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Original Article

Prevalence and predictors of tobacco use among general public of Gorakhpur district, India

Mamta Agrawal [a,*], *Shikha Jain* [b], *Nitin Maitin* [c], *Tulika Gupta* [d], *Shipra Maitin* [e]

[a] *Reader, Department of OMFS, Purvanchal Institute of Dental Sciences, GIDA, Gorakhpur 273001, Uttar Pradesh, India*

[b] *Reader, Department of Orthodontics, People's College of Dental Sciences and Research Centre, Bhopal 462010, India*

[c] *Senior Lecturer, Department of Conservative Dentistry and Endodontics, Buddha Institute of Dental Sciences and Hospital, Patna, India*

[d] *Consultant, Central Poly-Clinic, Gorakhpur 273001, India*

[e] *PG, Department of Pedodontics and Preventive Dentistry, Buddha Institute of Dental Sciences and Hospital, Patna, India*

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ABSTRACT

Objectives: The present study was undertaken to determine the prevalence and demographic correlates of tobacco use in the adult population.

Method: The sample selection was based on stratified random sampling technique selecting a total of 1635 persons from different parts of Gorakhpur district of Uttar Pradesh, India. The demographic details of participants along with prevalence of tobacco use were recorded.

Results: The prevalence of tobacco use among the subpopulation studied was 31.1% for males and 6.1 for females. Both smoking and chewing tobacco were found to be associated with various demographic parameters. The rural population showed a higher prevalence of tobacco use among both males and females; the male smoking prevalence was higher in the urban population (23.0%) than its rural counterpart (18.1%). Also the prevalence of tobacco use was directly proportionate to age increasing upto the age of approximately 60 years, then declined. Stepwise Regression analysis showed gender as the strongest predictor for smoking followed by area of residence, education and age. Whereas education was the most significant predictors for chewing tobacco, followed by gender and age.

Conclusion: The results of this study clearly indicate an association between tobacco prevalence and various demographic factors. To reduce the cancer burden, intervention measures to control tobacco use should specifically target those socio-demographic predictors of the subpopulation which are more susceptible to tobacco consumption.

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* *Corresponding author.*
E-mail address: mamtaag02@yahoo.co.in (M. Agrawal).

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Oral cancer in almost 80% of cases is attributable to tobacco (smoking and chewing) and excessive alcohol use and it ranks number one in terms of incidence among men and third among women.[1] The World Health Organization predicts that tobacco deaths in India may exceed 1.5 million annually by 2020.[2] A wide geographical variation in the incidence for oral cancer is found which is related to difference in exposure to known etiological factors such as tobacco and betel nut chewing, smoking and alcohol consumption. Also, there is great discrepancy in the pattern of tobacco consumption across various demographic groups of society.[3] In India, the use of smokeless tobacco is more prevalent than other forms of tobacco use; resulting in an alarming number of people being affected by oral cancer.[4] Among the smoked form of tobacco use, bidi, cigarette and hukkas are the popular modes and the smokeless tobacco is usually taken in the form of gutka, khaini, mishri, zarda, mawa, pan masala and many other forms which vary according to specific region in the country. The adverse effect of tobacco resulting in human disease and mortality is clear regardless of the form it may be consumed in.[3,5]

Understanding the demographic predictors of specific regions for tobacco smoking and chewing are important; if interventional measurers are to be undertaken to control tobacco use in the society. Hence, a cross-sectional study was planned on the general population of Gorakhpur district in order to determine the predictors and prevalence of tobacco use.

1. Materials and methods

1.1. Method

The target population for this study included individuals of 15 year age and above from different parts of Gorakhpur district, a north eastern part of Uttar Pradesh of India; also a region where tobacco use is apparently very high. The study was conducted during the period of one month in June 2012. The sample selection was based on stratified random sampling technique selecting a total of 1635 persons; belonging to different strata of society. The study procedure was approved by the institutional review board and its ethical committee. Appropriate consent was taken from the selected participants prior to data collection. The collected data was analyzed using SPSS software to assess the prevalence of tobacco use in both smoking and chewing forms and associated with other confounding variables.

1.2. Measure

The consenting participants were then given a self-administered questionnaire comprising of two sections, the first section recorded the demographic details including information regarding the age, sex, education, marital status, occupation and address and the second section recorded the respondent's tobacco use behavior. The data for tobacco consumption was recorded by means of only two questions 'do you smoke tobacco or did you smoke tobacco in past 30 days' and 'do you chew tobacco or did you chew tobacco in past 30 days'. Tobacco smoking and chewing included bidi, cigarettes, cigar, hukka, pan masala, mishri, gutka, khaini and other local forms of tobacco use which were explained to the respondent. Respondents were categorized as 'smokers' and 'tobacco chewers' respectively if answered 'yes' to the mentioned questions. Responses were scored in accordance with defined rules.

1.3. Statistical analyses

The demographic details and the scores were recorded, data was analyzed with SPSS 20.0 version software for windows. The scores were treated statistically and descriptive analyses was performed using frequency for categorical variation. Bivariate analysis was carried out in terms of odds ratio and confidence interval to identify the differences in the prevalence of tobacco habits across the demographic groups based on gender, age and level of education and to identify the possible demographic factors associated with use of tobacco in both chewing and smoking form. Significance was established at $p < 0.05$. Multivariate analysis of data by stepwise multiple regression analysis (SWRA) was done to tease out the significant demographic predictors for both smoking and chewing tobacco.

2. Results

2.1. Demographic pattern

The final sample consisted of 1635 respondents. Smoking and chewing (smokeless) tobacco use was assessed by gender (71.9% male and 28.1% female), age (41% in age range of 15–24 years, 23.5% in 25–39 years age group, 20.6% in 40–59 years age group and 14.9% in 60 plus years group), area of residence (urban 58.8% and rural 41.2% subjects) and education (5% illiterate, primary education 5.7%, higher secondary level 23.7% and graduates 65.6%)

2.2. Prevalence of tobacco use

Table 1 depicts the prevalence of smoking and chewing (smokeless) tobacco respectively. There is a significant difference in the male and female tobacco use both in the smoking and chewing form. In contrast to 31.1% male population using tobacco; only 6.1% of female prevalence is seen (including both the rural and urban population). Both smoking and chewing tobacco is higher among the male population with a 20.9% and 23.7% respective prevalence rate in comparison to the 6.1% and 4.7% prevalence rate among females. Fewer females are habitués than males for each of these habits.

2.3. Habit prevalence and demographic variation

Tables 2 and 3 show the prevalence along with unadjusted odds for smoking and chewing tobacco for different demographic variables. An increase in both the smoking and chewing form of tobacco is seen with age for the male habitués upto the age of 59, after which a significant decline is observed in prevalence of tobacco use. Male in the 40–59 age group had 2.46 times higher unadjusted odds (OR) than the 15–24 age group for chewing, which was higher in comparison

Table 1 – Prevalence of tobacco smoking, chewing and overall users (smoking and chewing) by residential setting and gender.

	Tobacco users (smokers and chewers) %			Smokers (%)			Chewers (%)		
	Urban	Rural	Total	Urban	Rural	Total	Urban	Rural	Total
Male	29.8	32.9	31.1	23.0	18.1	20.9	20.7	28.0	23.7
Female	5.4	7.2	6.1	3.9	6.1	4.8	3.2	6.8	4.7

Table 2 – Prevalence rates for smoking, odds ratio with 95% confidence interval derived from bivariate analysis.

Variable	Males		Females	
	Smoking prevalence	Odds ratio (95% CI)	Smoking prevalence	Odds ratio (95% CI)
Age				
15–24	21.5%	Referent	1.90%	Referent
25–39	22.4%	1.05 (0.85–1.30)	13.4%	7.99 (4.89–13.02)**
40–59	26.7%	1.33 (1.08–1.63)*	06.8%	3.77 (2.25–6.31)**
60 plus	10.6%	0.43 (0.34–0.56)**	12.5%	7.37 (4.51–12.05)**
Residence				
Rural	18.1%	Referent	06.1%	Referent
Urban	23.0%	1.35 (1.09–1.68)*	03.9%	0.63 (0.41–0.94)*
Education				
Graduate	19.5%	Referent	02.6%	Referent
High school	19.6%	1.01 (0.81–1.26)	3.8%	1.48 (0.89–2.45)
Primary	41.5%	2.93 (2.39–3.58)**	25%	12.49 (8.25–18.91)**
Illiterate	28.6%	1.63 (1.34–2.04)**	20.0%	9.37 (6.16–14.24)**

*p < 0.05; **p < 0.001. CI, confidence intervals; OR, odds ratios.

to the smoking prevalence (OR 1.33). No such pattern was observed for the female habitués, although a statistically significant increase in tobacco consumption was observed in all the age groups as compared to the 15–24 age group, but the 25–39 year age group showed a maximum prevalence for both smoking (OR 7.99) and chewing (OR 7.60) tobacco.

Smoking prevalence for males in the urban population was found to be significantly higher with 1.35 times higher unadjusted odd compared to their rural counterpart. In contrast tobacco use prevalence for females was observed to be lesser in the urban population (OR 0.63 for smoking and 0.43 for chewing). Chewing prevalence was significantly higher for males belonging to the rural sector in comparison to the urban population (OR 0.67).

The number of years of education seemed to have a detrimental effect on tobacco use among the male and female population; men with only primary education had the highest prevalence for both smoking and chewing tobacco with unadjusted odds 2.93 and 5.86 times more respectively than among male with graduate level of education. Although males

Table 3 – Prevalence rates for chewing tobacco, odds ratio with 95% confidence interval derived from bivariate analysis.

Variable	Males		Females	
	Chewing prevalence	Odds ratio (95% CI)	Chewing prevalence	Odds ratio (95% CI)
Age				
15–24	19.0%	Referent	02.2%	Referent
25–39	26.7%	1.55 (1.26–1.91)**	14.6%	7.60 (4.81–12.01)**
40–59	36.6%	2.46 (2.01–3.02)**	04.5%	2.09 (1.25–3.51)*
60 plus	11.0%	0.53 (0.41–0.68)**	12.5%	6.35 (4.00–10.08)**
Residence				
Rural	28.0%	Referent	07.2%	Referent
Urban	20.6%	0.67 (0.54–0.82)**	03.2%	0.43 (0.28–0.65)**
Education				
Graduate	19.4%	Referent	03.2%	Referent
High School	20.7%	1.08 (0.87–1.35)	03.8%	1.19 (0.74–1.93)
Primary	58.5%	5.86 (4.79–7.16)**	14.3%	5.05 (3.40–7.49)**
Illiterate	57.1%	5.53 (4.52–6.76)**	24.1%	9.61 (6.56–14.06)**

*p < 0.05; **p < 0.001. CI, confidence intervals; OR, odds ratios.

Table 4 – Variables identified by Stepwise multiple regression analysis as predictors of smoking.

Predictor variable	Criterion variables for smoking				
	R	R^2	R^2 change	Beta	F
Gender	0.137	0.019	0.019	0.137	31.264**
Residence	0.155	0.024	0.005	0.139	20.024**
Education	0.173	0.030	0.006	0.130	16.850**
Age	0.196	0.038	0.008	0.163	16.306**

**$p < 0.001$.

with no education at all had a slightly lower prevalence than those with primary education, but smoking and chewing prevalence both were significantly higher (OR 1.63 and 5.53) than for male graduates, showing a strong gradient between tobacco use and education level. Whereas among the female population the unadjusted odds were 12 times and 9.37 times higher respectively for those with only primary education and no education for smoking and 5.05 and 9.61 times for chewing.

2.4. *Multivariate analysis*

It is clear from the regression results (Tables 4 and 5) that smoking is strongly predicted by gender (β=0.137, $R^2 = 0.019$) followed by area of residence, education and age. Gender alone accounted for 1.9% of the variance and with all of the predictors 3.8% of the variance was accounted for.

Similarly the regression results for tobacco chewing show that education is the single best predictor followed by gender and age. More specifically education contributes positively ($\beta = 0.198$, $R^2 = 0.039$). Moreover independently education has predicted maximum positivity with 3.9% of the variance and the combined contribution of variance is 5.1% of all 3 factors.

3. Discussion

3.1. *Prevalence of habits*

This study reports tobacco use in a small local population, however the estimates of tobacco consumption are comparable to previous studies. Some variation seen in prevalence may be related to difference in exposure to different chewing and smoking forms of tobacco prevalent in this specific region.

Table 5 – Variables identified by stepwise multiple regression analysis as predictors of chewing tobacco.

Predictor variables	Criterion variable for chewing				
	R	R^2	R^2 change	Beta	F
Education	0.198	0.039	0.039	0.198	66.403**
Gender	0.214	0.046	0.007	0.188	39.003**
Age	0.225	0.051	0.005	0.218	29.089**

**$p < 0.001$.

The present study clearly shows that the prevalence of tobacco use is much higher in the rural areas (31.1%) as compared to urban areas (29.8%) with chewing form of tobacco being more prevalent (23.7%) as compared to smoking (20.9%). Area of residence (urban/rural) came out as a strong predictor for smoking as seen by multivariate regression analysis. Earlier studies report a generally higher prevalence of smoking over smokeless tobacco consumption in the western regions of globe and more use of smokeless tobacco in regions of Southern Asia[6,7] which was also seen in our study. A wide variation in the global prevalence of habits is seen mainly due to difference in cultural, ethnic, regional preferences and geographic factors.

A significant gender difference was seen for tobacco use with fewer females being habitués of tobacco as compared to males in our study and a similar prevalence pattern is seen almost globally. Gender was highly significant predictor for both smoking and chewing tobacco as analyzed by stepwise regression also. Smoking among females was found to be more prevalent in the urban and chewing prevalence more in rural population, which may be due to modernization and changing social habits resulting in more smoking in urban areas and increase in tobacco chewing in rural areas.[8,9]

The results also show that the prevalence of smoking and chewing tobacco is directly proportional to age upto a certain age (59 years, in this study); after which a decline in the habits is seen. These prevalence rates were consistent with WHO report (1997)[5] where age was seen to be directly associated with tobacco use prevalence. The prevalence for both chewing and smoking was highest for the 40–59 age group for males and 25–39 age group for females.

Lesser prevalence of tobacco consumption was seen in respondents with higher level of education for both smoking and chewing tobacco. Similar results with an inverse relationship between the levels of education and the use of tobacco are seen globally.[10–12] Education was the single best predictor of chewing and significant independent factor predictive of smoking as indicated by the results of regression analysis.

In conclusion this study confirms a demographic gradient for the prevalence of tobacco use; with the male, rural and lesser educated population being more susceptible to tobacco use. Tobacco control policies and awareness programs should specially target these predictors for reducing the disease burden and health care cost of the nation.

The limitation of this study is that the data completely relies on self-reporting, and some, if not many respondents are hesitant to acknowledge tobacco use, so the actual habitués might be higher than reported. Another limitation is that the tobacco prevalence data was collected via only two questions (if the respondent smoked/chewed or not), it did not distinguish between frequency and the type of product used. Also socioeconomic factors as household income and caste, religion were not taken into account which significantly contribute to the predictors of tobacco use.[3,13]

Conflicts of interest

All authors have none to declare.

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