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Prevalence of active and passive smoking among adult population: Findings of a population based survey

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Abstract
Introduction: Smoking is one of the major modifiable risk factors for non-communicable diseases.
Methodology- Using a cluster random sampling design, we recruited 5900 adult persons (15-75 years old) into our survey. After consenting, every participant was interviewed by a trained interviewer. The section for smoking included questions about daily (smoking at least one cigarette per day), non-daily, past and passive cigarette smoking as well as the duration of the exposure.
Results- Overall, 8.3% of study participants (15.5% in men vs. 0.8% in women, P = 0.010) reported themselves as daily smokers and an additional 1.7% (2.9% in men vs. 0.4% in women, P = 0.010) as non-daily smokers. The passive smoking was common in total (27.5%), while women experienced more exposure than men (30.1% vs. 25.0%, P = 0.010). In daily smokers, 3.2% smoked more than 20 cigarettes per day.
Conclusion: A majority of tobacco-free young adult women are exposed to passive smoking. Age and gender oriented interventions are required to change this risk pattern in Shimla community to prevent from further smoking related morbidities and mortalities.

Keywords: active smoking, passive smoking, smoking, cigarette

Introduction

Although smoking is one of the major modifiable risk factors for malignancies, it is still a frequent leading carcinogen in the world, in particular in high-income countries. In 2010, tobacco smoking including second-hand smoke (i.e., passive smoking) as the second leading risk factor for global disease burden after high blood pressure, accounted for 6.3% of global disability-adjusted life years (DALYs). Moreover, active smoking and the second-hand smoke combined contributed to 6.3 million deaths worldwide, reflecting a remarkable share in the burdens of disease in 2010 [1].

The tobacco epidemic is responsible for 8 million deaths per year, of which 7 million are directly related to tobacco use, including smoking and smokeless tobacco, and 1.2 million are caused by secondhand smoke (SHS), which affects nonsmokers [1]. Children and adults who are exposed to the phenomena of secondhand smoking most frequently do so in homes and places of employment. Since tobacco smoking impacts both active smokers and those nearby, "exposure to SHS is a major public health challenge that remains unaddressed." WHO states that there is no level of SHS exposure that is regarded as safe [1, 2]. The Government of India's Ministry of Health and Family Welfare (MoHFW, GoI) announced the smoke-free regulations in October 2008, making it mandatory for all public spaces in India to be smoke-free. Since that time, civil society organisations and state governments have fought to advance smoke-free public spaces [3]. 33% of males and 35% of females who were not smokers were exposed to SHS globally in 2004, according to WHO [4]. More frequently than owing to respiratory illnesses in the first few years of life, secondhand smoking causes more than 1.2 million annual premature deaths and about 165,000 infant deaths [5].

According to the Global Youth Tobacco Survey in India (GYTS), which was conducted in 2009 among adolescents aged 13 to 15, the prevalence of SHS exposure at home was calculated to be 21.9% overall and 24.1% and 18.8% among men and women, respectively [6]. The COTPA (Cigarette and Other Tobacco Products Act, 2003) was passed by the Indian government, and its Section 4 shields nonsmokers from SHS exposure. 7 The goal of the Global Adult Tobacco study (GATS)-India, the first sizable study done twice (GATS-1 in 2009–10 and GATS-2 in 2016–17), is to gather data on the factors that influence the consumption of tobacco and exposures [8, 9]. This is the only survey report in India, which includes detailed section on SHS exposure in three different settings. Although, the GATS-2 survey report compares overall versus non-smokers and fails to draw comparisons between smokers versus non-smokers. Also, limited information is available for relative change at subnational level in India and to our knowledge, no one has analysed it in past [10-12]. As, the recent evidence has focused primarily on non-smokers, the exposure rates among smokers that forms significant proportion of Indian population have not been conferred [11].

Given the availability of high-quality data from a population-based survey in this paper we report the estimates of both active and passive cigarette smoking prevalence among adolescent and adult population in Shimla.

Methodology

The study population was adolescents and adult population (15-75 years old) of residents living Shimla and that agreed to participate in the survey. The 5900 study subjects were recruited in 2012-2022 from 14 subpopulations' strata (15-19, 20-24, 25-34, 35-44, 45-54, 55-64 and 65-75 years by sex) using a one-stage cluster sampling. The study target sample size was to recruit 1000 participants from each 10 years subpopulation stratum [13].

Given the 250 postal codes randomly selected in proportion to the population size of the four urban regions in Shimla, the recruiting team visited the area, listed and invited all the eligible (15-75 years old) household members living in the same zip code. Participants were given referral coupon with an appointment to the study clinics located at Shimla downtown. Recruitment continued to reach to the total sample of 24 within each cluster. The details of sampling procedure were explained elsewhere [12].

Regarding smoking, using an interview-assist questionnaire, we collected several measurements. Based on self-reported data, we assigned the study participants into four mutually exclusive subgroups.

- Never smokers: Those who have never smoked cigarettes
- Past smokers: Those smoked cigarettes in the past but quit. Hence, at the time of the interview, they mentioned that during the past month they were not smoking cigarettes by any kind
- Non-daily smokers: Those active smokers who have reporting smoking cigarette currently, but not daily
- Daily smokers: Those acknowledged smoking at least one cigarette/day.

We also asked about exposure to cigarette smoke at home or work and anybody who acknowledged such exposure, were considered as a passive smoker. To measure the amount of exposure to active and passive smoking, we asked about the number of cigarettes smoked/day and in passive smokers we measured the number of days/week and hours/day that they were usually exposed to smokes.

Employing the survey's data analysis module in SPSS version 21, the data were examined. The estimations were weighted according to the actual population distribution of Ludhiana and the inverse rate of response, and the cluster code was employed as the main sampling unit for investigation. The survey ordinal logistic regression model was used in the study, which was conducted for each gender stratum individually and globally.

Results

The investigation had 5900 participants in all. They were 45.1% male, on average 43.6 [standard deviation (SD) 15.6] years old, 23.15% owned their own private business, compared to 40.5% who worked as housekeepers, and only 14.1% were illiterate.

Table 1 shows the prevalence of current, former, and passive smoking. Overall, 8.3% of research participants claimed to be daily smokers (15.5% of males vs. 0.8% of women, P = 0.001), and a further 1.7% (2.9% of men vs. 0.4% of women, P = 0.010) reported being a non-daily smoker. Approximately 4.4% of participants have previously given up smoking (8.1% of men vs. 0.6% of women, P = 0.001). Overall, there were 27.5% of those exposed to passive smoking, with women being more exposed than men (30.1% vs. 25.0%, P = 0.010). By the age of 55, active smoking (daily plus occasional) had decreased in both men and women (P = 0.100) but had increased overall (P = 0.001). Regarding age groups, passive smoking displayed a linearly declining trend.

As seen in table 2, 34.8% of daily smokers smoked between 10 and 20 cigarettes, whereas 3.2% smoked more than 20 cigarettes per day. Men smoked more cigarettes per day on average than women (P = 0.010). The percentage of the subjects who smoked more than 20 cigarettes per day rose with age, peaked at the 45–54 age group (4.5%), and subsequently fell to 2.8%. 62.6% of non-smokers were exposed to cigarette smoke more than six times each week. Women (67.8%) had this percentage much higher than men (57.5%). Age-related decline in such exposure was observed among men. Women aged 45 to 54 claimed to be exposed to passive smoking the most (78.3%). In terms of the average daily exposure hours, 18.2% of people had been exposed for more than three hours daily. Women's exposures to smoking more than 3 hours/day were higher than men (19.7 vs. 16.8%). Also, the levels of exposure to smoking measured as hours per day, had a significant decreasing trend among men (P = 0.005) (Table 3)

Table 1: Prevalence of current, past and passive smokers by age groups

Age groups (year)	Women						
	Daily smoker	**Non- daily**	**Past smoker**	**Never smoker**	**Passive smoker****	**Daily smoker**	**Non- daily**
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
15-19	0 (0.0)	0 (0.0)	0 (0.0)	133 (100)	33 (26.5)	0 (0.0)	2 (0.5)
20-24	0 (0.0)	1 (0.7)	2 (0.9)	284 (98.4)	100 (37.4)	13 (5.4)	5 (3.3)
25-34	4 (1.0)	2 (0.3)	0 (0.0)	595 (98.7)	135 (26.4)	73 (16.5)	18 (4.2)
35-44	5 (0.8)	2 (0.3)	3 (0.5)	597 (98.4)	180 (30.6)	108 (24.7)	18 (3.8)
45-54	16 (1.8)	3 (0.4)	7 (0.9)	686 (96.9)	196 (27.3)	161 (34.4)	14 (2.9)
55-64	9 (1.4)	5 (0.9)	7 (1.5)	514 (96.2)	130 (26.6)	116 (23.4)	14 (2.9)
65-75	4 (1.5)	2 (0.8)	2 (0.7)	252 (97.0)	43 (17.5)	48 (16.6)	1 (0.3)
Total	38 (0.8)	15 (0.4)	21 (0.6)	3071 (98.2)	822 (30.1)	519 (15.5)	72 (2.9)
P*			0.020		0.010		
			Men	Total			
Past smoker	Never smoker	Passive smoker	Daily smoker	Non- daily	Past smoker	Never smoker	Passive smoker
n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
4 (2.2)	164 (97.3)	55 (30.5)	0 (0.0)	2 (0.3)	4 (1.1)	297 (98.6)	88 (28.6)
3 (2.2)	184 (90.1)	59 (31.9)	13 (2.8)	6 (2.0)	5 (1.7)	468 (93.5)	159 (34.6)
35 (7.8)	345 (71.5)	123 (29.2)	77 (8.9)	20 (2.3)	35 (3.9)	940 (84.9)	258 (27.8)
48 (11.5)	268 (60.0)	92 (21.8)	113 (12.9)	20 (2.1)	51 (6.0)	865 (79.0)	272 (26.2)

73 (14.8)	238 (47.9)	66 (13.4)	177 (18.4)	17 (1.7)	80 (7.9)	924 (72.0)	262 (20.3)
83 (15.9)	269 (57.8)	49 (11.2)	125 (12.8)	19 (1.9)	90 (8.9)	783 (76.4)	179 (18.7)
54 (20.7)	184 (62.4)	34 (11.8)	52 (9.4)	3 (0.5)	56 (11.1)	436 (79.0)	77 (14.6)
300 (8.1)	1657 (73.5)	480 (25.0)	557 (8.3)	87 (1.7)	321 (4.4)	4728 (85.6)	1302 (27.5)
0.010		0.010		0.010			0.010

*Wald test statistics P value using survey ordinal logistic regression, P values assess the trend of smoking status regarding age, **Passive smoking is not complemented to other smoking status,% of daily, non-daily, past and never smoker added up to 100% in each row in women, men and total; for the passive smoker, which was a binary variable, we only report the% of study participants who were passive smoker.

Table 2: Number of smoked cigarettes/day in daily smokers

Age groups (year)	Women			Men			Total		
	< 10/day	10-20/day	> 20/day	< 10/day	10-20/day	> 20/day	< 10/day	10-20/day	> 20/day
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
15-19	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
20-24	0 (0.0)	0 (0.0)	0 (0.0)	6(57.8)	6 (34.8)	1 (7.4)	6 (57.)	6 (34.8)	1 (7.4)
25-34	4 (100)	0 (0.0)	0 (0.0)	35(48.7)	38 (51.3)	0 (0.0)	39 (74.1)	38 (25.9)	0 (0.0)
35-44	4 (90.0)	1 (10.0)	0 (0.0)	49(40.9)	57 (54.7)	4 (4.4)	53 (65.3)	58 (32.5)	4 (2.2)
45-54	11 (57.3)	5 (42.7)	0 (0.0)	52 (313)	96 (59.8)	15 (8.9)	63 (44.1)	101 (51.4)	15 (4.5)
55-64	9 (92.7)	1 (7.3)	0 (0.0)	46 (34.8)	67 (58.7)	6 (6.5)	55 (62.7)	68 (33.9)	6 (3.4)
65-75	2 (60.4)	2 (39.6)	0 (0.0)	21 (39.6)	24 (55.1)	2 (5.3)	23 (49.6)	26 (47.6)	2 (2.8)
Total	30 (85.9)	9 (14.1)	0 (0.0)	209 (47.5)	288 (47.3)	28 (5.2)	239 (62.0)	297 (34.8)	28 (3.2)
P*		0.260			0.040			0.040	

*Wald test statistics P value using survey ordinal logistic regression, P values assess the trend of smoking status regarding age

Table 3: Level of exposure to smoking among passive smoker

Days exposed/week	Women			Men			Total		
	1-2 days	3-5 days	6-7 days	1-2 days	3-5 days	6-7 days	1-2 days	3-5 days	6-7 days
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
15-19	10 (26.0)	6 (19.1)	17 (54.9)	9 (19.4)	6 (9.5)	40 (71.1)	19 (22.6)	12 (14.1)	57 (63.3)
20-24	23 (22.5)	9 (8.3)	68 (69.2)	13 (22.3)	8 (14.5)	38 (63.2)	36 (22.4)	17 (11.5)	106 (66.1)
25-34	35 (22.7)	18 (15.9)	82 (61.4)	29 (18.4)	21 (17.2)	72 (64.4)	64 (20.6)	39 (16.5)	154 (62.9)
35-44	30 (18.4)	20 (10.1)	130 (71.5)	32 (33.9)	13 (15.8)	47 (50.3)	62 (26.3)	33 (12.9)	177 (60.8)
45-54	30 (15.6)	15 (6.1)	151 (78.3)	18 (31.9)	17 (26.9)	30 (41.2)	48 (23.9)	32 (16.7)	181 (59.4)
55-64	30 (24.9)	9 (6.8)	91 (68.3)	23 (46.9)	8 (12.8)	18 (40.3)	53 (36.4)	17 (9.8)	109 (53.8)
65-75	12 (27.6)	5 (12.3)	26 (60.1)	16 (48.1)	4 (10.5)	14 (41.4)	28 (38.2)	9 (11.4)	40 (50.4)
Total	170 (21.3)	82 (10.9)	570 (67.8)	141 (26.6)	78 (15.9)	259 (57.5)	311 (23.9)	160 (13.5)	829 (62.6)
P*		0.352			0.001			0.111	
	Women			Men			Total		
Hours exposed/24 hours	< 1 hour	1-3 hours	> 3 hours	< 1 hour	1-3 hours	> 3 hours	< 1 hour	1-3 hours	> 3 hours
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
15-19	16 (45.4)	8 (28.0)	9 (26.6)	25 (51.6)	19 (30.9)	11 (17.5)	41 (48.5)	27 (29.6)	20 (21.9)
20-24	61 (60.9)	29 (30.4)	10 (8.7)	30 (52.5)	18 (27.6)	11 (19.9)	91 (56.6)	47 (28.9)	21 (14.5)
25-34	76 (56.8)	40 (30.2)	18 (13.0)	74 (62.1)	27 (20.0)	20 (17.9)	150 (59.4)	67 (25.1)	38 (15.5)
35-44	79 (45.5)	51 (27.7)	50 (26.8)	50 (57.1)	22 (24.0)	19 (18.9)	129 (51.4)	73 (25.8)	69 (22.8)
45-54	73 (37.3)	60 (31.2)	63 (31.5)	42 (67.1)	14 (20.8)	8 (12.1)	115 (52.4)	74 (25.9)	71 (21.7)
55-64	63 (52.9)	38 (27.4)	29 (19.7)	34 (75.8)	9 (15.7)	5 (8.5)	97 (64.8)	47 (21.3)	34 (13.9)
65-75	25 (66.7)	8 (12.4)	10 (20.9)	23 (70.7)	7 (17.1)	4 (12.2)	48 (68.8)	15 (14.8)	14 (16.4)
Total	394 (51.8)	234 (28.5)	193 (19.7)	280 (59.5)	116 (23.7)	78 (16.8)	674 (55.7)	350 (26.1)	271 (18.2)
P*		0.113			0.005			0.975	

Discussion

We discovered that men significantly smoked more than women, both in terms of prevalence and intensity. It was estimated that 5% of men smoke heavily (more than 20 cigarettes per day). Comparatively, one in four males and one in three women reported being passive smokers. The majority of passive smokers stated that they were exposed to smoking for more than an hour per day on practically every day of the week.

In developing nations, smoking is becoming more prevalent.14 Our smoking prevalence of 15.5% for men and 0.8% for women is lower than the national statistics for Iran from 2011 (23.4% for men and 1.4% for women) [14].

The spectrum of values published in three recent meta-analyses on the prevalence of smoking among Iranian women was 0.3-0.9% in various regions, which is consistent to our figures. Our estimate for men smoking in Iran is much lower than the range (19.2-22.9%) published by a previous systematic review [15, 16, 17].

Women are still stigmatised for smoking cigarettes, so either they switch to less stigmatised tobacco products like water pipes or they underreport their cigarette use [14]. Women made up 47.0% of deaths from secondhand smoke worldwide, followed by men (26.0%) and children (28.0%). 18 Despite the fact that smoking is prohibited in enclosed public spaces, around 25–35% of women and 21-24% of males in the Middle East are subjected to smoke, underscoring the need for additional measures to fully enforce smoke-free legislation [19].

In the Eastern Mediterranean, and South-East Asia, women are at least 50.0% more likely to be exposed to cigarette smoke than men. 18 As such, in our study, although the frequency of first-hand smoking was much less in women, however, they have been exposed much more to second-hand smoke than men. This also reported by the World.

Health Organization (WHO) in 2009 in their smoke-free environment guideline. 20 High exposure to active and passive smoking contributes to increasing trend of mortality and morbidities of NCDs and malignancies that we are observing in Iran. 21 This pattern need to be changed by implementing effective participatory and community-based interventions. 4, 6 According to reports, men, people in their mid-eighties, and people with poor socioeconomic level and educational attainment smoked more tobacco [16]. The same tendency was seen when we looked at gender and age. Other research in Iran [22] and in nations like China, Korea, Europe, and the United States have documented this [24]. In order for smoking prevention programs to be successful, they must be age- and gender-specific.

Passive smoking remained disproportionately affected young people and women, as seen by the decreased trajectory from young adults to adult population and from women to men. Our findings, which are in line with those of other studies, underline the fact that non-smoking women are more likely than non-smoking men to be exposed to tobacco smoke. 18, 21 This finding shows that nonsmokers, including women, nonetheless face exceptionally high exposures at home, especially in lower-income nations, despite the well-established bans on smoking in public areas. Furthermore, the implementation of legal bans does not appear to have reduced the frequency or duration of exposure to smoking in residences, according to the available data. When implementing successful programs to prevent, eliminate, or quit smoking, protecting non-smokers—especially women and children—from exposure to cigarette smoke in residential areas and at home should be given great consideration.

In line with earlier reports [22], we found that after the age of 55, both men and women had a decline in the prevalence of active tobacco use and the percentage of adults who smoked more than 20 cigarettes per day. The decline in active tobacco use after age 55 may, at least in part, be attributed to a higher mortality rate from NCDs, such as cardiovascular diseases (CVD). This requires investigation using appropriate study approaches, such as cohort studies. Furthermore, decrease in a number of cigarette smoking in old ages may be due to complications, such as chronic obstructive pulmonary disease, that occurred after a long time exposure to smoke. In fact, such smokers were not able to smoke cigarettes as many as they did before.

Conclusion

In summary, we found that smoking is pretty common among adult populations, particularly men. A majority of tobacco-free young adult women are exposed to passive smoking. Age and gender oriented interventions are required to change this risk pattern in our community to prevent from further smoking related morbidities and mortalities.

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