Effectiveness of mouth self-examination for screening of oral premalignant/malignant diseases in tribal population of Dehradun district

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Abstract

Background: Mouth self-examination (MSE) is shown as a speedy, economical, and effortless method of oral cancer detection. As previous studies were conducted in population with high literacy, the current survey was performed to explore the usefulness of MSE for finding the oral cancerous precancerous lesions in indigenous low literate population of Dehradun district. **Materials and Methods:** It is a cross-sectional survey which was done on the Buksa tribal communities in Dehradun district, India. Out of seven tehsils in the district, two were randomly selected, from which two villages were selected. Individuals belonging to Buksa tribe above the age of 18 years were gathered in commonplace. A total of 539 people who gave their consent were enrolled for study. Using a questionnaire, information regarding sociodemographic details, history of risk factors, and practice of MSE was obtained by interview method, followed by recording oral findings by a single expert. Later, performance of MSE was taught to the participants and they were asked to record the same. Descriptive analysis and Chi-square test were applied wherever applicable and significance level was kept at below 0.05. **Results:** It was observed that out of 539 participants, 220 (40.8%) practiced MSE and 319 (59.2%) have never practiced MSE. Further analysis showed that a total of 39% males and 42.7% females had MSE habits and this difference was not statistically significant ($P > 0.05$). In totality, the prevalence of oral lesions identified by health worker was 213 (39.5%), whereas MSE showed only prevalence rate of 69 (12.8%). MSE had low sensitivity (24.6%), whereas high specificity (87.4%) for all the lesions and most sensitive in detecting ulcers (72.7%), and highest specificity in identifying red lesions (99.2%). **Conclusion:** Even though the sensitivity of MSE for detecting oral premalignant/malignant lesions was low, specificity was very high. Frequent efforts to educate and encourage public on MSE may enhance efficacy and compliance.

Keywords: Indigenous population, oral cancer, self-examination

Introduction

Oral malignancies with its high morbidity and mortality encumber the patients, their relatives, moreover the community as a whole.[1] Oral cancer is a major health problem with worldwide especially in the Indian subcontinent with an annual incidence

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of 119 992 cases and 72 616 deaths, in the country.[2] The disease presents with vast range like white, red, proliferative, or ulcerated lesions or swellings.[3] Abolition of recognized risk factors like tobacco consumption, drinking excessive alcohol, and betel quid chewing helps in avoiding the occurrence of oral cancer.[4] India ranks among the top tobacco consumer globally and in Southeast Asia, tobacco (smoking or chewing) contributes to around 90% oral cancer and is considered as principal cause of death.[5,6]

Risk habits include, use of tobacco with or without alcohol, nutritional deficiency and having spicy food.[3,7] The early recognition of these lesions/conditions can avoid the malignant transformation.[8]

Poor knowledge in terms of signs and symptoms of oral cancer and occurrence of pain only at advance stages, often delay the detection.[9] Screening assists in the identification of early-stage oral cancer which in turn drastically improves the patient prognosis and decreases the mortality by 34%.[10-12] Screening of oral cavity in the asymptomatic and high-risk individuals aids in disease detection at significantly initial stages compared to symptomatic cohort patients.[13] Despite the advantages of screening, its economic feasibility has been reported only when carried out among targeted high-risk individuals.[14]

Rising numbers of oral malignancies in younger age persons make it critical that in screening programs, disease recognition in asymptomatic phases should not merely be planned for the traditionally known to be at higher risk elderly patients.[15,16] Also, individuals belonging to low socioeconomic status (SES) have an increased risk of oral cancer[17] necessitating the need for a noninvasive, inexpensive screening tool. Moreover, in developing countries like India where there is a shortage of skilled manpower, mouth self-examination (MSE) can be considered as a good alternative. Literature proves that MSE is speedy, economical, and effortless which encourages performance of oral examination by the high-risk individuals themselves, under adequate light with the help of a mirror, and to ask for medical attention in case they locate an abnormality.[18-22] But these studies were conducted in the populations where literacy levels were high. As it is known fact that learning is dependent on the level of literacy,[23] evaluating effectiveness of MSE in low literacy population is vital. Therefore, the present study was carried out to assess the effectiveness of MSE as a self-screening method for finding oral cancerous/precancerous lesions in indigenous population of Dehradun district.

Material and Methods

The present cross-sectional study was done among the tribal communities in Dehradun district, Uttarakhand, India. Ethical clearance to conduct the study was procured from the institutional ethical committee of Government Doon Medical College (Hospital), Dehradun, Uttarakhand, India on 23/10/2019. Different groups of traditionally underprivileged indigenous citizens in India have been given the official title of

Scheduled Tribes (STs).[24] In the Uttarakhand state, there are five reported scheduled tribes; out of those, Jaunsari and Buksa are residing in Dehradun district.[25] Buksa tribe have less total population and low literacy compared to Jaunsari,[24] making them more vulnerable population and high-risk group. Thus, we selected Buksa tribes for the present study.

There are seven tehsils in the district,[26] out of which two were randomly selected. From the selected tehsils, two villages were randomly selected. All the people belonging to Buksa tribe above the age of 18 years were considered eligible for the study. Individuals were requested to gather in commonplace with the help of community leader where the intent of the study was explicated, and those who all provided informed consent were taken for survey. A total of 539 participants were enrolled.

Utilizing theory, observation, expert opinion, and previous studies,[7,27] a questionnaire was prepared which was validated before the data collection. The final questionnaire consisted of three subdivisions: sociodemographic details, history of risk factors, and practice of MSE. Interviews were conducted in the local language by a single investigator for the data collection.

Following this, a trained and calibrated specialist (health worker) conducted the clinical oral examination (COE) on a portable dental chair in natural light at an open space for evaluation of the presence of oral lesions by employing criteria explained by Zain *et al.*[28]

COE was followed by delivering a health education lecture to the study participants in the local language by a trained and calibrated investigator. Risk habits, signs and symptoms by means of set of images depicting the numerous oral precancerous/cancerous lesions/conditions, and correct method to perform MSE aided by a mirror via verbal and demonstrative instructions were included in the lecture.

In the end, participants were asked to carry out the MSE using an 18 cm × 10 cm mirror and report the presence of any abnormalities or oral lesions.

Statistical analysis

After entering the data in MS Excel (MS Office version 2007 developed by Microsoft, Redmond, WA), it was analyzed using statistical software SPSS Version 20. Descriptive statistics were done by calculating frequencies and percentages. Unpaired *t*-test was used to assess the differences in disease detection by specialist and MSE by setting the level of significance below 0.05. Sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of MSE were also calculated.

Results

It was observed that out of 539 participants, 220 (40.8%) practiced MSE and 319 (59.2%) have never practiced MSE. Further analysis was performed based on the practice of

MSE with sociodemographic variables. It showed that a total of 39% males and 42.7% females had MSE habits and this difference was not statistically significant ($P > 0.05$). The MSE habit was found more in participants belonging to less than 25 years of age (52.1%) and among individuals with higher education (graduate: 65.7%) and also in participants with no risk factors history (47.1%), and all these differences were statistically significant ($P < 0.05$) [Table 1].

Table 2 shows that the overall prevalence of oral mucosal lesions identified by health worker was 213 (39.5%), whereas MSE showed only a prevalence rate of 69 (12.8%). Detection rates of oral lesions using MSE by the participants were statistically significantly lower than the health worker for all types of lesions except for red lesions and ulcers. Out of 69 lesions detected by MSE, 47 were true positive (TP), 22 were false positive (FP), 144 false negative (FN), and 326 true negative (TN).

Table 3 shows the efficacy of MSE for the screening of oral precancerous/cancerous lesions. For all the lesions, low sensitivity (24.6%) and high specificity (87.4%) were found. PPV and NPV were 68.1% and 69.3%, respectively. Further analysis revealed that MSE was found to be most sensitive in detecting ulcers (72.7%), whereas specificity was highest in identifying red lesions (99.2%).

Discussion

There is vast potential for the prevention of oral cancers due to their well-known risk factors, extended natural history, and the possibility of the identification of premalignant/malignant lesions by visual examination. Demographic factors like age, gender along with family background play a significant role in oral diseases' advancement. Increased risk in rural population owing to their geographical location, food habits, and oral hygiene practices has also been reported. Oral hygiene behaviors vary to a great extent among countries, and even within countries;[29,30] hence, this particular tribe of Dehradun district was taken.

Our findings show that the MSE was practiced more in young age participants and among individuals with higher education and no history of risk factors. This was in accord to another Indian study who reported that compliance to health education pertaining to MSE was more in individuals having higher education, no risk factors, in the younger age group, and among males.[19] However, in our study, no difference with respect to gender was found in MSE practice.

MSE procedure was unable to detect oral lesions/conditions as compared to health workers. Similar results were observed in the study conducted by Ghani *et al*.[7] and Elango *et al*.[19] The most prevalent lesion recorded in the present study was difficulty in mouth opening. This was in contrast to the previous researches which reported white lesions as most prevalent.[7,19] This could be due to the fact the tobacco situation in India is different because of a vast form of tobacco products available for smoking as well as smokeless use.[6] The smokeless form (tobacco chewing) causes oral submucous fibrosis in which fibrous bands are formed leading to restricted mouth opening.

Results showed that MSE had low sensitivity (24.6%) and high specificity (87.4%) for all the lesions. This was again in line with the prior studies by Ghani *et al*.[7] and Elango *et al*.[19] The low sensitivity was explained by them due to asymptomatic and subtle nature of premalignant lesions and high occurrence of these lesions in high-risk population. Thus, subjects may have mistaken them as normal findings.[19] Maximum subjects were not able to report white lesions in the present study, which was again similar to the previous studies.[7,19] Nevertheless, the identification of more dangerous lesions like red patches and nonhealing ulcers was high in our study as well study by Elango *et al*.[19]

Decentralization of health profession is the cornerstone for the optimum community health. It is not possible for all the health professionals to reach every corner of India; hence, the community should be educated for the diagnosis of their conditions. Since tobacco usage in India is extremely increasing especially in the marginalized population, it is the call of the hour

Table 1: Comparison of practice of MSE with demographics by Chi-square test

Variables		n (%)	Yes n (%)	No n (%)	P
Total		539 (100)	220 (40.8)	319 (59.2)	
Gender	Male	272 (50.5)	106 (39)	166 (61)	0.304
	Female	267 (49.5)	114 (42.7)	153 (57.3)	
Age (in years)	<25	117 (21.7)	61 (52.1)	56 (47.9)	0.043*
	25-40	184 (34.1)	69 (37.5)	115 (62.5)	
	> 40	238 (44.2)	90 (37.8)	148 (62.2)	
Education	<Primary	269 (49.9)	89 (33.1)	180 (66.9)	0.037*
	High School	162 (30.1)	60 (37)	102 (63)	
	Graduate	108 (20)	71 (65.7)	37 (34.3)	
Risk Factors	Present	382 (70.9)	146 (38.2)	236 (61.8)	0.022*
	Absent	157 (29.1)	74 (47.1)	83 (52.9)	

*P<0.05; Significant

Table 2: Overall Prevalence of lesions identified by mouth self-examination and health worker examination

Type of lesions	n (%)	n (%)	P	TP	FP	FN	TN
All lesions	213 (39.5)	69 (12.8)	0.001*	47	22	144	326
White lesions	91 (16.9)	12 (2.2)	0.001*	9	3	79	448
Red lesions	7 (1.3)	4 (0.7)	0.582	4	0	3	532
Ulcers	12 (2.2)	9 (1.7)	0.627	8	1	3	527
Difficulty in mouth opening	103 (19.1)	44 (8.2)	0.001*	36	8	59	436

*P<0.05; Significant

Table 3: Characteristics of lesions identified by mouth self-examination and health worker examination

Type of lesions	Sensitivity	Specificity	PPV	NPV
All lesions	24.61	87.40	68.12	69.36
White lesions	10.23	98.03	75.00	85.01
Red lesions	57.14	99.25	100.00	99.44
Ulcers	72.73	98.50	88.89	99.43
Difficulty in mouth opening	37.89	92.37	81.82	88.08

to empower them regarding their own oral cavity examination for any potentially benign or malignant condition.

Conclusion

Screening programs regarding oral cancer can increase awareness and inform the community about the disease. The MSE habit was found more in participants belonging to less than 25 years of age and among individuals with higher education. Oral lesions' detection rates using MSE by the participants were statistically significantly lower than the health worker for all types of lesions except for red lesions and ulcers. MSE was found to be most sensitive in detecting ulcers (72.7%), whereas specificity was highest in identifying red lesions.

Regular MSE can be achieved by repeated health education programs motivating the public, especially in the high-risk individuals, facilitating the early detection. Even though the sensitivity of MSE in detecting oral premalignant/malignant lesions was found to be low, specificity was very high. Frequent efforts to educate and encourage the public on MSE may enhance efficacy and compliance.

Declaration of participant consent

The authors certify that they have obtained all appropriate participant consent forms. In the form, the participants have given their consent for their images and other clinical information to be reported in the journal. The participants understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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