



Potential Predictor of Tobacco Cessation among Factory Workers: A Baseline Data of Worksite Tobacco Cessation Programs in the Central Part of India

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ABSTRACT

Aim: Our study aimed to evaluate the prevalence of tobacco use among factory workers and identify the predicting factors for quitting tobacco use.

Materials and methods: In this cross-sectional study, a total of 640 factory workers were included and divided into the quitter group and who had never quit the tobacco habit in the past. Data were collected by standardized and validated questionnaire pro forma, which comprised the demographic profile, smoking history, and Fagerström scale to check the nicotine dependence. Data were analyzed using descriptive analysis and Chi-squares test, whereas logistic regression was used to predict the factor for quitting the tobacco habit. All tests were applied using Statistical Package for the Social Sciences (SPSS) version 17.0.

Results: The mean age among the quitters was comparatively low than the never-quit group. Out of 640 participants, the majority of quitters and those who never quit were found to consume smokeless tobacco (232 [93.5]; 288 [73.5]). As per logistic regression analysis, gender of participants, age of starting tobacco use, and frequency of tobacco use can be considered as good predictors to quit smoking/chewing tobacco.

Conclusion: The present study found that participants in the quitter group were less dependent on tobacco, and these participants were more likely to quit smoking if behavioral support was provided at the early days of the quitting attempt.

Clinical significance: This study's result provides valuable insight into the current tobacco usage and potential predicting factors for quitting tobacco use among factory workers in India. These data can help in developing a policy for the implementation of tobacco cessation programs at the worksite.

Keywords: Factory workers, Nicotine dependency, Tobacco cessation, Tobacco quit, Worksite tobacco use.

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INTRODUCTION

Tobacco use is one of the important preventable causes of mortality and diseases related to it in the world.¹ Tobacco consumption often leads to leukoplakia and other oral potentially malignant disorders.²⁻⁴ The World Health Organization reported in 2013 that about 6 million deaths per year is because of smoke and smokeless forms of tobacco. This is causing an increase in health expenditure and costing \$100 billion/year.⁵

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Tobacco-related diseases, such as cancer and lung and cardiovascular diseases are the core roots of premature death worldwide.⁶ It has been appraised that smoking/chewing tobacco may reduce life expectancy by 7 to 10 years.¹ The health benefits of tobacco cessation are well established; still the prevalence of tobacco use is increasing.⁶ One-fourth of tobacco users who fail to quit tobacco use die at an average age of 20 years prior comparable with nontobacco users.¹ Every day, approximately 4,800 adolescents smoke their first cigarette, of them nearly 2,000 become regular smokers.⁷

Smoking habit is recognized as an additional important risk factor for health issues among industrial workers.⁸ Tobacco use at the workplace leads to increased absenteeism, reduced productivity, and increased occupational injuries.⁹ Besides the effects of tobacco use on worker's health, smoking causes a significant economic loss due to increased absenteeism and reduced productivity.¹⁰ In some instances, it has been reported that tobacco smoke can interact with other carcinogens at the worksite, and can increase the risk of developing lung cancer.⁸ Despite decades of awareness of the dangers of tobacco use, many tobacco users have been unable to successfully quit tobacco use. Factory workers or people living below the poverty line have little access to smoking cessation programs, and health treatment has seldom been targeted at them.¹¹ Hence, over recent years, concern has grown to cover the unattended population, such as employees at the workplace. The occupation-related inequalities in the prevalence of tobacco use are an actual challenge for the initiatives to prevent and control tobacco habit at the workplace.¹² Many tobacco users may be cognizant of the risks and motivated to stop tobacco use, but have severe difficulties in quitting the habit. In the United Kingdom and United States, 40% of smokers had made a quit attempt in the past year. Furthermore, 50% of quit attempts performed with no preplanning and 75% of quit attempts fail in the 1st week.¹ In addition, cessation rates are lower in more deprived socioeconomic groups and among the less educated. This appears to be an underlying factor in both attempts to stop and the success of those attempts. The probabilities of success of quit attempts are lower in those who live alone compared with those who live with a partner, and low among smokers as compared with those who live among nonsmokers.^{13,14} The major reason for the failure of smokers to achieve long-term abstinence is smoking relapse. Relapse is found to be more in the early quit period, and almost 75% of smokers who attempted to quit relapsed during the first 6 months of abstinence (health and services, 1990). However, tobacco relapse is a complex process that may not be similar in different populations. To date, no single metric can accurately summarize the process of relapse.¹⁵ Various

studies have identified predictors of smoking cessation in different populations and demographic frames. These include factors, such as smoking history and its initiation, marital status, depression, nicotine dependence, alcohol use, motivation, previous quit attempts, etc.^{13,16} Smoking history and the age at which they have started using tobacco products regularly are also some of the significant predictors of relapse and also predictors of tobacco cessation failure.¹⁷ Moreover, amount smoked has consistently been shown to predict failure of attempts to stop smoking.¹⁸ Several studies predicted that being in daily contact with other smokers reduced chances of quitting and also found that tobacco cessation in both the workplace and at home were significant factors of the successful tobacco cessation program.^{7,8}

These predictors were identified in clinical populations; however, predictors in workplace cessation programs may differ, especially in a developing country like India. Therefore, we hypothesized that predictors of success in workplace cessation programs differ from previous studies conducted in other countries. In addition, it was also hypothesized that differences may exist between the prevalence of tobacco use and motivation related to quit the tobacco habit.

MATERIALS AND METHODS

A cross-sectional study was conducted among factory workers in Amravati city, Maharashtra, India, in the year 2015. Before the start of the study, ethical approval was obtained from the institution. There were three major factories in Amravati district.

Pilot Survey

A pilot survey among 50 participants was carried out among the three factories. A pilot study reported that out of these three factories, one factory showed high-prevalence tobacco use. Moreover, no tobacco ban policy was implemented and few health-promotional activities were planned in the past.

Sample Recruitment

Tobacco propaganda was carried out to create awareness about the screening of tobacco use among factory workers. All participants from the factory who smoked or chewed tobacco were invited to participate in the study. Participants who were smoking or chewing tobacco 20 times or more per week for the past 30 days were included, whereas participants with unstable or life-threatening medical conditions and unwilling to participate in the study were excluded. Out of 730 factory workers who agreed and were found eligible to participate in the study, 640 actually participated and gave written consent, giving

the response rate of 89%. Most of the participants were males and fell in the age group of 18 to 60 years.

Data Collection

Data were collected by standardized and validated questionnaire pro forma. Sample questionnaire was translated into Marathi and piloted in a group of workers before initiation of the study. The first part of questionnaire comprises demographic characteristics (age, sex, education, marital status, and work category) and smoking history (age of starting tobacco use, total years of tobacco use, frequency of smoking/chewing tobacco, type of tobacco use, and tobacco use at the workplace). The second part of the pro forma was on checking the nicotine dependency of participants using Fagerström scale¹⁹ and their history of past quitting attempt. Data from both the participants were collected by an independent person with no knowledge of the study and individual participants. Depending on their past quitting attempt, participants were divided into two groups: (1) quitter group and (2) never-quit group. (Quitters: Participants were considered quitters/abstainers if at the time of the visit, they reported not having smoked/chewed tobacco for at least 24 hours; Never quit: A participant who never achieved abstinence for at least 24 hours until the time of assessment).²⁰

Statistical Analysis

Data were analyzed with descriptive statistics, and Chi-squared test was used to test the significant difference between two or more categorical values. The multivariate logistic regression analysis was performed using adjusted odds ratio (OR) and 95% confidence interval (CI). Statistical significance was considered when $p < 0.05$ and all the statistical analyses were performed using SPSS software (version 17.0).

RESULTS

In the present study, 640 (100) participants were selected and further divided into two groups, the quitter group (248 [100]) and who never quit the tobacco habit (392 [100]). Mean age among quitters (26.10 ± 7.06) was found significantly low compared with who never quit (28.98 ± 8.93). The majority of participants in quitter and who never quit were male (224 [90.3]; 360 [91.8]). Majority of quitter participants were literate (240 [96.8]) compared with those who never quit (376 [95.9]). A significant number of single (168 [67.7]) and married (80 [32.3]) participants tried quitting the tobacco habit compared with who never quit (216 [55.1] and 16 [4.1]) respectively, and this difference was found to be statistically significant. Most of the workers were skilled, and, significantly, a higher number of skilled workers tried quitting the habit

(136 [54.8]) compared with those who never tried quitting the habit (168 [42.9]). The mean age of starting tobacco use and frequency of tobacco use per day showed significant difference between the never quit group and the quitter group. However, the proportion of smokeless tobacco was found to be significantly more in the quitter group (232 [93.5]) than in the never quit group (288 [73.5]). However, significantly higher number of participants in never quit group uses the smoke form of tobacco (104 [26.5]) than the quitter group (16 [6.5]). Furthermore, it has been observed that majority of participants in quitter and never quit groups (208 [83.9]; 304 [77.6]) smoke or chew tobacco at the workplace (Table 1).

In the present study, the Fagerström test for nicotine dependence was used to understand the response of the participants in different situations. After they woke up, the significant number of participants in never quit group smoked/chewed tobacco within 5 minutes of time (80 [20.4]) than the quitter group. However, quitter group smoked/chewed within 30 to 60 minutes (104 [41.9]) after they wake up. Similarly, significant number of participants in the never quit group (88 [22.4]) find it difficult to refrain from smoking/chewing tobacco at forbidden

Table 1: Demographic profile

Demographic variables	Quitter	Never quit	p-value
Mean age	26.10 \pm 7.06	28.98 \pm 8.93*	0.00*
Sex			
Male	224 (90.3)	360 (91.8)	0.509
Female	24 (9.7)	32 (8.2)	
Education			
Illiterate	8 (3.2)	16 (4.1)	0.579
Literate	240 (96.8)	376 (95.9)	
Marital status			
Single	168 (67.7)*	216 (55.1)	0.00*
Married	80 (32.3)*	16 (4.1)	
Divorced	0 (0.0)	6 (3.3)	
Work category			
Skilled worker	136 (54.8)*	168 (42.9)	0.00*
Unskilled worker	72 (29.0)	104 (26.5)	
Semi-skilled worker	40 (16.1)	120 (30.6)*	
Age of starting tobacco use	16.13 \pm 5.24	18.59 \pm 6.79*	0.00*
Total years of tobacco use	9.87 \pm 6.79	10.43 \pm 6.88	0.31
Frequency of smoking/chewing tobacco	10.87 \pm 3.33	11.49 \pm 4.19*	0.05*
Type of tobacco use			
Smokeless tobacco	232 (93.5)*	288 (73.5)	0.000*
Smoking	16 (6.5)	104 (26.5)*	
Tobacco use at workplace			
No	40 (16.1)	88 (22.4)*	0.051*
Yes	208 (83.9)	304 (77.6)	
Total	248 (100)	392 (100)	

* $p < 0.05$ significant

Table 2: Proportion of behavioral attribute about tobacco use among study participants by Fagerström test for nicotine dependence

Fagerström test	Quitter	Never quit	p-value
How soon after you wake up do you have your first cigarette/chew tobacco? (in minutes)			0.00*
0–5	16 (6.5)	80 (20.4)*	
6–30	24 (9.7)	48 (12.2)*	
31–60	104 (41.9)*	120 (30.6)	
>60	104 (41.9)	144 (36.7)	
Do you find it difficult to refrain from smoking/chew tobacco when you are in places where it is forbidden, like in church, at the library, or in a movie theater?			0.05
Yes	208 (83.9)	304 (77.6)	
No	40 (16.1)	88 (22.4)*	
Which cigarette/chewing tobacco of the day would you hate to give up most?			0.748
First in the morning	88 (35.5)	144 (36.7)	
Any other	160 (64.5)	248 (63.3)	
How many cigarettes a day do you smoke/chew tobacco?			0.001
10 or less	184 (74.2)	272 (69.4)	
11–20	48 (19.4)	56 (14.3)	
21–30	16 (6.5)	64 (16.3)*	
31 or more	0 (0.0)	0 (0.0)	
Do you smoke/chew tobacco more frequently in the first hours of the morning than during the rest of the day?			0.567
Yes	136 (54.8)	224 (57.1)	
No	112 (45.2)	168 (42.9)	
Do you smoke/chew tobacco if you are so ill that you are in bed most of the day?			0.947
Yes	40 (16.1)	64 (16.3)	
No	208 (83.9)	328 (83.7)	
Total	248 (100)	392 (100)	

*p<0.05 significant

places. It was also found that 64 (16.3) participants in the never quit group significantly showed high frequency of smoking/chewing tobacco than the quitter group (16 [6.5]) (Table 2).

To identify the potential predictors among factory workers, multiple logistic regression analysis was applied. Analysis of gender revealed that higher OR 2.003 (95% CI: 1.001–4.009) was significantly associated with males as compared with females for willingness to quit the habit (p < 0.050). Similarly, literates significantly quit the tobacco habit compared with illiterate participants as indicated by OR 0.089 (95% CI: 0.023–0.348). It was also observed that those who had started the tobacco habit at 20 years of age and above were expected to quit the habit more than those who started at an early age (OR: 1.091; 95% CI: 1.024–1.162; p < 0.007). As per frequency of tobacco use, participants who smoked/chewed tobacco < 20 times per day were more likely to quit the habit than those who smoked/chewed more than 20 times per day (OR 1.043, 95% CI: 1.000–1.088, p<0.051) (Table 3).

DISCUSSION

The present study was conducted among 640 (100) factory workers who smoked/chewed tobacco and further, they were grouped into quitter group (248 [100]) and never quit group (392 [100]). To the best of our knowledge, no previous studies published in the past discussed any self-quit attempt. The majority of studies in the past were mainly focused on the prevalence of tobacco use among general population and effectiveness of the tobacco cessation program. The present study was focused to know the self-quit attempt and its correlation to various factors and to discover the predicting factor for quitting the tobacco habit. In the present study, the mean age among quitters was significantly low compared with those who never quit tobacco habit. This age group was in line with the study done in Mumbai by Pimpale et al.²¹ Here, the

Table 3: Predication of quitting pattern according to logistic regression

Variables	B	SE	Wald	Df	Significant	Exp (B)	95% CI for Exp (B)	
							Lower	Upper
Age	0.031	0.033	0.877	1	0.349	1.031	0.967	1.099
Sex (male)	0.695	0.354	3.847	1	0.050*	2.003	1.001	4.009
Education (literate)	-2.420	0.697	12.064	1	0.001*	0.089	0.023	0.348
Marital status			4.006	2	0.135			
Marital status (1)	-21.549	9335.811	0.000	1	0.998	0.000	0.000	
Marital status (2)	-22.162	9335.811	0.000	1	0.998	0.000	0.000	
Work category			1.784	2	0.410			
Work category (1)	-0.398	0.336	1.399	1	0.237	0.672	0.348	1.299
Work category (2)	-0.387	0.299	1.677	1	0.195	0.679	0.378	1.220
Age of starting tobacco use (>20 years)	0.087	0.032	7.349	1	0.007*	1.091	1.024	1.162
Total years of tobacco use	0.030	0.032	0.904	1	0.342	1.030	0.969	1.096
Frequency of tobacco use (<20 per day)	0.042	0.022	3.825	1	0.051	1.043	1.000	1.088

*p<0.05; SE: Standard error; Df: Degree of freedom

effect of behavioral counseling was tested among the factory workers, whereas it was quite different from the studies of workplace cessation programs carried out by Eriksen,²² Cruse et al,²³ Chong et al,²⁴ and Yilmazel et al.⁵ This contrast was found because those studies were conducted among blue- and white-collar workers, and our study engaged the factory workers in skilled, unskilled, or semiskilled work categories and of low socioeconomic status. The majority of the participants in both the groups were male and literate, but those who never quit were either less educated or illiterate. Tobacco control policy survey²⁵ by Kumar et al,^{26,27} and Prabhu et al²⁸ observed the higher prevalence of tobacco use among less-educated than more educated adults. More than 50% in both the groups were single and their chances of getting involved into the habit can be considered high compared with a married individual. Both the marital classes that tried quitting the habit in the past may have been due to peer, social, or family pressure. This can be correlated with Bindu et al,²⁹ who found married individuals less stressed compared with unmarried ones and involved easily in tobacco habit. Moreover, married people tend to have more economic advantages, and receive more social and psychological support, which can make quitting smoking easier. Type of job was significantly associated with smoking status in the present study. Most of the unskilled workers significantly never tried to quit may be due to high stress or being dissatisfied with their work. The present study findings were consistent with that of previous studies in Europe and Asia studies^{7,30,31} where it had been hypothesized that lower level occupational groups face more physical and psychosocial stress compared with the white-collar and therefore are more engaged in bad habits, such as smoking/chewing tobacco. The previous study also noted that smoking acts as a coping mechanism to manage stress.⁷

Vast majority of the smokers in our study started the tobacco habit in early adolescent age; mean age of starting tobacco use among both the groups was below 20 years. The reason for such behavior could be lack of knowledge and peer pressure at worksite. Ezat et al³² and Wee et al³³ proposed that those who started tobacco use at an early age are more likely at risk of developing dependency for long term. It was also observed that participants who smoked or chewed tobacco for < 10 years are more likely ready to quit the habit. However, most of the participants who never quit the habit were using tobacco for more than decade, which can be correlated with the study done by Pimple et al²¹ and Yilmazel et al.⁵ On the contrary, mean frequency of tobacco use among both the groups was more than 10 times per day, which was found similar to the study conducted by Pimple et al²¹ and Verra et al.³⁴

The majority of participants in quitter and never quit groups consume smokeless form of tobacco (232 [93.5]; 288 [73.5]) respectively, which is similar to Desai et al,³⁵ Kumar et al,²⁷ and Agrawal et al.³⁶ The authors reported that the prevalence of a smokeless form of tobacco was most common in Maharashtra, and it is more commonly seen among the lower socioeconomic class, whereas Agrawal et al³⁶ reported that the prevalence of tobacco use was more in an urban area. Furthermore, it has been observed that majority of participants in both the groups [208 (83.9); 304 (77.6)] smoked or chewed tobacco at workplaces. Verdonk-Kleinjan et al³⁷ and Meyers et al³⁸ reported a similar prevalence and suggested that no-smoking bans in public places and workplaces are significantly associated with increased use of tobacco, which was linked to increase in acute myocardial infarction incidence. Disease incidence can be reduced if tobacco ban policy is implemented over several years. The participants who never quit the habit smoked/chewed tobacco more frequently in the first hours of the morning compared with the quitter group. Moreover, participants in the never quit group showed a high frequency of smoking or chewing per day (>20 times). Similarly, Awojobi et al³⁹ reported that about 10% of smokers have their first cigarette >5 minutes after waking up, but the majority (53%) consumed tobacco about an hour or more after waking. It was also observed that most of the tobacco consumers hated to give up morning smoking/chewing tobacco habit.⁴⁰ Various authors postulated that those who smoked/chewed tobacco <15 times a day were found to be less dependent on nicotine.^{32,40}

Multiple logistic analysis was carried out to identify the potential predictor of quitting the habit among factory workers. Out of all demographic factors gender, literacy status, age of starting tobacco use, and frequency of tobacco use per day can be considered as good predictors to quit tobacco habit. Various authors^{7,16} identified the factors significantly associated with smoking initiation and/or smoking cessation. Among the selected predictors, age of patient, age of starting tobacco use, and lifetime tobacco exposure were the major factors to predict smoking cessation, whereas the study carried out by Agrawal et al³⁶ showed gender as the strongest predictor for smoking followed by area of residence, education, and age. Our study showed that late age of tobacco initiation can be considered as good predictor. This result was consistent with the finding of other studies.^{41,42} Ezat et al³² carried out smoking cessation in clinics and found that smoking <15 cigarettes per day is a predictor of quitting. Although many such studies agreed that a lower number of tobacco consumption has high predictive value, cigarette consumption has been considered a weak marker of tobacco dependence.^{43,44}

CONCLUSION

The present study was targeted among the factory workers who were grouped into quitters and who never quit the tobacco habit in the past. We conclude that majority of participants never quit the tobacco habit and those who quit at least once could not manage with withdrawal symptoms and eventually rebound to tobacco use. The dependency on tobacco use was found more among these participants due to job structure. Moreover, no tobacco cessation program or tobacco policy was implemented at the factory site. We found various predictors that can help in designing the tobacco cessation program for the factory workers. Therefore, thorough efforts should be expanded in research and practice to find practical solutions to help these individuals to quit tobacco habit at the workplace. We strongly recommend implementing the tobacco policy at workplaces, and there should be a monitoring body to check its effectiveness. Tobacco cessation program should be implemented at workplace rather than at hospital and clinic level. Our study was cross-sectional, which limits the study findings to correlating quitting programs with the previous study. Moreover, tobacco quitting was based on self-reporting and is not validated by any biochemical mean. In the future, more randomized controlled trials are required on factory workers to understand the actual validity of predicting factors for quitting the tobacco habit.

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