibility less than 20 mm. Grade 4- is a severe stage which contains any of the above condition without concurrent presence of potential malignant lesions. Grade 5- is a advanced stage which contains any of the above condition with concurrent presence of oral carcinoma.

In mouth blowing method, we requested the patients to blow their mouth in order to check the presence or absence of mouth blowing ability. And we also measured the distance from the corner of mouth to the tragus of the ear on both the side by requesting the patient to blow his mouth fully and by using a thread, that distance was measured and that measurement of the thread is taken by the scale and written in millimeters.

Pindborg's grading of OSMF was used to decide the severity of the patients. After all the procedure a feedback was obtained from the patient using interviewer's method regarding convenience of both the procedures. Then mouth blowing method and cheek retractor method was compared and the best choice was correlated with Pindborg's classification through the feedback obtained. The collection and arrangement of data was done in Excel 2016 program with a statistical analysis done on the SPSS version 21.

RESULTS

The level of statistical significance for multivariate model was set at p-value ≤ 0.005 using Chi-square test and $p < 0.05$ was considered to be statistically significant.

Table 1: Demographics of patient details

Variables		Number	Percentage
Age (in years)	17-25	20	16.9%
	26-35	44	37.2%
	36-45	32	27.1%
	>45	23	19.4%
Gender	Male	92	77.9%

	Female	26	22.1%
Cheek Retraction (Mean ± SD)		25.7±5.19	
Mouth blowing (Mean ± SD)		107.54±16.71	

Table 1 depicted demographic details of the patient aging from 17-69 years into 4 age groups. Maximum number of patients fall under group 2(n=44). Out of 118 patients recorded, 92 patients were under male category and 26 patients were under female category. Average cheek flexibility was 25.7mm [Standard Deviation (SD) = 5.19 mm]. Average mouth blowing was 107.54mm [Standard Deviation (SD) = 16.71 mm].

Table 2: Comparison between cheek retractor grading and Pindborg's grading by chi-square test.

Cheek retractor grading	Pindborg's grading						p- value
	Total	Stage 1	Stage 2	Stage 3a	Stage 3b	Stage 3c	
Grade 1- 30 mm and above	23	0	3	15	4	1	0.001 ^a
Grade 2- 20mm-30mm	82	1	22	25	24	10	
Grade 3- less than 20 mm	13	1	2	1	3	6	
Grade 4-without lesion	0	0	0	0	0	0	
Grade 5- with lesion	0	0	0	0	0	0	
Total	118	2	27	41	31	17	

^aP value <0.05; significant

Table 2 depicted comparison between cheek retractor grading and Pindborg's grading in which maximum number of patient of grade 1 cheek retraction were under the category of stage 3a(n=15). Grade 2 cheek retraction had maximum category of patient in stage 3a(n=25). Grade 2 was inconclusive because it had almost equal number of patient in stage 2,3a and 3b (22,25 and 24 respectively). Grade 3 cheek retraction had maximum category of patient in stage at3c (n=6).

Table 3: Comparison between mouth blowing grading and Pindborg's grading by chi-square test

Mouth blowing grade	Total	Pindborg's grading					p- value
		Stage 1	Stage 2	Stage 3a	Stage 3b	Stage 3c	
70-80	5	0	3	0	0	2	0.001 ^a
81-90	21	2	5	4	4	6	
91-100	21	0	7	6	7	1	
101-110	17	0	4	3	9	1	
111-120	27	0	4	8	9	6	
121-130	18	0	3	12	2	1	
131-140	9	0	1	8	0	0	
TOTAL	118	2	27	41	31	17	

^aP value <0.05; significant

Table 3 depicted comparison between mouth blowing and Pindborg's grading in which patient having mouth blowing of range 70-80mm had maximum number of patients falling under stage 2 of Pindborg's classification (n=3). Patient who had mouth blowing of range 81-90mm had maximum number of patients in stage 3c category (n=6). Patient who had mouth blowing of range 91-100 had maximum of patients falling under stage 2 and 3b(n=7). Patient who had mouth blowing of range 101-110mm and 111-120mm had maximum number of patients falling in stage 3b category (n=9). Patient who had mouth blowing of range 121-130 and 131-140 had maximum number of patients in stage 3a category of Pindborg's classification (n=12 and 8 respectively).

Table 4: Comparison between mouth blowing grading and cheek retractor grade by chi-square test

Mb range	TOTAL	Cheek retractor grade					p- value
		Grade 1- 30 mm and above	Grade 2- 20mm- 30mm	Grade 3- less than 20 mm	Grade 4- without lesion	Grade 5- with lesion	
70-80	5	0	4	1	0	0	0.001 ^a
81-90	21	0	15	6	0	0	
91-100	21	2	16	3	0	0	

101-110	17	1	16	0	0	0
111-120	27	4	20	3	0	0
121-130	18	10	8	0	0	0
131-140	9	6	3	0	0	0
Total	118	23	82	13	0	0

^aP value <0.05; significant

Table 4 depicted comparison of mouth blowing and cheek retractor grading in which patient who had mouth blowing of range 70-80, 81-90, 91-100,101-110 and 111-120 maximum of them fall under the category of grade 2 cheek retraction (n=4,15,16,16 and 20 respectively). While patient who are having mouthblowing of range 121-130 and 131-140 had maximum numbers of patient in grade 1 category of cheek retraction (n=10 and 6 respectively).

Table 5: Comparison between cheek retractor grading and mouth blowing grade of right side by chi-square test

Cheek retractor grading right side	Mouth blowing grade right side								p-value
	TOTAL	70-80	81-90	91-100	101-110	111-120	121-130	131-140	
Grade 1-30 mm and above	25	0	0	4	1	6	7	7	0.001 ^a
Grade 2-20mm-30mm	83	11	8	24	11	20	4	5	
Grade 3-less than 20 mm	10	5	0	4	1	0	0	0	
Grade 4-without lesion	0	0	0	0	0	0	0	0	
Grade 5-with lesion	0	0	0	0	0	0	0	0	
Total	118	16	8	32	13	26	11	12	

^aP value <0.05; significant

Table 5 depicted comparison of mouth blowing and cheek retractor grading of right side in which grade 1 cheek retraction had maximum number of patients falling under the range 121-130 and 131-140 of mouth blowing (n=7). Grade 2 cheek retraction had maximum number of patients falling under the range 91-100 of mouth blowing (n=24). While in grade 3 cheek retraction had maximum number of patients falling under the range 70-80 and 91-100 of mouth blowing (n=5 and 4 respectively).

Table 6: Comparison between cheek retractor grading and mouth blowing grade of left side by chi-square test

Cheek retractor grade left side	Mouth blowing grade left side								p-value
	Total	70-80	81-90	91-100	101-110	111-120	121-130	131-140	
Grade 1- 30 mm and above	24	0	0	1	4	5	8	6	0.001 ^a
Grade 2- 20mm-30mm	82	12	15	10	20	15	6	4	
Grade 3- less than 20 mm	12	2	6	3	1	0	0	0	
Grade 4-without lesion	0	0	0	0	0	0	0	0	
Grade 5- with lesion	0	0	0	0	0	0	0	0	
TOTAL	118	14	21	14	25	20	14	10	

^aP value <0.05; significant

Table 6 depicted comparison of mouth blowing and cheek retractor grading of left side in which grade 1 cheek retraction had maximum number of patients falling under the range 121-130 and 131-140 of mouth blowing (n=8 and 6 respectively). Grade 2 cheek retraction had almost maximum number of patients falling under the range 101-110 of mouth blowing (n=20). While in grade 3 cheek retraction had maximum number of patients falling under the range 81-90 of mouth blowing (n=6).

Table 7: Frequency of patient feedback

Items	Cheek retractor n[%]	Mouth blowing n[%]
More comfortable	10[8.5]	108[91.5]
Makes you more aware about the condition	42[35.6]	76[64.4]

Table 7 depicted feedback of patients in which 91.5% felt more comfortable with mouth blowing technique and 64.4% patient get aware about their condition from mouth blowing method.

DISCUSSION

Oral submucous fibrosis, a potentially malignant condition associated with tobacco and areca nut chewing is primarily seen in the Southeast Asian countries and Indian subcontinent.^[14] It is universally considered as an Indian disease. The overall prevalence rate 0.2% to 0.5% is believed to be in India.⁽²⁰⁾ OSMF, if diagnosed by a method which is less time consuming and easy to perform in clinical practice will decrease the chair-side time taken which also subsequently will decrease the time taken for further investigation and the management of the condition.

Presently, this study is done to analyse the role of different variables which play a vital role in the clinical diagnosing of OSMF. This study was done to find out comparative evaluation of cheek flexibility using cheek retractor method and mouth blowing method and its correlation with Pindborg's grading system for oral submucous fibrosis patient.

In this study of 118 patients, the age ranging starts from 17- 69 years, where majority of OSMF cases appear in the range 26-35 years of age. It is similar to another hospital based study by Ahmed⁽¹⁸⁾ where it was reported that majority of the OSMF cases belonged to the age group of 21-40 years. Similarly, Sirsat^[25] reported OSMF cases from 20 to 40 years of age. A similarity was seen between the study conducted by Borle RM and this present study with the occurrence of OSMF in particular age group⁽²⁶⁾ Vanaja Reddy.⁽¹³⁾ In contrast to Ranganathan et al, half of the study population appear in the age group of third decade.⁽²⁷⁾ This shows that middle age group of the population are more affected with OSMF in the Vidarbha region which is considered as the working population in India.

In the study of 118 OSMF patients with 92 patients of male and 26 patients of female, a male predominance was shown. Similarly male predominance was reported by Ranganathan (2004),⁽²⁷⁾ Kumar et al. (2007),⁽²⁸⁾ and Pandya et al. (2009)⁽²⁹⁾ Ceena et al. (2009)⁽³⁰⁾. However other investigations like Pindborg (1970),⁽³¹⁾ Caniff (1986)⁽³²⁾ and Johnson (2000) shows female predominance.⁽³³⁾ In our study male predominance can be due to the eccentric lifestyle of the youngsters in our society which brought the males to be more accessible into using of arecanut and its product more frequently than females.

The average cheek flexibility in this study was 25.7±5.19mm. Similar method was used by Hassan Shahid⁽³⁴⁾ for measuring the cheek flexibility. While in contrast to that Syeda Arshiya Ara et al.⁽³⁵⁾ showed average cheek flexibility as 7.18 mm. Ranganathan et al. (2001)⁽³⁶⁾ showed that the mean values of cheek flexibility in males as 9.7 mm, and in females as 9.0 mm. This difference in their mean value may be due to difference in the method of measurement where Ranganathan et al. and Syeda Arshiya Ara et al. used a method in which a line is joined in between the tragus of the ear and angle of the mouth. An imaginary perpendicular line from the outer canthus of the ipsilateral eye was extended downwards to intersect the angle-tragus line. The point of intersection was marked as a reference point. This

was done on the right and left sides for measuring cheek flexibility. The average mouth blowing in our study was 107.54 ± 16.71 mm.

On co-relating cheek flexibility and Pindborg's grading, though the inter-relation between them is not reliable, the statistical analysis with Chi square test shows a high significant with $p < 0.001$. Cheek flexibility method is also used in Hassan Shahid et al.⁽³⁴⁾ to estimate oral health impact profile (OHIP) in patients who are suffering from oral submucosal fibrosis (OSMF) and its co-relation with Pindborg's clinical grading. Sadiya Khan⁽³⁷⁾ also mentioned the classification of cheek flexibility in their study for classifying the OSMF. Advantages of cheek retractor method was its easy to assess which side is more affected by OSMF on the other hand advantage of mouth blowing method are easy to perform, less time consuming and patient co-operation is more. Disadvantages of cheek retractor method are time consuming, painful for the patient, need certain materials to perform and for mouth blowing method disadvantages are some time its really difficult to diagnose by the investigator whether it is normal or diseased, and even mouth breather and asthmatic patient cannot blow for longer time. Limitation of this study a larger sample size may be needed to establish the significance and magnitude of this association. To diagnose OSMF by cheek retraction and mouth blowing we required certain materials like cheek retractor, scale and thread. Even this study does not include patients who had severe stage of OSMF.

CONCLUSION

Oral Submucous fibrosis is considered as a potentially malignant disorder, therefore it is essential to diagnose and treat as per the stage of the disease. The method or criteria choosing for diagnosing the condition should be easy to perform with minimum armamentarium as well as sensitive and less time consuming. None of the methods fulfills all the criteria necessitating the need to further do the research in this direction.

CLINICAL SIGNIFICANCE

This method can be used under resource constraint setting for preliminary grading of the OSMF.

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