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Original Research Article

Tobacco uses and awareness about its ill-effects among municipal solid waste workers in Davangere city: a cross-sectional survey

Puja C. Yavagal[1]*, Manjunath L. A. Reddy[2], Jayanth Tadur[2], Madhurya G. Krishnan[2], Karthik K. Y. Naik[2], Neha G. V. Reddy[2], Nikhath A. R. Khan[2], Mahammad T. Kaginelli[2], Jerusa J. Naripati[2]

[1]Department of Public Health Dentistry, Bapuji Dental College and Hospital, Davanagere, Karnataka, India
[2]Bapuji Dental College and Hospital, Davanagere, Karnataka, India

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***Correspondence:**
Dr. Puja C. Yavagal,
E-mail: pujacyavagal@gmail.com

ABSTRACT

Background: Tobacco consumption among municipal waste handlers in India is a major health and economic burden. Aim of the study was to assess the prevalence of tobacco use and awareness about its ill effects among municipal solid waste (MSW) workers in Davanagere city.
Methods: A cross-sectional survey involved a stratified sample of 360 group D municipal workers aged 38.58±10.7 years in Davangere city done from January – April 2023 in the field setting. Data was collected using investigator administered structured proforma which had provision to record demographic characteristics and had a 6 items questionnaire with closed ended responses, tested for validity.
Results: Majority were female workers (51%). Around 74% of were sweepers and rest were waste collectors. Self-reported systemic diseases and oral health problems were prevalent among 11% and 13.33% respectively. Around 39.3% reported using tobacco wherein, 31% used smokeless form and 8.3% used smoking form. Average age of onset of smoking was 25.35±6.39 years. Betel nut and leaf was most common additive (23.3%) used with smokeless tobacco followed by gutka and pan masala. The mean knowledge score of participants was 8.49±1.1 reflecting good knowledge about ill effects of tobacco consumption. Majority of workers believed that tobacco was injurious to health (91.3%), 86.7% were aware of early signs of oral cancer.
Conclusions: Inspite of fair knowledge about harmful effects of tobacco consumption the prevalence of tobacco use was high among group D municipal workers of Davanagere city.

Keywords: Group D workers, Municipal workers, Tobacco, Prevalence, Knowledge

INTRODUCTION

The foundation of the municipal cleaning system is the sanitation workforce. There are around 1.2 million sanitation employees in India.[1] In urban areas of a developing nation like India with little resources, the majority of cleaning is carried out by hand. These personnel are exposed to dirt, infectious organisms, and other dangerous elements like chemicals, animal excreta, and sharp objects due to insufficient segregation of waste materials at the source and all forms of garbage being disposed of on the streets.[2] They have unintended traumas, skin diseases, respiratory and digestive problems, eye and ear infections, and other ailments. There are exposure pathways for the majority of these diseases (water, air, and contact-borne), and there are contact pathways for the majority of injuries (hepatitis B virus [HBV], human immunodeficiency virus [HIV], and tetanus).[2] Adding to this health burden, the prevalence of addictions, including those to smoking and gutkha is high (76%) in this population which might be attributed to peer pressure and

lack of education.[3] A study done in Aurangabad revealed that around, 138 (75.82%) workers were addicted to one or the other addiction like tobacco, alcohol, gutkha, and smoking.[3] A study done among sanitation workers in Allahabad showed that prevalence of smoking was seen more in younger age group and tobacco chewing habit was more prevalent among old age group. Dental caries, missing teeth and enamel erosion were higher in tobacco users that non users.[4] Waste loaders and street sweepers of Mumbai were significantly more likely to smoke, consume alcohol and chew tobacco based on a study by Salve et al.[5] Around 65.6% of the MSW workers in Karimnagar and Hyderabad reported smoking and chewing tobacco and 26% of them consumed alcohol.[6] Tobacco consumption among municipal waste handlers is a major health and economic burden. A study trying to explore the prevalence of tobacco consumption among this vulnerable population in Davanagere city might provide valuable baseline data which would help in planning awareness and treatment programs targeted at reducing tobacco consumption in this population. Hence, a study was planned to assess the prevalence of tobacco use and awareness about its ill effects among municipal solid waste (MSW) workers in Davanagere city using a pre-validated investigator administered questionnaire.

METHODS

Study design was descriptive, cross sectional questionnaire survey conducted between March 2023 to May 2023. The study was conducted among municipal solid waste (MSW) workers in Davanagere city. It was done in field setting. Sample size was scientifically calculated using the formula.[7]

$$n = 4p(1-p)/d^2$$

Where n=sample size, p=65% prevalence of tobacco use among municipal solid waste workers based on previous study, and d=0.05 (precision of the study).[6] Substituting the values in the above mentioned formula, the sample size calculated was 352 which was approximated to 360 (n).

Sampling method

Around 300 municipal solid waste collectors and 500 road sweepers assembled at 22 reporting sites of municipal wards in Davanagere city. Each municipal site was supervised by an in-charge municipal supervisor. A stratified random sample of 360 solid waste workers were selected out of 800 population of workers. Around ten reporting sites were randomly selected out of the list employing a lottery method. At each site, first 36 workers who voluntarily wished to participate were selected based on consecutive sampling method.

Eligibility criteria of study participants

Municipal solid waste workers (group D workers -solid waste collectors and sweepers) in Davanagere city who consented were included in the study. Municipal workers who were absent on the day of data collection at the respective waste collection sites were excluded. Ethical approval was obtained from the Institutional Ethical Review Board of college to which authors were affiliated. Permission to conduct the study was obtained from Director and Principal of concerned Dental College and The Commissioner of Davanagere City Municipal Corporation. Voluntary informed consent was obtained from the study participants after explaining them about the purpose of conducting the study and procedure of collecting the data through participant information letter.

Method of data collection

Data was collected using investigator administered pre tested, structured proforma containing both open and closed ended questions. The proforma was divided into two sections: First section had the provision to record demographic characteristics like name, age, address, contact number, nature of work, socio economic status and years of service and second section had a questionnaire to record details related to tobacco use and knowledge related to ill effects of tobacco use. A questionnaire was framed consisting of 6 items to assess the awareness related to ill effects of tobacco use. All questions were closed ended. The responses for items 1,3,5,6 were on dichotomous scale and responses for 1 and 2 items were multiple choice.

Validation of the questionnaire

Language validity of the questionnaire

As majority of the population preferred Kannada questionnaire, for easier understanding and unbiased answers, Kannada questionnaire was prepared by translating all the questions in the English to Kannada-by-Kannada scholar. It was later retranslated into English by translation experts well versed in both Kannada and English by Back translation method. This was done to check the translation validity.

Content validity of the questionnaire

The questionnaire was tested for content validity by 5 validators (two public health dentists, one community medicine specialist and two oral medicine specialists. Items in the questionnaire were assessed for relevance, simplicity, clarity and ambiguity. The content validity index (CVI) of questionnaire was computed and validity was tested. According to Yaghmale et al, the item with CVI score over 0.75 was recommended as acceptable CVI value.[6] A satisfactory level of agreement was found as reflected by every score for each item among the five validators, i.e., CVI score for relevance=0.86, clarity=0.83, simplicity=0.92, and ambiguity=0.96, respectively. These CVI values suggested that the questionnaire had a good content validity. Necessary modifications were done based on comments of the validators. Face validity of the questionnaire was determined by administering the

questionnaires to solid waste workers. A satisfactory level of agreement was found among participants regarding the clarity and understandability of the questions and language of the questionnaire

Details of pilot study

A pilot study was conducted to check the feasibility, reliability and internal consistency of questionnaire. The questionnaire was administered to 20 participants for pilot testing. After a period of three days the questionnaire was again re-administered to the same participants to check the reliability by test-retest method. The Kappa score was 0.9 which reflected good reliability of the questionnaire. Cronbach's α was 0.75 which reflected good internal consistency. The questionnaire was investigator administered.

Method of data collection

Data was collected from municipal solid waste workers by asking them questions and entering it in a proforma at the premises of reporting sites of workers. Sufficient time was given to participants to answer the questionnaire. Maximum time of 20 minutes per participant was allowed to answer the questionnaire. Participants were not allowed to discuss among themselves during answering of questionnaires.

Statistical analyses

The data obtained was compiled systematically in Microsoft excel sheet. IBM statistical package for the social sciences (SPSS) Statistics for Windows, version 20 (IBM Corp., Armonk, N.Y., USA) was used for statistical analysis. The significant level was fixed at $p<0.05$. Responses were expressed in terms of frequencies and percentages.

RESULTS

The mean age of participants was 38.58±10.7 years with an average work experience of 12.10±8.95 years. Majority were female workers (51%). Around 74% of group D workers were sweepers and rest were waste collectors. Almost 99% of them belonged to upper lower class based on modified Kuppuswamy scale with an average of 5.02±2.13 members in a family (Table 1).

Around 11% of them reported of having systemic diseases majorly hypertension (5%), diabetes (3%), body ache (1.7%) and heart problems (1.3%). Around 10% were on medications. Self-reported oral health problems were prevalent among 13.33% of workers. Around 9% reported having decay followed by tooth loss and bleeding gums in 1.6% each and stains in 1% of workers. Around 19.7% reported of consuming alcohol with 10.7% having it rarely and 9% occasionally. Arecanut consumption was reported by 49% of workers with 17.7% consuming it after every meal ,16.7% rarely and 14.7% occasionally. Nearly half of the workers cleaned their teeth twice daily (50%) with majority using tooth brush and paste (94.3%) (Table 2).

Table 1: Demographic details of the study population.

Socio-demographic factors	Number of subjects (%)
Gender	
Male	148 (49)
Female	152 (51)
Age	
Mean age (years)	38.58±10.07
Number of family members	5.02±2.13
Years of service	12.10±8.95
Socio-economic status	
Upper lower class	296 (98.7)
Lower class	4 (1.3)
Type of work	
Solid waste collector	78 (26)
Sweeper	222 (74)

Around 39.3% reported using tobacco wherein, 31% used smokeless form and 8.3% used smoking form of tobacco. Among smokers, 5.6% used beedis and 2.7% used cigarettes. Around 2.3% smoked weekly and rest occasionally and daily. On an average smokers smoked 8.6±2.82 beedis/cigarettes daily. Duration of smoking was 7.5±5.07 years. Average age of onset of smoking was 25.35±6.39 years. Data collected from workers using smokeless tobacco revealed that many consumed it in powder form (19%).Betel nut and leaf was most common additive (23.3%) used with tobacco followed by gutka and pan masala. Around 18.6% used tobacco for 0-5 years followed by 5-10 years by 6.6%. Only 5.6% used it for more than 10 years. Majority started using tobacco at the age of 30-40 years (21.3%). 1.6% of them started using it as early as 11-20 years. Around 15.6% tried to quit tobacco out of which 6.6% tried to quit twice and 2.6% tried more than twice. Participants expressed stress as the major reason for relapse (29.75), followed by 1.7% reporting severe withdrawal symptoms and less than 1% reporting social pressure. Around 39.3% reported use of tobacco among their first-degree relatives (Table 3). The responses to knowledge-based questions were assigned scores and the knowledge score per person ranged between 5-10, which was categorized as good knowledge (7.5-10) and poor knowledge (5-7.4). The mean knowledge score of participants was 8.49±1.1 reflecting good knowledge of group D municipal workers towards ill effects of tobacco consumption. Around 80% of workers had good knowledge and 20% had poor knowledge. Majority of workers believed that tobacco was injurious to health (91.3%). Around 86.7% were aware of early signs of oral cancer and 72.3% were aware that tobacco consumption was linked to various health issues like breathing problems, heart problems, nerve problems, pregnancy complications, Infertility, oral problems and cancer (Table 4).

Table 2: Self-reported health and oral health parameters.

Self-reported health	Number of subjects (%)
Systemic diseases	
Present	33 (11)
Absent	267 (89)
Type of systemic diseases	
Absent	267 (89)
Heart related problems	4 (1.3)
Hypertension	15 (5)
Diabetes	9 (3)
Body ache	5 (1.7)
History of medications	
No	270 (90)
Yes	30 (10)
Self-reported oral problems	No
Present	40 (13.33)
Absent	260 (86.67)
Type of self-reported oral problems	
None	260 (86.67)
Decay	27 (9)
Gum bleeding	5 (1.7)
Stains	3 (1.5)
Loss of teeth	5 (1.7)
Alcohol consumption	
Yes	59 (19.7)
No	241 (80.3)
Frequency of alcohol consumption	
Non alcoholic	241 (80.3)
Rarely	32 (10.7)
Occasionally	27 (9)
Arecanut consumption	
Yes	147 (49)
No	153 (51)
Frequency of arecanut consumption	
Never	153 (51)
Rarely	50 (16.7)
Occasionally	44 (14.7)
After every meal	53 (17.7)
Frequency of cleaning teeth	
Weekly	10 (3.3)
Once daily	140 (46.7)
Twice daily	150 (50)
Method of cleaning teeth	
Tooth brush and powder	8 (2.7)
Tooth brush and paste	283 (94.3)
Finger and tooth paste	8 (2.7)
Finger and tooth powder	1 (0.3)

Table 3: Responses related to tobacco use.

Tobacco use	Number of subjects (%)
Tobacco use	
Yes	118 (39.3)
No	182 (60.7)
Form of tobacco	

Continued.

Tobacco use	Number of subjects (%)
Smoking form	25 (8.3)
Smokeless form	93 (31)
Type of smoking form of tobacco	
Cigarette	8 (2.7)
Beedi	17 (5.6)
Frequency of smoking	
Daily	5 (1.7)
Weekly	7 (2.3)
Monthly	6 (2)
Occasionally	7 (2.3)
Number of cigarettes/beedis consumed per day	8.6±2.82
Duration of smoking habit	7.5± 5.07
Age of onset of smoking	25.35±6.39
Type of smokeless form of tobacco	
Powder	57 (19)
Leaf	36 (12)
Type of additive used with tobacco	
Pan masala	9 (3)
Beetel nut and leaf	70 (23.3)
Gutka	14 (4.7)
Frequency of smokeless tobacco consumed per day	
Once	30 (10)
Twice	32 (10.6)
More than twice	31 (10.3)
Duration of smokeless tobacco consumption habit	
0-5	56 (18.6)
5.1-10	20 (6.6)
More than 10	17 (5.6)
Age of onset of smokeless tobacco consumption habit (years)	
11-20	5 (1.6)
21-30	12 (4)
30-40	64 (21.3)
More than 40	12 (4)
Attempt to quit tobacco	
Yes	47 (15.6)
No	0 (84.4)
Quit attempts	
Once	10 (3.33)
Twice	20 (6.6)
More than twice	17 (2.6)
Reason for relapse	
Stress	89 (29.7)
Withdrawal symptoms	5 (1.7)
Social pressure	1 (0.3)
Family history of tobacco use among first degree relatives	
Yes	118 (39.3)
No	182 (60.7)

Table 4: Responses to knowledge related questions.

Items	Response	
	Yes	No
Tobacco is injurious to health	274 (91.3)	26 (8.7)
Tobacco use is linked to breathing problems/heart problems/nerve problems/problems in pregnancy/infertility/oral problems/cancer	217 (72.3)	83 (27.7)

Continued.

Items	Response	
	Yes	No
Are you aware of early signs of oral cancer related to tobacco use?	260 (86.7)	40 (13.3)
Are you aware that second hand smoke is injurious to health?	211 (70.3)	89 (29.7)
Are you aware of assistance available for quitting tobacco use	91 (30.3)	209 (69.7)

DISCUSSION

Based on the results of the study majority of municipal group D workers had good knowledge regarding harmful effects of tobacco. The prevalence of tobacco use was 39.3% out of which 31% were using smokeless form of tobacco and 8% smoking form. Similar study done by Ansari et al in Allahabad revealed that 4.75% of sanitation workers were smokers, 15.9% used both smokeless and smoking form and 55.24 used smokeless form.[4] Another study by Sangeetha et al revealed that 11% of group D workers of 4 hospitals in Bangalore were smokers 1.4% used Gutka.[8] Mahajan et al observed that around 75% of sanitary workers in Aurangabad city were addicted to smoking, alcohol and chewing tobacco.[3] Lack of awareness about oral health and implied health risks could be the possible reasons for high prevalence of tobacco use which was reported in a study by Chandrashekar et al who did a survey of municipal workers in Mysore city.[9] In the present study, inspite of good knowledge regarding harmful effects of tobacco, majority workers used it because of stress and peer pressure. Use of smokeless form of tobacco was more prevalent in the present study. The reason for this could be that smokeless forms are believed to pose fewer systemic risks whereas smoking tobacco is viewed as being more dangerous overall, unlikely to produce any advantages, and likely to rule-breaking charges.[10] Similar views were expressed by participants in the study by Chaffee et al.[11]

Smokeless tobacco is a complex chemical mixture that contains a variety of chemicals and additives, including flavors, areca nut, and slaked lime, and used with betel leaves.[12,13] Products made from smokeless tobacco (SLT) are incredibly complex, with about 4000 different compounds found in them, many of which are dangerous, mutagenic, and carcinogenic.[14] Nicotine, the most addictive ingredient in tobacco, comes in both protonated and unprotonated forms. Nicotine bioavailability is increased when slaked lime is added to smokeless tobacco preparation.[15,16] Betel quid with tobacco, Khaini, Gutka, Pan Masala with tobacco, Zarda, Mishri, Mawa, Gul, Bajjar, Gudhaku, and other smokeless tobacco products are widely available and used in India. These items can be chewed, sucked, or placed between the cheek, gum, or teeth.[17,18] According to the global adult tobacco survey-2, (GATS 2), every third adult in rural India and every fifth adult in urban India consumes tobacco in some form or another.[19] Thus, 28.6% (266.8 million) of adults in India aged 15 and above use tobacco in some form. The prevalence of tobacco usage in India is 42.4% among men and 14.2 % among women. The most popular tobacco product is Khaini (tobacco and lime mixture), which is used by one in every nine adults (11.2%), followed by bidi, which is smoked by 7.7% of adult Indians.[20] Gutkha (a mixture of tobacco, lime, and areca nut) is ranked third (6.8%), and betel quid with tobacco is ranked fourth (5.8%). In India, 18.4% of women use smokeless tobacco(SLT), and because smoking is typically a socially taboo (GATS 2), SLT is used as an alternate and more acceptable form of tobacco intake.[21] Affordability and accessibility lead to increased use of smokeless tobacco products, including through illicit trade.[22] Even in instances of jurisdictional ban, the sale and possession of smokeless tobacco products, continue through illicit means.[18] Oral cancer, oral mucosal lesions, periodontal disease, salivary gland hypofunction, dental caries are among many other oral diseases and conditions linked to tobacco use.[23]

Tobacco, smoked or smokeless, causes oral squamous cell carcinoma (OSCC).[24] Cigarettes and other combusted tobacco products are dangerous nicotine delivery devices that contain a complex mixture of tumor promoters, co-carcinogens, and various toxicants that exacerbate the effects of the carcinogens.[25] In a narrative review of 32 selected articles, Jiang et al proposed a plausible carcinogenic pathway attributing tobacco as the major risk factor for OSCC. Tobacco may cause epigenetic alteration of oral epithelial cells and inhibit multiple systemic immune functions of the host. Its toxic metabolites may also cause oxidative stress on tissues releasing reactive oxygen species that can damage, cause mutations and induce oral squamous cell carcinoma.[24] In a meta-analysis of 15 case-control studies, Sadri et al found that smokers are 4.65 (95% CI: 3.19–6.77) times more likely to have oral cancer.[26] Another systematic review found tobacco chewing increased the risk of oral cancer by 4.7 (95% CI: 3.1–7.1) times and paan (betel leaf and areca nut) with tobacco increases the risk by 7.1 (95% CI: 4.5–11.1) times.[27] A systemic review of 1179 cases and 5798 controls found that people exposed to secondhand smoke (SHS) are 1.51 (95% CI: 1.20–1.91) times more likely to have oral cancer. When the duration of exposure was more than 10–15 years, the odds ratio increased to 2.07 (95% CI: 1.54–2.79).[28] Smoking and alcohol have a synergistic effect on oral cancer development.[29] A strong association has been found between tobacco use and mucosal lesions such as leukoplakia, smokeless tobacco keratosis at the site of tobacco placement, nicotinic stomatitis, smoker's melanosis and erythroplakia.[30.31] About 3 to 6% of leukoplakias undergo malignant transformation, with this frequency increasing with longer follow-up periods. Epithelial dysplasia may appear clinically as white or red due to hyperkeratosis or epithelial atrophy, respectively.[30] Heavy smokers may also have a condition called the black hairy tongue. The dorsal surface of the tongue has a hair-

like appearance due to hypertrophy of filiform papillae and retardation of the normal rate of desquamation.[31] Smokers have higher gingival recession, tooth loss, and pocket depths compared to non-smokers.[32] A recent systematic review found that tobacco smoking increases periodontitis by 85% (RR=1.85; 95% CI: 1.5–2.2).[33] Majority cleaned their teeth twice daily. Similar result was observed in the study done by Sangeetha et al.[8] Many consumed arecanut in the present study. Similar result was seen in the study done by Sangeetha et al where, 19.8% consumed arecanut.[8] Since arecanut chewing is implicated in oral leukoplakia and submucous fibrosis, both of which are potentially malignant in the oral cavity it's a cause of serious concern to health professionals.[10] Alcohol consumption was seen in 19.7%. Similar prevalence was reported in few studies.[5,8] Around 11% suffered from systemic diseases in the present study. Similar results were seen in few studies.[3,8]

Even with the adequate knowledge on ill effects of tobacco, it's wide - spread use is not surprising among group D sanitation workers because of the addictive properties of tobacco. Those who get addicted and dependent require motivation and sustained efforts to get rid of this habit. Hence, a high level of awareness and health education is needed to encourage these people to give up this habit. A stronger focus from the government is imperative when it comes to crafting comprehensive policies and guidelines aimed at supporting the welfare of municipal solid waste (MSW) workers. Collaborative efforts between human rights advocates, researchers, and administrative personnel are essential to delve into the inherent difficulties confronted by these workers and to extend compassionate assistance and social welfare initiatives. Conducting studies that examine different segments within the MSW workforce is highly advisable, as this would yield a more profound insight into their means of sustenance.

Furthermore, a pertinent avenue of exploration involves investigating the occupational practices of MSW workers, both during and subsequent to public health emergencies. Such a study could prove invaluable in understanding their work dynamics and challenges they face during tobacco quit. There are specific strengths and limitations of the study. The major strength was that this study was the first study done in Davanagere establishing the baseline data of tobacco use among the group D workers which would further help dental professionals and policy makers to plan various health promotion activities for the group D workers.

However, the cross-sectional nature of data collection couldn't assess the temporality between intention to quit tobacco and awareness. Since the study was a questionnaire survey, social desirability bias might have influenced the responses of participants. This study was limited only to group D municipal workers of the city which might not explain the point of generation of awareness about ill effects of tobacco use.

CONCLUSION

Inspite of fair knowledge about harmful effects of tobacco consumption, the prevalence of tobacco use was high among group D municipal workers of Davanagere city. It is important to acknowledge that the essential task of ensuring environmental cleanliness and sanitation hinges upon the dedication of MSW workers. Therefore, the urgency of safeguarding their health, security, and intrinsic dignity cannot be overstated.

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