

Assessment of Exhaled Carbon Monoxide Levels, Knowledge, Awareness, Attitude, and Perception toward Tobacco Use and Oral Cancer among Residents of Thirumazhisai, Tamil Nadu

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ABSTRACT

Background: Tobacco use is the leading cause of preventable death worldwide. Tobacco raises mortality and morbidity contributing to global epidemic disease burden. **Aim:** The present study was conducted to assess expired carbon monoxide levels, knowledge, awareness, attitude, and perception toward tobacco use and oral cancer among residents of Thirumazhisai, Tamil Nadu. **Materials and Methods:** This was a population-based descriptive cross-sectional study in which data were collected. Data were collected by a self-administered questionnaire by considering all possible variables according to information, developed on the basis of relevant literature. The questionnaire consisted of four parts. Demographic characteristics are presented in frequency and Chi-square test was used to compare the qualitative variables and parametric test like t-test was used for quantitative variables such as such as age, frequency of using tobacco, and duration of tobacco usage. **Results:** A carbon monoxide level between 0 and 5 ppm was demonstrated by a greater proportion of 28 smokeless tobacco users than 20 (53%) smokers which denotes the tobacco dependence levels which should also be taken in to consideration while formulating appropriate polices for restriction of tobacco. **Conclusion:** The major finding of the study was that the study subjects had poor knowledge, inadequate awareness, and negative attitude toward oral cancer and tobacco use.

KEY WORDS: Attitude, Knowledge, Laws, Policies, Tobacco

INTRODUCTION

Tobacco use is the leading cause of preventable death worldwide. The World Health Organization reports that tobacco is the sixth risk factor out of eight for death of approximately 6 million people every year and estimates an increase in the annual death toll to more than 8 million by 2030.^[1,2] Tobacco raises mortality and morbidity contributing to global epidemic disease burden.^[3-6] Families of smokers on an average spend thrice more than non-smokers for illness episodes.^[7]

The Global Adult Tobacco survey conducted in India between 2016 and 2017 concludes that among

266.8 million tobacco users which are estimated to be 28.6%. The report estimates that 19.0% of men, 2.0% of women, and 10.7% (99.5 million) of all adults currently smoke tobacco while 29.6% of men, 12.8% of women, and 21.4% (199.4 million) of all adults currently use smokeless tobacco. The same survey estimates revealed that the overall consumed of tobacco was approximately 42.4% in all men and 14.2% in females.^[8]

The World Health Organization in 2019 has revealed facts that tobacco kills up to half of its users which is more than 8 million people each year. More than 7 million of those deaths are the result of direct tobacco use while around 1.2 million are the result of non-smokers being exposed to second-hand smoke. It has also estimated that around 80% of the world's 1.1 billion smokers live in low- and middle-income countries.^[1]

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Tobacco products contain dried processed leaves of the tobacco plant *Nicotiana rustica* or *Nicotiana tabacum*, which is harmful to human health.^[9,10] Tobacco smoke contains more than 4000 chemicals and around 40 carcinogens, including nicotine, tar, carbon monoxide (CO), methoprene, propylene glycol, benzopyrene, butane, cadmium, acetone, ammonia, lead, benzene, and formaldehyde.^[11]

Carbon monoxide is a colorless and odorless gas. CO breath is correlated to the number of cigarettes smoked during the past 24 h as well as to the time since the last cigarette smoked. CO analyzers have great potential to be used as an adjunct in achieving the goal of combating tobacco addiction.

The measurement of expired carbon monoxide levels might be useful in smoking cessation programs in terms of emphasizing these levels to smokers who might become aware of the direct benefits of smoking cessation as CO levels decrease to normal levels after cessation.^[12]

The present study was undertaken with an aim to assess the knowledge, awareness, and attitude toward the risk factors, symptoms, and diagnosis of oral cancer and tobacco use, the levels of expired CO and also to investigate the barriers in translating the knowledge into practice among residents of Thirumazhisai area in Chennai, Tamil Nadu.

MATERIALS AND METHODS

Study Design

This was a population-based descriptive cross-sectional study in which data were collected during the weekends to gain the maximum sample size from residents by stratified sampling. It was done on a single day as repeat visits would lead to duplication of the data as the same people may be given questionnaires repeatedly. The questionnaire was pretested for clarity and data were collected from all those who gave consent with willingness to participate. All data were anonymous and confidential.

Study Period

The proposed study was conducted from April 2018 to May 2018.

Study Population

Thirumazhisai is located on the western corridor a suburb of Chennai Metropolitan City in Thiruvallur district of Tamil Nadu, India. This town panchayat has population of 19,733 of which 9884 are males while 9849 are females as per report released by Census India 2011. Literacy rate is 81.42% higher than state average of 80.09%. Male literacy is around 87.86% while female literacy rate is 74.98%. It has over 5220

houses.^[13] Residents of this area were selected as study participants.

Sample Size Calculation

Considering the estimated population size of Tamil Nadu to be 6.79 crores in 2012 (online data), with 95% confidence level and 5% allowed margin of error, we need 385 participants for this survey. Due to 10–15% sample loss that could be estimated due to loss of data or inappropriate data, we plan to recruit 425 participants to this survey.

Research Instrument

Data were collected by a self-administered questionnaire by considering all possible variables according to information, developed on the basis of relevant literature. The questionnaire consisted of four parts. The first part was framed to receive demographic details. The next section was framed to determine awareness regarding oral cancer. Questions to assess knowledge contained queries on incidence of oral cancer worldwide and in India along with specific symptoms, risk factors, and methods of diagnosis. The third section comprised queries to gather information regarding tobacco consumption and the final fourth part consisted of queries for determining attitude regarding the same. The maximum questions were close ended and the possible answers were “yes” or “no.”

Data Analysis

Obtained data were checked for error and then data entry was completed and finally data will be analyzed using SPSS 11.0 software. Demographic characteristics are presented in frequency and Chi-square test was used to compare the qualitative variables and parametric test like t-test was used for quantitative variables such as such as age, frequency of using tobacco, and duration of tobacco usage.

RESULTS

Table 1 shows the distribution of the study participants based on gender and tobacco habit. All the smokers and smokeless tobacco users in our study were males. In the non-smokers group, there were nearly 22 (62.9%) males and 13 (37.1%) females contributing to a total of 35 (100%) non-smokers.

Table 2 shows the distribution based on the responses for perception about oral cancer leading to death. This

Table 1: Distribution of the study participants based on gender and tobacco habit

Groups	Male	Female	Total
Smoker	38 (100%)	0	38 (100%)
Non-smokers	22 (62.9%)	13 (37.1%)	35 (100%)
Smokeless tobacco users	33 (100%)	0	33 (100%)

Table 2: Distribution based on the responses for perception about oral cancer leading to death

Smokers (%)			Smokeless tobacco users (%)			Non-smokers (%)		
Yes	No	Do not know	Yes	No	Do not know	Yes	No	Do not know
68.4	8	10.5	66.7	24.2	9.1	54.3	17.1	28.6

table shows us that despite the fact of being smokers, majority of them 26 (68.4%) of them believed that oral cancer leads to cancer while around 22 (66.7%) of the smokeless tobacco users also had the same perception. Out of the total 106 study participants, 22 (20.8%) of them disagreed with the above fact while nearly 17 (16%) of them were totally unaware about it. This table also reveals that around 8 (21.1%) and 8 (24.2%) of the smokers and smokeless tobacco users, respectively, have responded that oral cancer does not lead to cancer. Few of the smokers 4 (10.5%) and 3 (9.1%) smokeless tobacco users did not have any idea regarding the same.

Table 3 shows the distribution of the study participants based on their responses regarding inhalation of cigarette smoke from others causing hazard to health. This table reveals that the highest percentage of the study participants in every group, that is, nearly 76.3% of the smokers, 75.8% of the smokeless tobacco users, and even 77.1% of non-smokers was of the opinion that inhalation of cigarette smoke from others does not cause any hazard to health. This table also shows that only 23.7% of the smokers followed by 24.2% of the smokeless tobacco users and 22.9% of the non-smokers had agreed and was aware of the fact that inhalation of cigarette smoke from others causes hazard to health.

Table 4 shows the distribution of study based on their responses for complications of second-hand smoking. This table shows us that 34.2% of the smokers were of the opinion that respiratory infection in children was caused as a result of inhalation of cigarette smoke from others while a similar proportion of them thought it to be lung cancer. This similar pattern of response was obtained from 13.2% for asthma in children, throat cancer, and abortion. However, 31.6% of them believed to have no effect. It was thought to be heart disease by 21.1% followed by premature birth by 15.8%. Only nearly 2.6% of them had believed it to be complications during birth. Around 66.7% of the smokeless tobacco users are of the opinion that inhalation of cigarette smoke from others do not cause abortion and premature birth while 33.3% of them agree to it. A higher percentage comparatively has disagreed to the options given among the smokeless tobacco users with 48.5% of them stating that there was no effect, 33.3% of them of the opinion, namely, abortion and premature birth and 21.2% of them opting respiratory infection in children. Around 18.2% of them have stated that lung cancer is the

cause as a result of inhalation of cigarette smoke from others while 12.1% of them were of the opinion complications during birth and asthma in children. It was thought to be heart disease and throat cancer by around 9.1% and 6.1% of the smokeless tobacco users, respectively. According to the awareness level of non-smokers, only 48.6% and 45.7% of them have revealed that respiratory infection in children and lung cancer were the cause as a result of inhalation of cigarette smoke from others respectively. Around 28.6% of them were of the opinion of heart disease followed by complications during birth by around 20%. Abortion and throat cancer options were opted by an equal proportion of 14.3% within the non-smokers group. The same pattern of response has been obtained for the responses, namely, asthma in children and nil effect by the least around 2.9% of them.

Graph 1 shows the distribution of study participants based on the type of help needed to quit tobacco. This figure reveals that nearly 27.3% of the smokeless tobacco users and 15.8% of the smoker have revealed that they did not require any type of help to quit tobacco. However, around 42.1% and 31.6% of the smokers preferred individual counseling by a professional and a peer who had quit tobacco, respectively. This figure also shows that 36.4% and 27.3% of the smokeless tobacco users also had similar choice in the same pattern mentioned above. It was found that group counseling by a professional counselor was also a type of help needed by 9.1% of the smokeless tobacco users and 7.9% of the smokers, respectively.

Graph 2 shows the distribution of the study participants based on the numbers of smokers and breathes CO level. This figure reveals that carbon monoxide levels between 0% and 5% were demonstrated by a greater proportion of 28 smokeless tobacco users than 20 smokers. It also reveals that it was >5% among 13 smokers. The above figure also shows that five smokeless tobacco users showed a carbon monoxide level beyond 10% while four smokers demonstrated the similar level. The highest level of carbon monoxide was observed by a smoker which was beyond 20% and <25%. It was also clear that none of the smokeless tobacco users demonstrated a carbon monoxide level beyond 15%. This figure also shows that none of the tobacco users had levels and >25% and between 16% and 20%.

DISCUSSION

Most of the smokeless tobacco users 22 (66.7%) were Hindi speaking while the least 1 (3%) was speaking Marathi and 10 (30.3%) were Tamilians. A majority of the non-smokers were Tamil speaking while the least of about 3(8/6%) were Telugu-speaking residents. Although language is not a barrier for usage of tobacco, it is found in a study conducted by Ali and Watson that

it is an evident barrier in any country or setting as it can affect the ability of health care workers to communicate effectively with their patients and thereby has a negative impact on the provision of appropriate, timely, safe, and effective care to meet patient's needs.^[14]

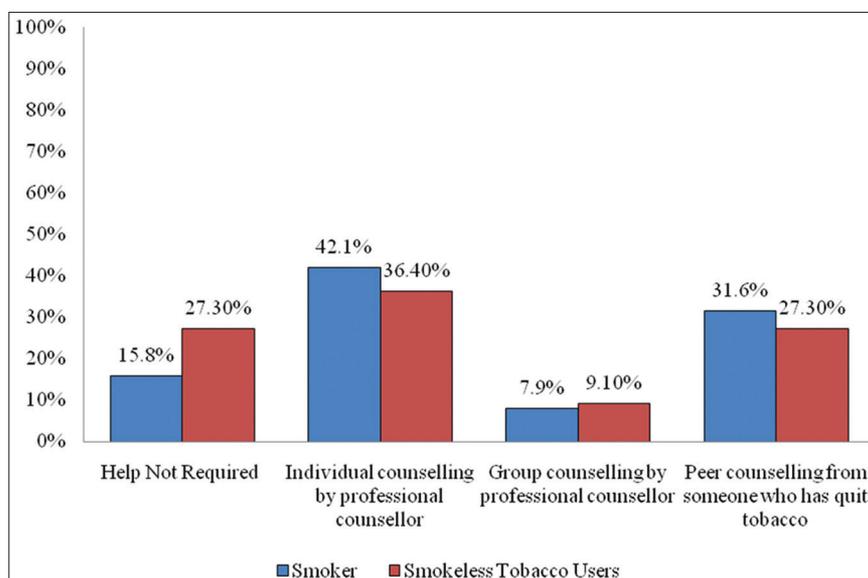
Despite the fact of being smokers, majority of them 26 (68.4%) of them believed that oral cancer leads to cancer while around 22 (66.7%) of the smokeless tobacco users also had the same perception. Out of the total 106 study participants, 22 (20.8%) of them disagreed with the above fact while nearly 17 (16%) of them were totally unaware about it. About 8 (21.1%) and 8 (24.2%) of the smokers and smokeless tobacco users, respectively, have responded that oral cancer does not lead to cancer. Few of the smokers 4 (10.5%) and 3 (9.1%) smokeless tobacco users did not have any idea regarding the same. The findings of this study are in contrast to most of the surveys so far that have frequently revealed oral cancer as one of the least well-known cancers.^[15-18]

Table 3: Distribution of the study participants based on their responses regarding inhalation of cigarette smoke from others causing hazard to health

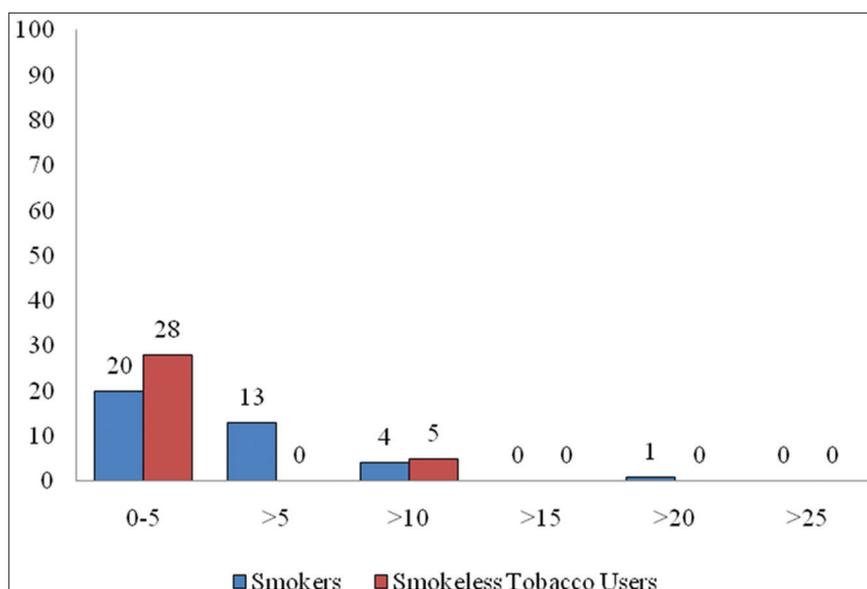
Groups	Inhalation of cigarette smoke from others causes hazard to health		
	Yes	No	Do not know
Smokers	23.7	76.3	0
Smokeless tobacco users	24.2	75.8	0
Non-smokers	22.9	77.1	0

Table 4: Distribution of study based on their responses for complications of second-hand smoking

Complications of second-hand smoking	Smokers		Smokeless tobacco users		Non-smokers	
	Yes	No	Yes	No	Yes	No
Abortion	13.2	86.8	33.3	66.7	14.3	85.7
Premature birth	15.8	84.2	33.3	66.7	8.6	91.4
Complications during birth	2.6	97.4	12.1	87.9	20.0	80.0
Respiratory infection in children	34.2	65.8	21.2	78.8	48.6	51.4
Asthma in children	13.2	86.8	12.1	87.9	2.9	97.1
Heart disease	21.1	78.9	9.1	90.9	28.6	71.4
Throat cancer	13.2	86.8	6.1	93.9	14.3	85.7
Lung cancer	34.2	65.8	18.2	81.8	45.7	54.3
No effect	31.6	68.4	48.5	51.5	2.9	97.1



Graph 1: Distribution of the study participants based on the type of help needed to quit tobacco



Graph 2: Distribution of the study participants based on the numbers of smokers and breathe CO level

Majority of the smokers 25 (65.8%), smokeless tobacco users 19 (57.6%), and non-smokers 13 (37.1%) perceived that consumption of alcohol does not cause oral cancer. These results are in line with the reported lower recognition of alcohol consumption as a risk factor compared with tobacco as in a survey in New York conducted by Cruz *et al.* which observed that only 25% of the individuals knew that alcohol was a risk factor.^[18] A similar percentage was found by Warnakulasuryia *et al.* in about 8 (19%) for Great Britain and by Rogers *et al.* for the Mersey region from 21%.^[15,19-27]

Out of 106 study participants, majority of them in every group and overall as well agreed that usage of cigarette and bidi smoking causes oral cancer. About 10 (9.4%) of the total members in this study disagreed to the above fact while 3 (2.8%) of them were not aware of it. This finding of the present study is similar to another study in which there was awareness of the relationship between oral cancer and smoking among 89.5% of subjects, residents of the city of Valongo in Portugal.^[16] The fact that smokers are aware of the potential harm of tobacco use is well reported.^[28]

The above findings in the present study are lesser than that of other studies conducted by Formosa *et al.* in which it is reported that 92% of their study respondents agreed or strongly agreed that smoking is a strong risk factor for oral cancer, followed by tobacco chewing (84%), tobacco chewing with areca nut (68%), chewing areca nut alone (51%), and exposure to actinic radiation (71%) as risk factors. However, the results for alcohol intake, age, and HPV infection were found to be relatively poor with proportions 33%, 34%, and 23%, respectively.^[23] The observations

in the present study are lower in proportions when compared to studies conducted by Elango *et al.* in which 77% of the subjects identified smoking, 64% alcohol, and 79% pan chewing as a cause of oral cancer and Ariyawardana and Vithanaarachchi that reported that 80.7%, 47%, and 17% were aware of links with tobacco smoking and alcohol consumption, respectively.^[29,30]

Most of the smoker 17 (44.7%) were of the opinion that a lump in the side of the neck caused oral cancers while nearly 12 (34.3%) of the non-smokers had also given the same opinion. It also reveals that a same proportion of the participants in the latter group and nearly 12 (36.4%) of the smokeless tobacco users were not aware of the same. The presence of a non-healing wound and oral lumps was widely identified as one of the first signs of oral cancer. This is in accordance with other reports.^[31]

In a study by Agrawal *et al.* about the oral cancer awareness among the general public in Gorakhpur city, abnormal tissue growth, non-healing oral ulcers/sores, and reduced mouth opening were the symptoms known by most (more than 60% of respondents) and 39.8% of subjects knew presence of red/white spots and 23.2% knew undue loss of teeth as an early symptom, as compared to our study in which most of them did not know any symptoms of oral cancer and only 28.9% of the smokers, 45.5% of the smokeless tobacco users while 34.3% of the non-smokers had reported that lump or tissue overgrowth in the mouth causes oral cancer while 21.1% of smokers and 36.8% of the smokers, 45.5% of the smokeless tobacco users, and 31.4% of the non-smokers had revealed that having multiple ulcers often led to oral cancer.^[32]

Majority of the smokers were indulged in the habit despite being aware of the fact that the parts affected as a result of tobacco usage were lungs followed by heart, food pipe, the circulatory system, and finally the stomach. All the participants in the smokeless tobacco users category were very well aware that lung is the organ damaged followed by the heart, food pipe, stomach, the circulatory system, and then finally the kidneys. The lungs were the primarily affected organ according to the perception of the most of the non-smokers 27 (77.1%) as well. They were also of the opinion that the food pipe was the organ to be affected next followed by the circulatory system, the heart, the stomach, and ultimately the kidneys. This observation was greater than in the study conducted by Mahendra *et al.* in which among various cancers, maximum awareness was for oral cavity cancer (49.4%) followed by lung cancer (39.9%) and blood cancer (23.0%) and minimum awareness was for stomach cancer (3.0%).^[33]

The findings of this study pertaining to the location of the mouth were higher in percentages for all the parts while it was almost equal for gums in another study conducted among Portugal residents.^[16]

CONCLUSION

Despite being educated, the residents of Thirumazhisai area in Chennai, Tamil Nadu, have poor knowledge, inadequate awareness, and negative attitude toward oral cancer & tobacco use. Similar such studies involving larger populations are the need of the hour so that the derived results could be generalizable and forwarded to the Indian Central Government for appropriate initiatives suitable awareness and health programs. This study signifies the need to educate the public regarding the harmful effects of tobacco and also necessitates active tobacco cessation initiatives.

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