

# Use of mid upper arm circumference for evaluation of nutritional status of OSMF patients

Suryanarayana R. Yallamraju, Rachit Mehrotra<sup>1</sup>, Abhishek Sinha, Shashank Reddy Gattumeedhi<sup>2</sup>, Abhishek Gupta<sup>3</sup>, Smita V. Khadse<sup>4</sup>

Department of Periodontics, Dental College, Azamgarh, <sup>1</sup>Department of Periodontics, Rama Dental College, Kanpur, Uttar Pradesh, <sup>2</sup>Private Practitioner, BDS, Vokkaligara Sangha (VS) Dental College and Hospital, Bengaluru, Karnataka, <sup>3</sup>Department of Orthodontics, Eklavya Dental College and Hospital, Kotputli, Rajasthan, <sup>4</sup>Department of Oral Pathology and Microbiology, Maharaja Ganga Singh Dental College and Research Center, Sriganganagar, Rajasthan, India

Corresponding author (email: <rachit994@yahoo.com >)

Dr. Rachit Mehrotra, Department of Periodontics, Rama Dental College, Kanpur, Uttar Pradesh, India.

## Abstract

**Background:** Oral submucous fibrosis (OSMF) is always associated with juxtaepithelial inflammatory reaction followed by fibroblastic changes in lamina propria, with epithelial atrophy leading to stiffness of oral mucosa and causing trismus and inability to eat. Mid upper arm circumference (MUAC) is a useful tool for a fast assessment of the nutritional status. **Aims:** The study was undertaken to evaluate the correlation of MUAC as a nutritional status indicator in OSMF patients. **Patients and Methods:** The study group comprised 50 clinically diagnosed and histopathologically confirmed cases of OSMF. MUAC was recorded using a plastic measuring tape. The right upper arm was measured at the midpoint between the tip of the shoulder and the tip of the elbow (olecranon process and the acromium). **Results:** Out of 50 subjects, 76% (38) were having MUAC value <23 cm, which shows an inverse relation between MUAC and clinical staging. The relation of MUAC with clinical staging was significant. **Conclusion:** The patient with OSMF becomes unable to eat due to burning, ulcers, and inability to open mouth, which affects the health of the individual. Thus, it is crucial to access the nutritional status to improve the survival rate of patients.

**Key words:** *Mid upper arm circumference, nutrition, oral submucous fibrosis*

## INTRODUCTION

Oral submucous fibrosis (OSMF) is a chronic, premalignant condition of the oral mucosa which was first described by Schwartz in 1952. Pindborg (1966) defined OSMF as follows: "An insidious, chronic disease affecting any part of the oral cavity and sometimes the pharynx. Although occasionally preceded by and/or associated with vesicle formation, it is always associated with juxta-epithelial inflammatory

reaction followed by fibroelastic change of the lamina propria, with epithelial atrophy leading to stiffness of the oral mucosa and causing trismus and inability to eat."<sup>[1]</sup> OSMF is a well recognized potentially malignant disorder of the oral mucosa. Paymaster first described the malignant potential of OSMF in 1956, the rate of which has been estimated to be 7–13% recently.<sup>[2]</sup> The disease is seen in those from the Indian subcontinent and from many parts of South-East Asia, such as Taiwan.<sup>[3]</sup>

Mid upper arm circumference (MUAC) is a useful tool for a fast assessment of the nutritional status. It is an easy and inexpensive way to detect nutritional status and is used in developing countries for rapid and extensive nutrition surveillance and screening programs.<sup>[4,5]</sup>

MUAC is the circumference of the right upper arm measured at the midpoint between the tip of the shoulder and the tip of the elbow (olecranon process and the

Access this article online	
Quick Response Code:	Website: www.jispcd.org
	DOI: 10.4103/2231-0762.146217

acromium). The other anthropometric parameters include skin-fold thickness at defined sites, muscle circumference, and waist: Hip ratio.<sup>[6]</sup> MUAC is a useful indicator of malnutrition that can be used in ill patients (normal MUAC >23 cm in males, >22 cm in females).<sup>[7]</sup> Nutrition and oral health are interrelated. Nutrition is a major factor in infection and inflammation. The study was undertaken to evaluate the correlation of MUAC as a nutritional status indicator with OSMF patients.

## PATIENTS AND METHODS

The patients for the study were selected randomly among the outpatients who visited during the period October 2011–August 2013 in the Department of Oral Medicine and Radiology of our institute. A detailed case history of the patients with emphasis on their habits (chewing betel nut, various brands of chewing tobacco available in market, smoking, alcohol consumption, etc.) was taken. A thorough clinical examination was done and recorded on standard proforma. Fifty patients (39 males and 11 females) in the age group 15–45 years, diagnosed of OSMF based on the history and clinical features, with the diagnosis confirmed through histopathological examination were included in the study. A formal ethical clearance to conduct this study was obtained from the ethical committee of the institute. Patients selected for the study were explained in detail about the condition affecting their oral cavity and the procedure that they would be subjected to. A formal informed written consent was obtained from all of them. A detailed case history was recorded for all patients with special reference to their habits, their nature, duration, and frequency of use. All patients were subjected to a thorough general physical and oral clinical examination and details were recorded on standard proforma. After establishing the clinical diagnosis of OSMF, the patients were subjected to routine hemogram to rule out any systemic ailment. The patients were clinically categorized according to the classification given by Bose and Balan, 2007 into mild, moderate, and severe cases.<sup>[8,9]</sup>

### 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 vermilion border; mouth opening >3 cm.

### Moderate cases

Symptoms of soreness of mucosa or increased sensitivity

to chillies, diffuse involvement of the mucosa, blanched appearance, tough and inelastic fibrous bands palpable in buccal mucosa, considerable restriction of mouth opening (1.5–3 cm) and variable tongue movement.

### 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.

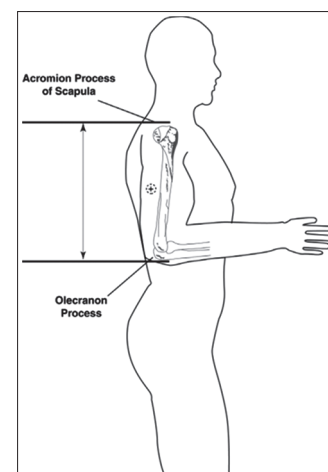
This was followed by a histopathological confirmation of diagnosis by performing an incisional biopsy of the lesion. Following the establishment of the diagnosis, the patient was informed about precancerous potential. The patient was then advised to discontinue the use of areca nut in all preparations.

MUAC was recorded using a plastic measuring tape. The right upper arm was measured at the midpoint between the tip of the shoulder and the tip of the elbow (olecranon process and the acromium) [Figure 1].

Data analysis and database management were done using Statistical Package for Social Sciences (SPSS) version 16.00 (IBM SPSS Modeler). Level of significance was set up at  $P < 0.05$ . Unpaired *t*-test was used to determine the level of significance.

## RESULTS

All patients in the present study gave a positive history of areca nut chewing either in raw form as a quid or in a commercial preparation such as gutkha and paan masala.



**Figure 1:** Subject position for upper arm length and midpoint ([http://www.cdc.gov/nchs/data/nhanes/nhanes\\_07\\_08/manual\\_an.pdf](http://www.cdc.gov/nchs/data/nhanes/nhanes_07_08/manual_an.pdf))

Out of 50 subjects, 76% (38) were having MUAC value <23 cm, which shows an inverse relation between MUAC and clinical staging. The mean age of patients with MUAC value <23 cm was 36.5 years. Table 1 and Graph 1 show that 20 patients were in mild category, out of which 13 were having MUAC value <23 cm with the *P* value being 0.04; 25 were in moderate category, out of which 20 were having MUAC value <23 cm with the *P* value being 0.05; and 5 were in severe category with all 5 having MUAC value <23 cm and a *P* value of 0.03. A *P* value of <0.05 reveals the significance of MUAC with the severity of the disease.

## DISCUSSION

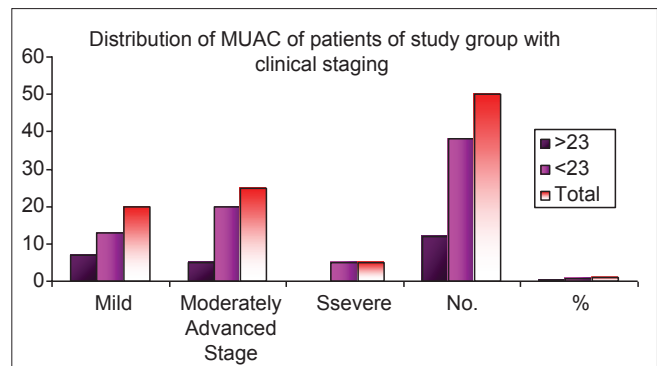
The incidence of OSMF is increasing like an epidemic among youngsters in the Indian and South-East Asian population. The etiology for OSMF is still obscure and various factors have been proposed, arecanut chewing being the most important.<sup>[10]</sup>

The lack of awareness, aggressive marketing strategies of these products, and failure to impart primary preventive measures have also contributed to a considerable increase in the incidence of OSMF among the rural and urban younger population.<sup>[11]</sup>

Measurements of adult MUAC have long been known to reflect changes in adult body weight, and the major determinants of MUAC, arm muscle and subcutaneous fat, are both important determinants of survival in starvation.<sup>[12]</sup>

In the present study, out of 50 subjects, 76% (38) were having MUAC value <23 cm, which shows an inverse relation between MUAC and clinical and histological staging. Tsai *et al.*'s study was the only cross-sectional study that we found on the elderly using MUAC as the method to assess the nutritional status of adults.<sup>[13]</sup> In a study carried by Shetty *et al.*,<sup>[14]</sup> serum and salivary ascorbic acid level and iron level consistently decreased with the progression of OSMF. In a similar study carried out by Guruprasad *et al.*,<sup>[15]</sup> the levels of serum vitamin C and iron were significantly decreased in OSMF patients. In another similar study carried out by Balpande *et al.*, serum iron and zinc levels were found to be decreased.<sup>[16]</sup> These studies attributed poor nutritional status<sup>[13-17]</sup> and oxidative stress in precancerous lesions and conditions as being responsible for the decrease in serum and salivary vitamin C and vitamin E levels.<sup>[18]</sup>

As in the present study all the subjects were from same socioeconomic status, decreased MUAC appears to be



Graph 1: Distribution of MUAC of patients and severity of the disease

Table 1: Distribution of MUAC of patients having OSMF according to clinical staging

Clinical staging	MUAC		Total	<i>P</i> value
	>23 cm	<23 cm		
Mild	7	13	20	0.04
Moderate	5	20	25	0.05
Severe	Nil	5	5	0.03
Total number of patients	12	38	50	0.02
Percentage of patients	24	76	100	

MUAC=Mid upper arm circumference, OSMF=Oral submucous fibrosis

the outcome of the disease. Thus, it can be suggested that the lack of consumption of normal diet could be the cause of decreased MUAC.

## CONCLUSION

Thus, it is concluded from the present study that the patients with OSMF become unable to eat due to burning, ulcers, and inability to open their mouth, which affects the health of the individual. Thus, it is important to assess the nutritional status to improve the survival rate of patients.

## REFERENCES

- Reddy V, Wanjari PV, Banda NR, Reddy P. Oral submucous fibrosis: Correlation of clinical grading to various habit factors. *Int J Dent Clin* 2011;3:21-4.
- Ekanayaka RP, Tilakaratne WM. Oral submucous fibrosis: Review on mechanisms of pathogenesis and malignant transformation. *J Carcinogene Mutagene* 2013;5:1-11.
- Kiran Kumar K, Saraswathi TR, Ranganathan K, Uma Devi M, Elizabeth J. Oral submucous fibrosis: A clinico histopathological study in Chennai. *Indian J Dent Res* 2007;18:106-11.
- Velzeboer MI, Selwyn BJ, Sargent F 2<sup>nd</sup>, Pollitt E, Delgado H. The use of arm circumference in simplified screening for acute malnutrition by minimally trained health workers. *J Trop Pediatr* 1983;29:159-66.
- Roy NC. Use of mid-upper arm circumference for evaluation of nutritional status of children and for identification of high-risk

- groups for malnutrition in rural Bangladesh. *J Health Popul Nutr* 2000;18:171-80.
6. Anthropometry Procedures Manual 2007. Available from: [http://www.cdc.gov/nchs/data/nhanes/nhanes\\_07\\_08/manual\\_an.pdf](http://www.cdc.gov/nchs/data/nhanes/nhanes_07_08/manual_an.pdf). [Last accessed on 2014 Oct 25].
  7. Tsai AC, Chang TL, Yang TW, Chang-Lee SN, Tsay SF. A modified mini nutritional assessment without BMI predicts nutritional status of community-living elderly in Taiwan. *J Nutr Health Aging* 2010;14:183-9.
  8. Bose T, Balan A. Oral submucous fibrosis. A changing scenario. *J Indian Acad Oral Med Radiol* 2007;19:334-40.
  9. More CB, Gupta S, Joshi J, Varma SN. Classification system for oral submucous fibrosis. *J Indian Acad Oral Med Radiol* 2012;24:24-9.
  10. 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.
  11. 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:ZC54-7.
  12. Mid Upper Arm Circumference (MUAC). Available from: <http://www.unsystem.org/scn/archives/adults/ch06.htm>. [Last accessed on 2014 Oct 25].
  13. Tang AM, Dong K, Deitcher M, Chung M, Maalouf-Manasseh Z, Tumilowicz A, *et al.* Use of cutoffs for Mid-Upper Arm Circumference (MUAC) as an Indicator or Predictor of Nutritional and Health-Related Outcomes in Adolescents and Adults: A Systematic Review. *Food and Nutrition Technical Assistance III Project (FANTA)*. Washington, DC: United States Agency for International Development (USAID); 2013. p. 1-39.
  14. Shetty SR, Babu S, Kumari S, Shetty P, Vijay R, Karikal A. Evaluation of micronutrient status in serum and saliva of oral submucous fibrosis patients: A clinicopathological study. *Indian J Med Paediatr Oncol* 2012;33:224-6.
  15. Guruprasad R, Nair PP, Singh M, Singh M, Singh MP, Jain A. Serum vitamin C and iron levels in oral submucous fibrosis. *Indian J Dent* 2014;5:81-5.
  16. Balpande AR, Sathwane RS. Estimation and comparative evaluation of serum iron, copper, zinc and copper/zinc ratio in oral leukoplakia, submucous fibrosis and squamous cell carcinoma. *J Indian Acad Oral Med Radiol* 2010;22:73-6.
  17. Trivedy C, Warnakulasuriya KA, Hazarey VK, Tavassoli M, Sommer P, Johnson NW. The upregulation of lysyl oxidase in oral submucous fibrosis and squamous cell carcinoma. *J Oral Pathol Med* 1999;28:246-51.
  18. Rai B, Kaur J, Jacobs R, Singh J. Possible action mechanism for curcumin in pre-cancerous lesions based on serum and salivary markers of oxidative stress. *J Oral Sci* 2010;52:251-6.
- How to cite this article:** Yallamraju SR, Mehrotra R, Sinha A, Gattumeedhi SR, Gupta A, Khadse SV. Use of mid upper arm circumference for evaluation of nutritional status of OSMF patients. *J Int Soc Prevent Communit Dent* 2014;4:S122-5.

**Source of Support:** Nil, **Conflict of Interest:** None declared.