

Oral Cancer Screening at Workplace in India— One-year Follow-up

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ABSTRACT

Background: Oral cancer remains the commonest form of cancer and cancer-related deaths among Indian males due to popularity of avoidable risk factors such as tobacco and alcohol use. A workplace oral cancer screening and tobacco cessation study was commenced on World No Tobacco Day 2007 at a chemical industry in rural Maharashtra. **Aims:** The objectives were to screen the employees for oral neoplasia and to correlate it with their tobacco consumption pattern. In addition, the objective was to provide tobacco cessation services at the workplace. **Materials and Methods:** This is an interventional cohort study among 104 employees of a chemical industrial unit in rural Maharashtra. Naked eye examination of the oral cavity was performed for all employees by a doctor irrespective of the tobacco habits at the beginning and at the end of 1 year. In between, the tobacco users were regularly examined during each follow-up. **Statistical analysis used:** Through personal interviews of the participants, data were manually recorded and were transferred to electronic data base. Data analysis was conducted in STATA™ 8.2 on intention to treat basis. **Results and Conclusions:** Among the 104 employees, 50 (48.08%) were current tobacco users at the beginning of the program. Oral precancers were seen exclusively among 20 (40%) tobacco users. After 1 year of workplace tobacco cessation intervention, 80% of oral precancers regressed. This shows that screening of the oral cavity at the workplace is effective when combined with tobacco cessation.

Keywords: Naked eye examination, oral cancer screening, tobacco cessation, workplace

Introduction

Globally, oral cancers account for 267,000 new cases and 128,000 deaths, of which two-third cases are contributed by the developing countries.⁽¹⁾ The high prevalence is mainly due to avoidable risk factors such as tobacco and alcohol use, coupled with scarcity of accessible, preventive, and curative health care services in these countries. Oral cavity is easily accessible for screening and visible mucosal changes precede almost

all oral malignancies. Further, there are no embarrassing procedures involved in the oral cancer screening such as breast and cervix cancer screening. Despite this, oral cancer remains the commonest form of cancer and cancer-related deaths among Indian males.⁽¹⁾ This is not only because India is the third largest consumer of tobacco but also because there is scarcity of screening services at the population level, and when services are available there is a lack of awareness of seeking screening services. Thus, multiple barriers exist at the mass level. This envisages a huge scope for primary and secondary prevention of oral cancer in this country.

Among the several methods of oral cancer screening, it is now proved that naked eye examination of oral cavity is a simple, acceptable, and an accurate method that can reduce the oral cancer mortality.⁽²⁾ Other screening methods for oral cancer screening are being used as an

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adjunct to naked eye examination. Use of Toluidine Blue as a screening test of oral cancer has several limitations. It involves subjectivity in the interpretation of positive stains and has lower sensitivity for detecting dysplasia, and hence gives higher false-positive rates in the primary care setting.⁽³⁾ Screening of oral cancer with chemiluminescence light although enhances the identification of mucosal abnormalities, still remains largely subjective for the assessment of oral lesions. There is refuting evidence about its ability to differentiate dysplastic or malignant lesions from benign lesions of the oral cavity.^(3,4)

Tissue autofluorescence imaging technique developed in the form of Visually Enhanced Lesion Scope (VELScope) demonstrates extended margin delineation of clinically evident tumors of oral cavity. However, there is no published evidence about its efficacy in the population without history of dysplasia and oral cancer. It also lacks evidence of its usage as an adjunct in the terms of easy reproducibility by the primary care workers.^(3,4)

Workplace offers a feasible environment for organizing intervention related to health promotion and offers a relatively stable cohort for follow-up to assess the impact. Asymptomatic people do not like to visit hospital for a preventive check up and there is a lack of awareness about screening at the mass level in the community. Hence, workplace remains an ideal setting for conducting oral cancer screening in India. Worldwide, initiatives have been taken for workplace cancer screening for various organs such as breast, cervix, colorectal, and gastric, but the published literature about workplace oral cancer screening is limited.⁽⁵⁻¹¹⁾

Higher incidence of oral cancer among Ratnagiri district of Maharashtra is reported by Tata Memorial Hospital-based cancer registry and also by Tata Memorial Hospital Rural Outreach Program. A workplace tobacco cessation study was commenced at a chemical industry at Khed, Ratnagiri district of rural Maharashtra on World No Tobacco Day 2007. This study was of 1 year duration. The objectives were to screen the employees for oral neoplasia and to correlate it with their tobacco consumption pattern. In addition, the objective was to provide tobacco cessation services at the workplace and to assess the change in the status of the oral lesion. This article describes the prevalence of oral neoplasia at the beginning and its outcome assessment due to the tobacco cessation intervention services at the end of 1 year of follow-up.

Materials and Methods

This is an interventional cohort study among 104 employees working in a chemical industrial unit at Khed,

Ratnagiri, in rural Maharashtra. All employees were invited to participate. There were no exclusion criteria for the enrollment of the participants in this study. The detailed methodology, findings of initial phase,⁽¹²⁾ and the follow-up interventions along with the results of tobacco cessation at the end of 1 year⁽¹³⁾ have been published in the earlier articles.

In this study, any employee who was using tobacco at the time of recruitment or had consumed any form of tobacco during the past 6 months was considered as tobacco user. Employees using areca nut were clubbed as tobacco users because of its carcinogenic potential with respect to the oral cavity. All employees irrespective of their tobacco use were screened for oral neoplasia by the doctors through naked eye examination of oral cavity at the first visit and the last visit. They were also educated about mouth self-examination, oral hygiene, and the role of diet in prevention of oral cancer. Periodic screening for oral neoplasia was done for the tobacco user employees at every six- to eight-weekly interval during seven follow-up visits conducted throughout the study. Employees with oral precancerous lesions were offered antioxidants for 2 months and multivitamin supplements for 15 days orally. Medical and paramedical teams from the industrial medical unit and from a local referral hospital were involved as trainees during all the sessions to facilitate man-power development for the oral cancer screening and tobacco cessation activities.

The trial has been approved by the Institutional Review Board of Tata Memorial Hospital. The trial is registered with clinicaltrials.gov with the registration number 458 and has ClinicalTrials.gov Identifier NCT00750503.

Data were manually recorded by the social workers and doctors through personal interviews of the participants. It was then transferred to electronic data base. Data analysis was conducted in STATA™ 8.2 on intention to treat basis.

Results

Among the 104 employees, 50 (48.08%) were tobacco users at the beginning of the program. Thirty-three (66%) tobacco users were using smokeless forms of tobacco, 7 (14%) were using tobacco in smoking forms, and 10 (20%) were combination users. Five (10%) of the tobacco users were consuming tobacco with betel leaves and there were no exclusive betel quid users in the study. Three (6%) used only areca nut. Seventeen (34%) of the tobacco users were using tobacco for less than 10 years and 33 (66%) were using for more than 10 years. The details of different forms of tobacco use among the participants at the initiation of the program are published.⁽¹²⁾

All the employees irrespective of the history of tobacco use were screened for oral neoplasia with naked eye examination by the doctors in the first visit [Figure 1]. Oral precancers were detected exclusively among tobacco users. Forty percent of the tobacco users, that is, 20 employees, had oral precancerous lesions [Figure 2]. No frank oral cancers were detected. The details of the oral precancers detected are as mentioned in the Table 1.

Thirteen (65%) lesions were seen among employees using smokeless forms of tobacco, two (10%) were seen in employees using smoking forms of tobacco, and five (25%) among employees using tobacco in combination forms. None of the areca nut user had oral precancer.

At the beginning of this study, among the total oral lesions, 6 (30%) leukoplakias were detected among 19 employees who used tobacco only and not alcohol. Among 30 employees who used tobacco along with alcohol, 12 (60%) had leukoplakias and 2 employees (10%) had erythroplakias.

Table 2 indicates location of oral precancers in the oral cavity among tobacco users.

Fourteen oral precancers (70%) were seen on the buccal mucosa, which correlates with the typical tobacco use habits of the employees.

Sociodemographic details of the employees including

Table 1: Distribution of oral precancers among tobacco user employees

Oral precancer	Tobacco chewers (n = 33)	Tobacco smokers (n = 7)	Combination users (n = 20)	Total
Erythroplakia	1	—	1	2
Leukoplakia	12	2	4	18
Total	13	2	5	20

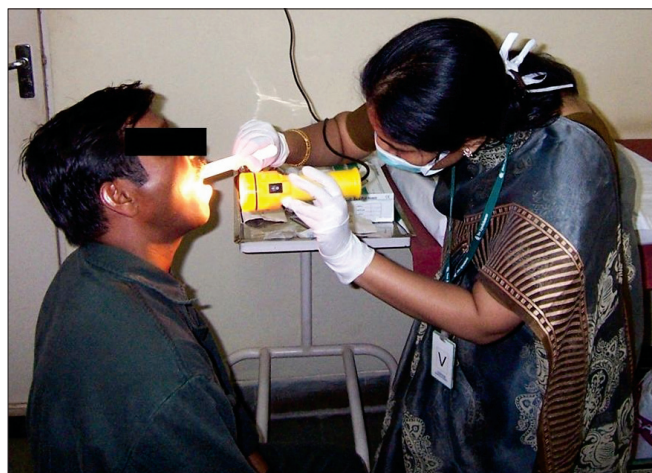


Figure 1: Oral neoplasia screening performed by a doctor through naked eye examination

age group are published.⁽²³⁾ Seventy-one (68.26%) of the employees were in the age group of 41–50 years. Sixteen oral precancers (80%) which include 14 employees with leukoplakia and 2 employees with erythroplakia were detected among employees in the age group of 41–50 years.

Only three employees had low body mass index (less than 18.5). They, however, had no oral precancerous lesions. Seven (35%) oral precancers (all leukoplakia) were seen among the employees using tobacco for less than 10 years, and 13 (65%) (11 leukoplakia and 2 erythroplakia) were detected among employees with tobacco history of more than 10 years. Four (20%) oral precancers were seen in tobacco users with Fagerstorm score of less than 4 and 16 (80%) in the tobacco users with Fagerstorm score of more than 4.

The results achieved with a year-long program of tobacco cessation conducted at the workplace have been published.⁽¹³⁾ As the program focused only on tobacco cessation and not on alcohol de-addiction, no change

Table 2: Location of oral precancers in the oral cavity among tobacco users

Type of lesion	Number	Location
Leukoplakia	3	Right buccal mucosa
	5	Left buccal mucosa
	3	Right and left buccal mucosa
	1	Lower labial mucosa
	2	Maxillary gingiva
	1	Mandibular gingiva
	1	Lower labial mucosa and mandibular gingiva
	1	Left buccal mucosa and mandibular gingiva
	1	Right and left buccal Mucosa and mandibular gingiva
	Erythroplakia	1
1		Lower labial mucosa



Figure 2: Oral leukoplakia indicated by an arrow

was recorded in the alcohol consumption pattern among the employees, at the end of 1 year of follow-up. At the end of the tobacco cessation program of 1 year, 51.52% of smokeless tobacco users, 14.29% of the smokers, and 20% of the employees who were using tobacco both in the smoking and smokeless forms reported to have quit tobacco, which was validated with the absence of cotinine in the urine.⁽¹³⁾

The status of oral neoplasia among the employees using smokeless forms of tobacco is as follows. Among the 33 employees using smokeless forms of tobacco, 12 oral leukoplakias and 1 erythroplakia were detected. Seventeen (51.52%) among them reported to have quit tobacco at the end of 1 year. By the end of 1 year, two employees with oral leukoplakias, one with erythroplakia regressed and the lesion of one employee with leukoplakia remained static. Among 16 employees who were unable to quit tobacco, 6 employees with oral leukoplakia showed regression in the lesion and 3 employees had persistent lesion at the end of 1 year.

The status of oral lesion among the employees using smoking forms of tobacco is as follows. Among the seven smokers, two had oral leukoplakia at the first visit. One of the smokers who quit tobacco had no oral lesion. All other employees continued their tobacco usage. Among the two employees with oral precancerous lesions, the lesion of one of the employees regressed as he had significantly decreased his tobacco usage though not quit completely. The other employee with lesion who continued with his tobacco habit had no change in the oral leukoplakia at the end of 1 year of the study.

At the beginning of the study, there were 10 employees using tobacco in the combination forms and 4 of them were detected with oral leukoplakia and 1 with erythroplakia. At the completion of the study, two of the tobacco combination users had quit tobacco, among whom one had oral leukoplakia at the initial examination. No change was observed in the oral leukoplakia findings of the tobacco quitter employee at the completion of the study. Rest of the employees with oral lesions continued their tobacco usage though in much reduced forms. Hence, reduction in the oral lesions (three employees with oral leukoplakias and one with erythroplakia) were observed among all the rest of employees using combination forms of tobacco.

Figure 3 shows that majority of oral leukoplakias and both the erythroplakias regressed among the tobacco user employees at the end of 1 year of tobacco intervention.

Among the six employees who used tobacco but not alcohol who were detected with oral precancerous lesions, four showed regression in the lesion at the end

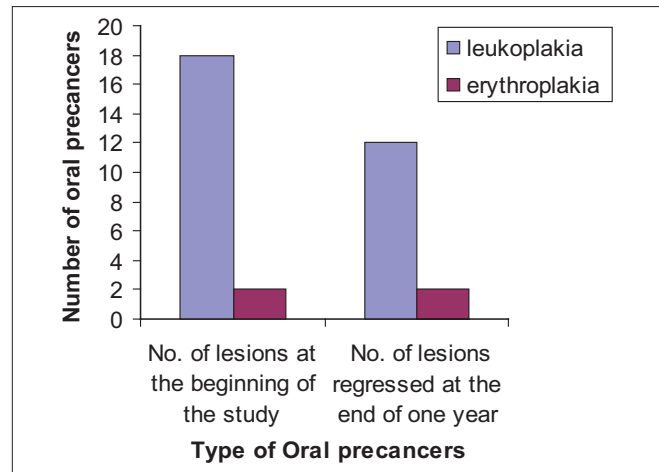


Figure 3: Regression of oral precancers among the tobacco user employees at the end of 1 year

of 1 year. All these four employees had quit tobacco. Among the 14 oral precancers detected in employees who used tobacco and alcohol, 11 regressed and 4 of them were tobacco quitters at the end of 1 year. There was no change in the alcohol habits of the tobacco user employees at the end of 1 year.

Among the five tobacco users who were prescribed pharmacotherapy, only two had initiated the prescribed treatment. They, however, did not complete the entire prescribed course as they found the side effects disturbing, and hence its role on regression of oral precancers could not be assessed.

Discussion

At the beginning of the study, 48.08% of the employees were tobacco users. No frank oral cancer was detected. Smokeless form of tobacco use was predominant, and majority of the oral precancers were detected in employees using the smokeless forms. In our study, among the betel quid users, two were detected with oral leukoplakia. Betel quid either with or without tobacco is known to be carcinogenic for oral cavity. Eighty-five percent of the workers in Gujarat used tobacco, mainly in the smoking form, either alone or in combination with chewing pan/supari. Mouth lesions were present among 33% workers with oral habits and 4% without oral habits. Twenty-three workers (0.05%) had oral cancers.⁽¹⁴⁾

In our study, all oral precancers were exclusively detected among tobacco users. Even though none of the exclusive areca nut users had oral precancers, worldwide there is enough evidence about increased risk of leukoplakia, submucous fibrosis, and oral cancers along with dose-response relationship.⁽¹⁵⁻¹⁹⁾ In our study, higher oral precancers among tobacco and alcohol users when compared with exclusive tobacco users indicate

the action of alcohol as a synergistic agent with tobacco as a risk factor for oral precancers.

None of the oral precancers was located in the known high-risk areas of mouth, that is the floor of mouth, ventrolateral (ventral) aspect of tongue, and soft palate complex.⁽²⁰⁾ Location of majority of the oral precancers on the buccal mucosa of the oral cavity in this study could be due to the tobacco chewing habits of the participants, typical of South East Asian countries.

In our study, all oral precancers were common in the middle age group between 41 and 50 years. Similar pattern has been seen worldwide with oral leukoplakia being common in the age group above 40 years.⁽²¹⁾ Though there was no correlation between low body mass and oral precancers in this study, inverse association between body mass and oral cancer is established.⁽²²⁻²³⁾ In our study, the observation of more number of oral lesions among employees with an increase in the Fagerstorm score corresponds to the dose and period response relationship for oral precancers among tobacco users.^(10,24-26)

At the completion of the study, 66% of oral leukoplakia and both erythroplakia regressed, and none of the oral precancers progressed to oral cancers. Regression of oral precancers among tobacco non-quitters could be explained on the basis of reduction in the consumption of tobacco among the tobacco user employees. In the study conducted at an industrial set up in Gujarat, 31.6% of leukoplakia regressed and 0.13% progressed into oral cancers over the period of 2 years in the absence of tobacco intervention.⁽¹⁴⁾ Globally the literature suggests that effective smoking cessation leads to reduction in both the prevalence and incidence of oral precancers. Therefore, tobacco cessation is crucial for primary prevention of oral cancer.⁽²⁷⁻³⁰⁾

Medical and paramedical staff from the industrial medical unit and local referral hospital were successfully involved throughout this study for the capacity building in oral cancer screening and tobacco cessation activities. This man-power development is crucial to ensure sustenance of the program in the same industry and replicate similar programs in other workplaces so as to reach the masses for reducing the preventable burden of oral cancers.

This study has demonstrated that simple naked eye examination of the oral cavity along with tobacco cessation services offered at the workplace is effective in detecting and appropriately managing the oral neoplasia. However, appropriate back up referral facilities need to be established. High prevalence of tobacco usage and oral precancers among the employees highlights the need to

incorporate oral cancer screening and tobacco cessation activities in the routine periodic health check up of the employees. Of utmost importance is the commitment of the management and cooperation of the employees of the industry.

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