RESEARCH COMMUNICATION

An Integrated Approach to Worksite Tobacco Use Prevention and Oral Cancer Screening Among Factory Workers in Mumbai, India

Sharmila Pimple¹*, Mangesh Pednekar², Parishi Majmudar¹, Nilesh Ingole¹, Savita Goswami³, Surendra Shastri¹

Abstract

Background: Tobacco control and cessation interventions are among the most cost effective medical interventions but health systems in low resource countries lack the infrastructure to promote prevention and cessation among tobacco users. Workplace settings have the potential to provide opportunities and access for tobacco prevention interventions. Methods: This is a single group study evaluating tobacco use prevention and cessation through a structured three stage intervention program for tobacco users comprising education on harmful effects of tobacco, oral cancer screening and behavior therapy for tobacco cessation at the worksite. Results: All the 739 workers who were invited participated in tobacco awareness program and were screened for oral pre cancer lesions. 291 (39.4%) workers were found to be users of tobacco in some form. Education, gender and alcohol use (p<0.0001) were some of the factors associated with tobacco user status. The prevalence of clinical oral precancer lesions among tobacco users was 21.6%. Alcohol consumption (p<0.001), the type of tobacco consumed (p<0.018), personal medical history of chronic diseases (p<0.007) and combined use of alcohol and tobacco (p<0.001) were some factors found to be associated with presence of oral pre cancer lesions. Conclusion: An integrated approach for worksite based tobacco use prevention with oral cancer screening program showed good acceptance and participation and was effective in addressing the problem of tobacco consumption among the factory workers.

Asian Pacific J Cancer Prev, 13, 527-532

Introduction

Tobacco use is the largest cause of preventable morbidity and mortality worldwide. Tobacco kills a third to half of all people who use it, on average 15 years prematurely (Peto et al., 1992:1996; Murray et al., 1997). By 2030, unless urgent action is taken, tobacco’s annual death toll will rise to more than eight million (Mathers et al., 2006). The International Classification of Diseases (ICD-10) has recognized that “tobacco dependence” is also a disease (WHO 1994). Considering the social and economic impact of tobacco consumption, the adoption of “WHO Framework Convention on Tobacco Control” (WHO FCTC 2003) by the World Health Assembly on 24th May 1999 is an important landmark to achieve comprehensive tobacco control worldwide. India is the 7th country that has ratified the WHO FCTC in February 2004 (Tobacco Free Initiative 2011). But the major obstacle to tobacco control in developing countries like India is the lack of effective implementation of tobacco control strategies, with little evidence of a systematic tobacco control plan in place. To control the tobacco epidemic, the younger generation should be prevented from initiating tobacco use. Yet, the benefits of such a measure would only be fully appreciated in the long term. In the short term, concerted efforts needs to be made for inducing current tobacco users to quit.

Tobacco control interventions are among the most cost effective of all medical interventions. Unfortunately priority for both tobacco control in general and tobacco cessation services in particular is lacking not only among health policy makers but also among practitioners of medicine. Tobacco Cessation is not viewed as key control strategy for tobacco control. More over tobacco cessation capacity is in its infancy in India, with no infrastructure to promote cessation among tobacco users. Though, on a small scale, the Ministry of Health and Family welfare, Government of India has taken a positive stand and has opened eighteen Tobacco Cessation Clinics, mostly in big cities, all over India, but there is a need for more integration of such clinics with health services at various levels for current tobacco users who are unable to quit because of nicotine dependence.

Under these circumstances the workplace is one such favourable setting for the implementation of anti-tobacco interventions through which large groups of people can be reached to encourage tobacco cessation (Cahill et al., 2008). Workplaces (employers) incur a significant cost
with employees consuming tobacco at work, besides the direct impact on health of the employee. Also worksites have the potential to provide sustained peer group support and positive peer influence for quitting and staying tobacco free with the convenience of cessation opportunities and programmes on-site for the employee (Smetsduln et al., 2004). The tobacco cessation efforts are compounded in a multiple ways in Indian settings where the smokeless forms of tobacco usage abound in diverse forms in multicultural urban settings, with a much wider spectrum of tobacco and health problems.

Proven individual cessation strategies include counseling and behavioral therapy (Fiore et al., 2000). Also the implementation of smoking cessation programmes in groups has been a popular method of delivering behavioural interventions (Cochrane, 2005). This study therefore assessed the effectiveness and impact of a three phase tobacco cessation intervention programme, combining individual and group therapy interventions at a confectionary factory worksite in Mumbai. We are reporting findings of this study in a series of two papers: paper-I (in this paper) mainly reports on baseline findings of actual intervention.

### Materials and Methods

#### Participants

The present study was conducted in a confectionary factory located in Mumbai, India. All the 739 workers on payroll of the factory, across all divisions were invited to participate in the tobacco awareness programme. They were assessed for their tobacco usage through an interview using a structured questionnaire. Current tobacco users in any form were then invited to participate in the larger intervention study for tobacco use prevention and cessation program. All subjects were informed about tobacco use prior to the intervention. The participants with history of current tobacco use in any form were then enrolled for the tobacco cessation programme with a proper informed consent. A structured questionnaire detailing information on sociodemographic variables with medical and other risk factors with complete assessment of their tobacco habit were entered by medical social workers. Oral cancer screening was also offered to all workers, tobacco users as well as non-users as part of the tobacco control intervention program.

The tobacco users enlisted among all the factory workers were then invited to participate in the tobacco cessation intervention for individual counseling. Structured individual behavioral counseling by medical social workers for tobacco cessation lasting for fifteen to twenty minutes was undertaken. All participants were assessed for their tobacco use status at all interventions.

After three months of the first contact at Second Contact Programme tobacco cessation intervention session was conducted by MSW with groups of 10-15 tobacco users. This involved 30 minutes of group behavioral therapy for reinforcement of tobacco cessation advice. After three months of the second contact at Third Contact Programme the final intervention session was conducted. During which group behavioral therapy in groups of 10-15 tobacco users, lasting for 30-45 minutes duration was conducted by MSW along with a Clinical Psychologist. After twelve months of the first contact Final outcome measure, i.e., self reported tobacco abstinence was assessed.

Oral cancer screening: All the factory workers who participated in the tobacco awareness programme, were also invited for oral cancer screening.

Oral cancer (ICD C00-C06) has clinically recognizable precancerous lesions (leukoplakia, erythroplakia and oral...
submucous fibrosis) and asymptomatic early invasive lesions. The study protocol included a visual oral soft tissue examination and a questionnaire-based interview. Visual examination of the oral cavity is a simple approach used to detect asymptomatic oral cancers and precancerous lesions. The performance characteristics of this test are satisfactory in terms of sensitivity, specificity, and predictive value (Warnakulasuriya et al., 1984; 1991; Mehta et al., 1986; Mathew et al., 1997), therefore, it is considered as a suitable screening test for oral cancer. Oral visual inspection of eligible subjects was performed with the help of a halogen flashlight by medical officer. All the intraoral sites were carefully examined and palpated. The neck was also palpated to detect enlarged lymph nodes.

The clinical findings were recorded as 1. Normal; 2. Benign or non cancerous lesions such as fissures in the tongue, aphthous ulcer, black patch, tobacco-related blanching, fibroma, hypertrophied papillae, etc.; and 3. Pre cancer lesions if found to have a white patch, ulcerated white patch, verrucous lesion, submucous fibrosis, red patch, suspicious ulcer or growth. All the above findings suspicious for oral precancer on screening evaluation were clinically confirmed by medical officers.

Statistical Analysis

Analyses were performed with SPSS 13.0 for Windows. To analyze the differences between tobacco users (oral lesions present) and non users (oral lesion absent), we used the chi-square test to determine differences in age groups, education, income groups, religion, gender, tobacco history of family members, alcohol use, personal medical history, marital status, and Fagerstrom score. Mean and standard deviation were also calculated for age of initiation, duration and frequency of various habits.

Results

All the 739 workers on payroll of the factory, across all divisions with in the factory were invited to participate in the Tobacco Prevention and Cessation Program designed for the factory workers. Out of 739 workers, 291 (39.4%) were found to be users of tobacco in some form at the baseline survey. Among the 291 tobacco users, 215 (66.0%) were smokeless tobacco users while 50 (17.2%) were smokers and 49 (16.8%) were users of both smoked and smokeless forms of tobacco. Of the 215 smokeless users, 106 (36.4) were Khaini (Mixture of sun dried tobacco and slaked lime) users followed by 24 (8.2) Pan betel leaf/Nut with tobacco, 17 (5.8) Gutkha (pan masala with tobacco) and 8 (2.7) Masheri (roasted dried tobacco powder applied on teeth). Of the total workers 219 (29.6%) reported consuming alcohol, of which 114 (52.1%) were consuming tobacco as well. Mean age for starting tobacco in any form was 27.9 years (ranges from 25.6 years for Masheri to 37.7 years for bidi smokers). The average duration of habit was 12.4 years (ranges from 6.6 for Gutkha to – 23.3 for Masheri) at an average frequency of 4 per day (ranges from 2.1 for Masheri to 5.3 for Bidi). (Table 1)
consume tobacco than the ones who did not. Age, income, religion, marital status, history of close family member using tobacco and personal medical history was not found to be associated with their own tobacco usage.

All the workers (739) were invited and screened for oral pre cancer lesions. Total 63 (8.5) workers were detected with clinical pre cancer lesion on oral visual inspection test and all were tobacco users of some form. Leucoplakia was detected among 34 (49.3) workers, followed by Sub mucous fibrosis among 22(31.9) workers. Erythroplakia with erythro-leucoplakia and non healing ulcers were also seen among 5(7.9) and 2(3.2) workers respectively.

While determining the factors affecting the distribution of clinical oral pre cancer lesions among worker population, it was seen that, among the socio demographic and other risk factors studied, age, alcohol consumption, personal medical history, the type of tobacco consumed, combination of alcohol with the type of tobacco consumed and tobacco use were found to be associated with presence of oral pre cancer lesions. Education, income, religion, duration and frequency of tobacco use as well as tobacco dependence in the form of fagerstrom scores were not associated with oral precancerous lesions (Table 3).

Highest prevalence of oral pre cancer lesions was observed in the age group of 35 to 45 years (p=0.027). Individuals with other medical ailments seems to have significantly more oral pre cancer lesion than ones who did not have any significant medical history (p=0.007). Alcohol users were also significantly more (p=0.000) at risk of having oral pre cancer lesions. Within the category of various types of tobacco consumed, users of smokeless tobacco in the form of Gutkha (41.2%), Mawa (27%), Masheri (25%), Khaini (24.5%) and mixed users (both smoking and smokeless forms, 26.5%) showed increase prevalence of oral precancerous lesions (p<0.0001). When various forms of tobacco use and alcohol use were combined it was observed that smokeless tobacco use along with alcohol intake had the highest prevalence of oral pre cancer lesions (39.1%) followed by clinical oral pre cancer lesions were absent among only smokers and only alcohol users. Since no significant medical history than ones who did not have any significant medical history (p=0.007).

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## Discussion

Tobacco as the risk factor for major chronic diseases like cancers, heart disease and chronic obstructive respiratory diseases have been extensively researched (Ministry of Health and Family Welfare 2001). India has one of the highest rates of oral cancer in the world, partly attributed to high prevalence of tobacco chewing (Vora et al., 2000). Considering the burden of chronic disease in India with tobacco being one of the major risk factors, there is an urgent need for tobacco control and prevention efforts targeted at the population levels.

The prevalence of tobacco use in any form among the workers in the confectionary factory was 39.4% comparable to the recent Global Adult Tobacco Survey

### Table 3. Distribution of Oral Pre Cancer Lesions by Demographics and Other Factors by Tobacco Use

<table>
<thead>
<tr>
<th>Presence of clinical Oral Pre cancer Lesion</th>
<th>&quot;p-value, Chi-square&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes (N = 63)</td>
<td>No (N = 676)</td>
</tr>
<tr>
<td>Age Group</td>
<td></td>
</tr>
<tr>
<td>25-29</td>
<td>4</td>
</tr>
<tr>
<td>30-34</td>
<td>8</td>
</tr>
<tr>
<td>35-39</td>
<td>19</td>
</tr>
<tr>
<td>40-44</td>
<td>17</td>
</tr>
<tr>
<td>45-49</td>
<td>8</td>
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<tr>
<td>≥50</td>
<td>7</td>
</tr>
<tr>
<td>Education</td>
<td></td>
</tr>
<tr>
<td>Nil</td>
<td>1</td>
</tr>
<tr>
<td>Primary</td>
<td>2</td>
</tr>
<tr>
<td>Secondary</td>
<td>53</td>
</tr>
<tr>
<td>≥Secondary</td>
<td>7</td>
</tr>
<tr>
<td>Income Group</td>
<td></td>
</tr>
<tr>
<td>&lt;5000</td>
<td>18</td>
</tr>
<tr>
<td>5001 -10000</td>
<td>45</td>
</tr>
<tr>
<td>&gt;10001</td>
<td>0</td>
</tr>
<tr>
<td>Religion</td>
<td></td>
</tr>
<tr>
<td>Hindu</td>
<td>60</td>
</tr>
<tr>
<td>Others</td>
<td>3</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>63</td>
</tr>
<tr>
<td>Female</td>
<td>0</td>
</tr>
<tr>
<td>Marriage Status</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>58</td>
</tr>
<tr>
<td>Unmarried</td>
<td>5</td>
</tr>
<tr>
<td>Widowed</td>
<td>0</td>
</tr>
<tr>
<td>Family Member</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>13</td>
</tr>
<tr>
<td>No</td>
<td>50</td>
</tr>
<tr>
<td>Alcohol consumption</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>37</td>
</tr>
<tr>
<td>No</td>
<td>26</td>
</tr>
<tr>
<td>History of Chronic diseases</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>12</td>
</tr>
<tr>
<td>No</td>
<td>51</td>
</tr>
<tr>
<td>Tobacco Habits</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>63</td>
</tr>
<tr>
<td>No</td>
<td>0</td>
</tr>
<tr>
<td>&quot;Combined use of Alcohol &amp; or Tobacco&quot;</td>
<td></td>
</tr>
<tr>
<td>Alcohol + Smoking</td>
<td>4</td>
</tr>
<tr>
<td>Alcohol + Smokeless Tobacco</td>
<td>35</td>
</tr>
<tr>
<td>Only Alcohol</td>
<td>1</td>
</tr>
<tr>
<td>Smokeless Tobacco</td>
<td>27</td>
</tr>
<tr>
<td>Smoking</td>
<td>1</td>
</tr>
<tr>
<td>No Tobacco or Alcohol</td>
<td>1</td>
</tr>
<tr>
<td>The Variables below were assessed (N=291) only</td>
<td></td>
</tr>
<tr>
<td>Fagerstrom score</td>
<td>0.208, 3.1</td>
</tr>
<tr>
<td>Low</td>
<td>41</td>
</tr>
<tr>
<td>Medium</td>
<td>12</td>
</tr>
<tr>
<td>High</td>
<td>19</td>
</tr>
<tr>
<td>Form of Tobacco use</td>
<td></td>
</tr>
<tr>
<td>Betal Quid with Tobacco</td>
<td>2</td>
</tr>
<tr>
<td>Gutkha</td>
<td>7</td>
</tr>
<tr>
<td>Masheri</td>
<td>2</td>
</tr>
<tr>
<td>Khaini</td>
<td>26</td>
</tr>
<tr>
<td>Mawa</td>
<td>10</td>
</tr>
<tr>
<td>Combination</td>
<td>13</td>
</tr>
<tr>
<td>Cigarette</td>
<td>2</td>
</tr>
<tr>
<td>Bidi</td>
<td>1</td>
</tr>
<tr>
<td>Duration of Tobacco Use in years</td>
<td></td>
</tr>
<tr>
<td>&lt;5</td>
<td>4</td>
</tr>
<tr>
<td>6-10</td>
<td>17</td>
</tr>
<tr>
<td>11-15</td>
<td>18</td>
</tr>
<tr>
<td>&gt;15</td>
<td>24</td>
</tr>
<tr>
<td>Frequency of Tobacco Use per day</td>
<td></td>
</tr>
<tr>
<td>≥3</td>
<td>19</td>
</tr>
<tr>
<td>4-6</td>
<td>38</td>
</tr>
<tr>
<td>≥7</td>
<td>6</td>
</tr>
</tbody>
</table>
of which predominates among the socioeconomically challenged communities where such health education and tobacco cessation efforts needs to be focused. These findings were consistent with results reported from Mumbai Cohort study which showed a direct association between greater consumption of alcohol use and increases risk of mortality from alcohol specific causes. In addition the study also demonstrated the synergistic interaction between alcohol and tobacco use in various forms on mortality (Pednekar et al., 2011).

Similar associations have been reported in a study from Taiwan which showed significant associations among leukoplakia (P < 0.01), OSF (P < 0.0001), and verrucaous lesions (P < 0.0001) and the life style of smoking, and alcohol drinking (Chung et al., 2005). Another study among alcohol users attending a rehabilitation center in south India, conducted to assess the prevalence of various oral mucosal lesions (OML) amongst whom 72% smoked tobacco reported a total of 25% alcohol users having at least one OML (Rooban et al., 2009).

In an oral cancer screening study in India, tobacco chewing was the most important risk factor for multiple oral premalignant lesions but smoking was not associated with the risk of multiple oral premalignant lesions (Thomas et al., 2003). Considering the fact that the present study showed significantly more oral pre cancer lesion among individuals with other medical ailments, amply demonstrates that tobacco and alcohol users in general are at greater risk for many major chronic diseases.

India has one of the highest rates of oral cancer in the world, partly attributed to high prevalence of tobacco chewing (Dixit et al., 2000; Mathers et al., 2006). In spite of the high prevalence of tobacco consumption and the huge burden of oral cancers, population based programs for awareness about prevention of tobacco use and oral cancer screening is nonexistent in India. Also there is still limited awareness among health care professionals like dentists, family physicians or doctors at primary care level to counsel tobacco users accessing their services or conduct simple oral visual inspection during their routine clinical practice to detect oral pre malignant lesions early. Oral cancer screening, even when planned at community levels in general by inviting people to the screening centers, may however not accomplish the desired purpose since those (especially the high risk group) who work during the day may not visit screening centers. Worksite adoption of tobacco prevention and control initiatives gives an opportunity to overcomes these challenges. Workplaces due to its confined workforce offers opportunities to reach out to large groups for delivering the above activities which requires regular follow up and multiple contacts with those at risk, to ensure an effective programme. One such study conducted to assess the feasibility of a screening program to detect potentially pre-malignant oral disorders in a workplace in India, by visual inspection concluded that it is not only feasible but also effective (Wamakulasuriya et al., 2010).

In conclusion, an integrated approach, a first of its kind to address tobacco use prevention with oral cancer screening and tobacco cessation services for tobacco users in an urban factory work place settings was highly
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effective in methodically dealing with the problem of
tobacco consumption among the factory workers with
high prevalence of oral pre malignant lesions. The study
demonstrated a good acceptance and participation by the
workers in the tobacco control initiative at the workplace.
The employers favored the initiative as positive for the
overall health benefits to the workers in general and the
momenant gained due to the program for an effective
tobacco free policy for the company.
Tobacco remains one of the most important preventable
causes of addiction, sickness and mortality in the world.
Comprehensive and sustainable tobacco use prevention
and control activities such as these if can be integrated
and inbuilt with in the existing work place medical
services can go a long away in bringing down the burden
of several preventable chronic diseases related to tobacco
consumption and the subsequent medical cost to the
companies.

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care workers for early detection of oral cancer and precancer
of an oral cancer and precancer detection program using a primary health care model in Sri Lanka.
Cancer Detect Prev, 15, 331-4.
workplace screening for potentially malignant oral disorders
Classification of Diseases and Related Health Problems;