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Research

Prevalence and Determinants of Smoking and Smokeless Tobacco in the Rural Population of Karnataka, India

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ABSTRACT

Background: Tobacco is known as a major cause of various preventable non-communicable diseases and kills half of all its users. With a greater prevalence in the rural community compared to the urban, this global health burden is substantially malignant. This study aimed to bridge the gap in the lack of adequate statistical information pertaining to prevalence and determinants of smoking and smokeless tobacco use in the rural population of Karnataka.
Subjects and Method: This randomized community interventional study was conducted in primary health center areas of Karnataka, India. A total of 4,576 persons were interviewed (2,087 males and 2,489 females). Subjects ≥30 years of age and residents for a minimum of six months were included. Mentally challenged, bedridden or differently abled subjects were excluded. The study employed a validated questionnaire adapted from the WHO STEPS questionnaire concerning demographical information, behavioral, physical, and biochemical measurements. Besides tobacco, information on use of beedis, cigarettes, and smokeless tobacco products (snuff, chewing tobacco) were also elicited. Data analysis of socio-demographic characteristics (age, educational/ marital/ occupational status) was carried out only for the participants with a current smoking habit. Data were analyzed using SPSS Version 18.0.
Results: The overall prevalence rate of current smoking and smokeless tobacco habit in the study population was 54.8% (95%CI= 53.40 to 56.20) and the prevalence rate of ever/past users was 39.7% (95%CI= 38.26 to 41.10). Gender-wise analysis predicted a higher prevalence of males currently smoking, and among them, most were 50 to 59 years of age (43.3%), illiterate (42.7%), widowed/ separated (39.8%), unskilled (44%), and semi-skilled workers (30%).
Conclusion: Both genders participate in tobacco use, prevalence of smoking was higher among men and consumption of smokeless tobacco was higher among women. Subjects aged 50-59 years, illiterate, divorced/widowed/separated and, involved in unskilled or semi-skilled labor exhibited greater prevalence of tobacco habit compared to other determinants.

Keywords: noncommunicable diseases, global health, tobacco use, tobacco smoking, smokeless tobacco.

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BACKGROUND

Tobacco is a nicotine-rich Native American plant utilized in the form of smoking tobacco (cigarette, beedi, shisha, cigar) and smokeless tobacco products (snuff, betel quid, gutkha, khaini, mishri) in India (Bhavya et al., 2015). Tobacco kills nearly 6 million people each year globally, of which around 5.4 million are due to direct use of tobacco while remaining 0.6 million are a result of exposure to second-hand smoke. India is predominantly affected because of its geographically diverse and heterogeneous smokeless and smoking forms of tobacco use among its population. With over one-third of the population using tobacco, India makes significant contributions to the global burden of disease attributable to tobacco (Pednekar et al., 2016). In India, every tenth adult (99.5 million) and every fifth adult (199.4 million) currently use smoking and smokeless tobacco respectively (Jangir et al., 2021). Each year tobacco use kills about 1 million Indians and is responsible for half of all the cancers in men and a quarter of all cancers in women in addition to other noncommunicable diseases. Further, tobacco-related healthcare costs accounted for more than 1% of the gross domestic product in India (Yuvaraj et al., 2020).

By 2020, tobacco attributed diseases are expected to overshadow the harm caused by any single disease. Despite being a preventable non-communicable disease (NCD), seven million deaths are caused due to tobacco every year, which is expected to rise to nearly 8 million by 2030 worldwide (Jangir et al., 2021; Neelopant and Ashtagi, 2016). According to the "The Global Burden of Disease" (1997) by the World Health Organization (WHO), deaths due to NCDs are projected to increase two-fold (4 million to 8 million) every year in India. This predicted burden is significantly related to larger aging populations exposed to tobacco and its consumption in the developing areas (Lee et al., 2022). With India being the third largest producer and second largest consumer of tobacco world-wide, the mortality is estimated to rise close to 1.3 million; one million due to tobacco smoking and the rest as a result of smokeless tobacco products (Jha et al., 2008; Sinha et al., 2014). According to the Global Adult Tobacco Survey, India (2016-2017), tobacco use among male was 42% and among female was 14%, in them smokers were 11% and tobacco chewers were 21%. The prevalence of use of smoking tobacco was 8.8% and of smokeless tobacco was 16.3% in Karnataka. The survey also highlighted that 55.4% of smokers and 49.7% of smokeless tobacco users in the study intended to quit smoking (Jangir et al., 2021).

This study aimed to bridge the gap in the lack of adequate statistical information pertaining to prevalence and determinants of smoking and smokeless tobacco use in the rural population of Karnataka.

SUBJECTS AND METHOD

1. Study Design

This randomized community interventional study was conducted in 2013 at the Kaiwara and Kurubur Primary Health center (situated north-east of Bengaluru) of Chintamani Taluk, Chikballapur District, Karnataka, India.

2. Population and Sample

Villages from Mylapura sub-center of Kaiwara and Doddaganjur sub-center of Kurubur were recruited as intervention and comparison groups, respectively. The intervention and comparison groups included 4576 adults aged ≥ 30 years, who were residents of the area for a minimum of six months. Mentally challenged, bedridden or differently abled subjects were excluded from this analysis since tobacco addiction information could not be obtained.

3. Study Variables

Detailed survey concerning demographical information, behavioral, physical, and biochemical measurements was carried out. Besides tobacco, information on use of beedis, cigarettes, and smokeless tobacco products (snuff, chewing tobacco) were also elicited. Data analysis of socio-demographic characteristics (age, educational/ marital/ occupational status) was carried out only for the participants with a current smoking habit.

4. Operational Definition of Variables

Smoking and smokeless tobacco intake was monitored with respect to age, gender, literacy, marital status and occupational status in terms of frequency as well as prevalence rate.

5. Study Instruments

Tobacco intake was analyzed using the WHO STEPS questionnaire which consisted of a detailed survey concerning demographical information, behavioral, physical, and biochemical measurements (WHO STEPS Instrument Question-by-Question Guide).

6. Data Analysis

SPSS Version 18.0 was used for analysis of data. The data was presented through frequency distribution tables. The prevalence rate of the condition along with 95% CI was calculated for various groups. Chi-squared test of significance was utilized to test for associations.

7. Research Ethics

Ethical clearance was obtained from Ethical Review Board before initiating this study. The Ethical Review Board (MSRMC/ ERB/ 2010) gave ethical clearance for conducting the current study. Informed consent was obtained from patients participating in this study.

RESULTS

The overall prevalence rate of smoking and smokeless tobacco addiction was 54.8%. The data was presented through frequency distribution tables below:

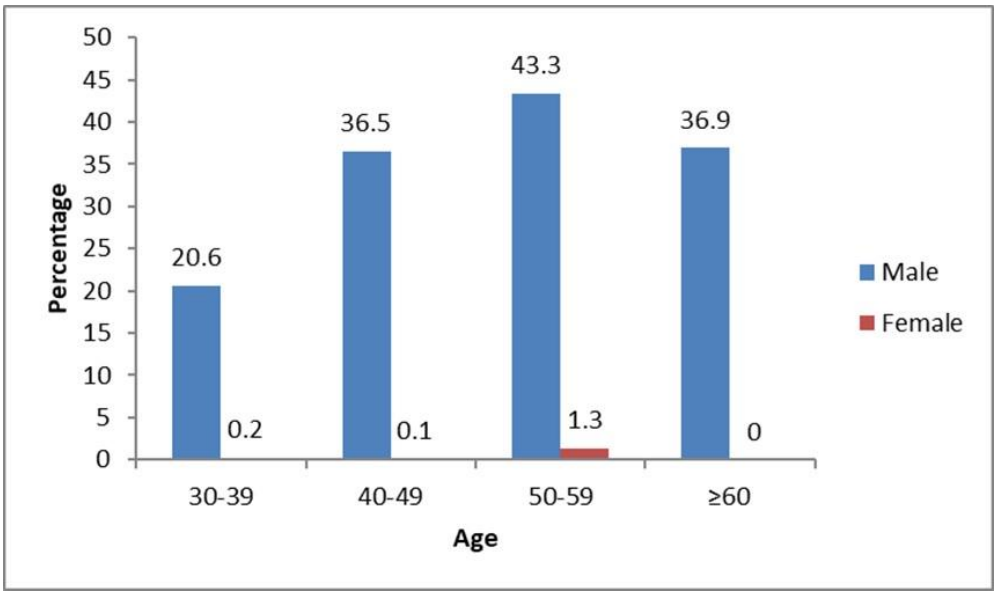

Figure 1: Gender-wise analysis of currently smoking tobacco products (%) across different age groups (in years).

Lowest prevalence of tobacco smoking was observed among the college-educated subjects as compared to other groups (Figure 2). Gender-wise analysis highlighted increased prevalence of smoking in illiterate males. Level of education and smoking habit was statistically significant in males ($p<0.050$), while the contrary was true among females.

Combined gender-wise prevalence according to marital status (Figure 3) revealed that tobacco use was high among married subjects (17.7%), particularly among married and divorced/ separated men. Association between marital status and smoking habit in males was observed to be statistically siginificant (p<0.005).

Tobacco smoking was found to be highly prevalent among both unskilled and semi-skilled, as well as skilled groups (21.2%, 21.8%); and lowest in semi-professional and professional groups (5.1%). The association between Occupational status and smoking habit among males was statistically significant (p<0.005) .

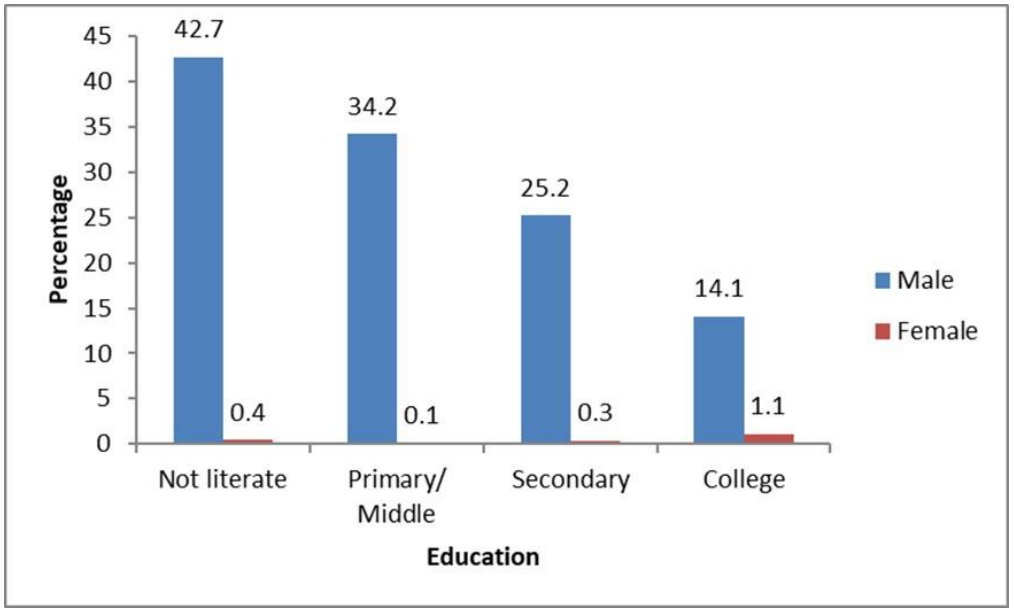

Figure 2. Gender-wise analysis of currently smoking tobacco products (%) across educational status

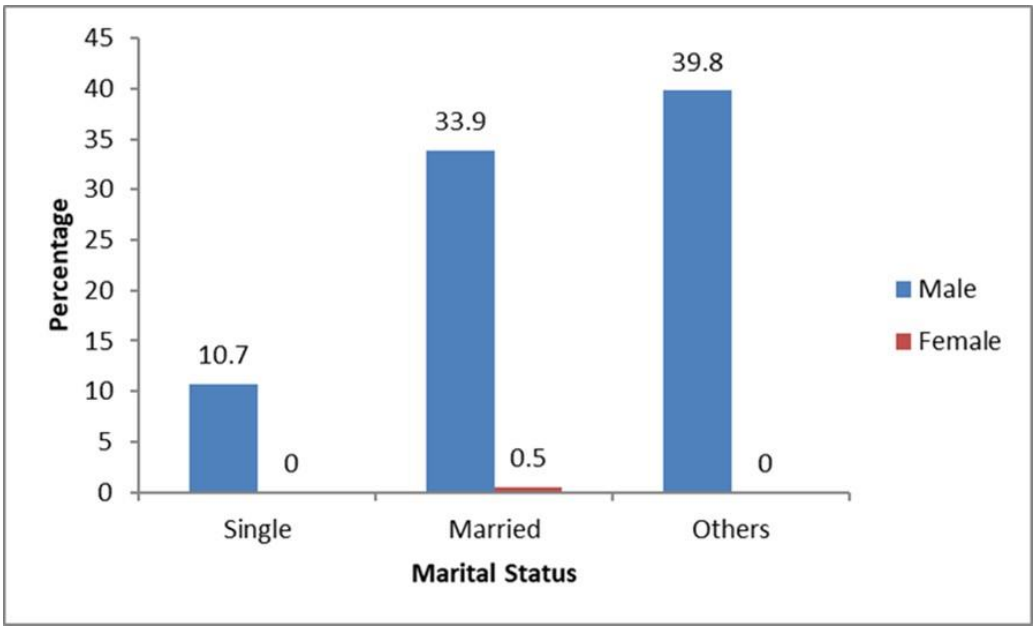

Figure 3. Gender-wise analysis of those currently smoking tobacco products (%) across marital status

Table 1. Prevalence rate (%) of smoking and smokeless tobacco consumption among study subjects

Habit		Male		Female		Total	
		Number of persons interviewed	Prevalence of the condition	Number of persons interviewed	Prevalence of the condition	Number of persons interviewed	Prevalence of the condition
Smoking	**Currently smoke any tobacco products**	2,087	33.5% (699)	2,489	0.4% (9)	4,576	15.5% (708)
	95% CI		(31.5 to 35.5)		(0.15 to 0.65)		(14.4 to 16.5)
	Ever smoke any tobacco products	2,087	17.1% (356)	2,489	15.1% (375)	4,576	16.0% (731)
	95% CI		(15.5 to 18.7)		(13.7 to 16.5)		(14.1 to 17.9)
Smokeless	**Use any smokeless tobacco**	2,087	20.1% (426)	2,489	55.1% (1372)	4,576	39.3% (1798)
	95% CI		(18.4 to 21.8)		(53.1 to 57.1)		(37.9 to 40.6)
	Ever use smokeless tobacco products in past	2,087	10.9 (228)	2,489	34.4 (857)	4,576	23.7 (1085)
	95% CI		(9.6 to 12.2)		(32.5 to 36.3)		(22.5 to 25.1)
Smoking	**Both current and ever**	2,087	50.6 (1055)	2,489	15.5 (384)	4,576	31.5 (1439)
	95% CI		(48.5 to 52.8)		(14.1 to 16.9)		(30.4 to 32.9)
Smokeless	**Both current and ever**	2,087	31.3 (654)	2,489	89.5 (2229)	4,576	63 (2883)
Smoking + Smokeless	**95% CI**		(29.3 to 33.3)		(88.3 to 90.7)		(61.6 to 64.4)
	Current	2,087	53.9 (1125)	2,489	55.5 (1381)	4,576	54.8 (2506)
	95% CI		(51.8 to 56.1)		(53.5 to 57.5)		(53.4 to 56.2)
	Ever	2,087	27.9 (584)	2,489	49.5 (1232)	4,576	39.7 (1816)
	95% CI		(26.05 to 29.91)		(47.53 to 51.46)		(38.26 to 41.10)

Figures in parenthesis indicates number of subjects with the habit

An increased statistically significant tobacco smoking rate among men (33.5%) was noted when compared to women (0.4%), ($p < 0.001$). However, this was seen to be reversed in smokeless tobacco consumption, with 55.1% women consumers. Comparing the current and past tobacco (smoking and smokeless) consumption behaviors among both genders highlighted a two-fold increase in current tobacco consumption among the men (53.9% from 27.9%) (Table 1).

DISCUSSION

On average, a tobacco user loses 15 years of his/her life (WHO Report on the Global Tobacco Epidemic, 2008). The growing burden of NCDs because of tobacco is estimated to be six million deaths per year, with five million deaths linked to direct tobacco smoking and the rest to second-hand smoking. Several national-level efforts have been made to collect data through various studies, such as the National Family Health Survey (NFHS-4) (Raj et al., 2021), Global Adult Tobacco Survey (GATS) (Jangir et al., 2021), Global School Personnel Survey (GSPS) (Global School Personnel Survey), and Global Health Professions Students Survey (GHPSS) (Sinha et al., 2010), apart from many cross-sectional studies carried out in different parts of the country. These statistical data provide insights for policy-making in public health sectors. Rural populations require different approaches of anti-tobacco campaigns due to unique disparities from urban life. The present study aimed to evaluate tobacco burden in the rural areas of Karnataka.

The study conducted by Sorensen et al observed a higher prevalence amongst men (current or past, 54%) than women (23%) for tobacco smoking users, while women used smokeless tobacco at a higher ratio compared to men (Sorensen et al., 2005). The findings of the present study are agreement with the findings of the above study. The GATS-2 survey reported a lower prevalence in Karnataka compared to our study, i.e., 16.8% of men, 0.7% of women and a total of 8.8% of adults currently smoke tobacco; while 22.2% of men, 10.3% of women and 16.3% of adults reported to currently use smokeless tobacco (Jangir et al., 2021).

This study observed that 10.9% of men, 34.4% of women and 23.7% of adults of both sexes reported ever using smokeless tobacco products in the past, comparable to a study conducted by Bhawna et al., 2013; revealing females from rural areas consumed more tobacco (23.7%) in contrast to women in urban areas (11.8%). Use of smokeless tobacco in the rural areas was 20.0% compared to 10.7% in urban areas; whereas tobacco smoking was 2.3% in rural areas compared to 0.7% among urban areas.

The gender-wise analysis of the data revealed that among males, considering the age groups, the prevalence of tobacco use was highest among those aged 50-59 years (43.3%) and lowest among those aged 30-39 years (20.6%), with a total prevalence of 33.5% in all age groups. The study conducted by Gupta et al., was at par with our observations (Gupta et al., 2010). Likewise, GATS-2 reported the highest incidence of smoking and smokeless tobacco use among <65 age groups in Karnataka (Jangir et al., 2021).

Several studies from the literature were on par with our observations pertaining to educational status. The analysis concludes that population with lower education and income are more prone to consume tobacco than the population with higher learning and revenue (Sinha et al., 2014; Prabhakar et al., 2012; Eek et al., 2010; Thakur et al., 2011). Occupational status is a conservative approach to a persons' socio-

economic grading and is closely associated with working status than any other socio-economic indicators (Laaksonen et al., 2005). Several misperceptions pertaining to tobacco use exist, such as it increases concentration, represses appetite, reduces anxiety, relaxes skeletal muscles, and stimulates feelings of pleasure. Due to these perceived benefits, consumption of tobacco is highest among the labor classes and the lower socioeconomic population (Ansari et al., 2010; Thankappan and Thresia, 2007; Fagan et al., 2007).

Study of GATS-2 in India highlighted the prevalence of tobacco usage among divorced and widowed, followed by married individuals, and the least tobacco usage was reported among single or unmarried individuals. The study also emphasized that marital status (married, widowed and single) may differ with respect to men and women, and stressed the need for a gender-wise survey (Ruhil 2019). This disparity was also observed in this study, where a higher prevalence of tobacco consumption was seen among divorced/separated men (39.8%) and married females (0.4%). No statistically significant association was observed between marital status and smoking habit among females.

The lower-income, least educated and the aged are more inclined towards the use of smoking/smokeless tobacco. The Government should amend the tobacco taxation policy, as increased taxes will correspondingly decrease tobacco affordability. Rural India has greater predominance of smokers compared to urban, however, currently, 19 tobacco cessation clinics are available in India (with one cessation center in Bengaluru, Karnataka) at the tertiary health care level (Varghese et al., 2012). Wider availability and accessibility of cessation clinics with trained healthcare workers benefits the lesser privileged population with respect to economic status, qualification and employment. All tobacco policy, education programs, public health media, and messages should direct their focus not only on smoking, but also on the consumption of smokeless tobacco, which has been observed to be used more frequently (Koh and Sebelius, 2012).

To conclude, both genders currently use smoke and smokeless forms of tobacco in the rural community of Karnataka. A higher prevalence of smoking tobacco was found among men, whereas a higher ratio of women preferred smokeless tobacco. Age group between 50-59 years of age, illiterate and divorced/widowed/separated individuaals showed a greater prevalence of tobacco habit compared to other determinants. Anti-tobacco policy/campaigns should be designed specific to the region and culture, to successfully reach the rural community.

AUTHOR CONTRIBUTION

Dinesh Rajaram contribute to made concept, design, data acquisition, data interpretation, data analysis, manuscript preparation, manuscript revision, approval of final manuscript. Shalini C Nooyi: contribute to made concept, design, data acquisition, data interpretation, data analysis, manuscript preparation, manuscript revision, approval of final manuscript. Pruthvish S and Shalini Pradeep who contribute to made concept, design, data acquisition, data interpretation, data analysis, manuscript preparation, approval of final manuscript. Anjana G: Data acquisition, Data interpretation, Data analysis.

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CONFLICT OF INTEREST

The authors declare that there are no competing interests.

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