

## Original Article

## The Prevalence of Cigarette Smoking in Residents of Tehran

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**Background:** To determine the prevalence of cigarette smoking in Tehran and some of its determinants.

**Methods:** In a cross-sectional population-based study, a sample from citizens of Tehran was obtained using stratified random cluster sampling. Through a face to face interview, data such as the history of smoking in the past (abstinence from smoking) and at the present time (active smoking), and number of cigarettes per day and per year were collected. In general, people who smoked more than 100 cigarette-days were considered smokers. Pack per year was used to evaluate the severity of smoking.

**Results:** Out of the sampled people, 4565 participated in the study. Of these, 74.4%, who were over 15 years of age, were studied for smoking. The prevalence of smoking in Tehran was 11.9% (95%CI, 10.6 – 13.3). Some 20.6% of the male participants (95%CI, 18.2 – 23.1) and 2.9% of the female participants (95%CI, 2.2 – 3.7) were smokers ( $P<0.001$ ). The prevalence of smoking significantly increased with age until 54 years of age (OR=1.07; 95%CI, 1.06 – 1.08). People with higher education smoked more. Also, married people smoked significantly more than singles (OR=2.7; 95%CI, 1.85 – 3.95). Smokers used 209 cigarette pack-years on average, which was significantly higher in men and in people with lower education ( $P<0.001$ ).

**Conclusion:** The results of this study showed lower prevalence of cigarette smoking has relatively decreased compared with previous studies. However, healthcare officials should consider educational and healthcare programs to decrease the prevalence of smoking.

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**Keywords:** Cross-sectional study • prevalence • smoking • Tehran

## Introduction

In the year 2003, noncommunicable and chronic diseases along with obesity and diabetes were responsible for 60% of 57 million deaths worldwide; also, 46% of the total burden of diseases is attributed to them.<sup>1</sup> Several reports have acknowledged smoking, especially cigarette smoking, as one of the main causes of noncommunicable and chronic diseases.<sup>2-5</sup> Based

on WHO reports, it is estimated that 5.4 million people die annually because of cigarette smoking. Smoking is the sixth cause of death in the world<sup>6</sup> and if the trend remains the same until 2030, the number of smoking-induced deaths will increase to eight to ten million.<sup>6,7</sup> WHO statistics show that over one billion people are addicted to cigarette, which has increased about ten folds compared with the 20<sup>th</sup> century.<sup>6</sup> Meanwhile, the diversity observed in reports about the prevalence of smoking shows the mutual effects of environmental and racial factors on smoking.<sup>8-14</sup> During the past several years in Iran, extensive studies have been performed on smoking, of which National Health and Disease Survey, as the most extensive one, reported a decrease in smoking from 14.6% in 1991 to 11.7% in 1999.<sup>15,16</sup>

According to one of the large-scale national studies assessing 11,801 cases in Iran, the "Tehran Lipid and Glucose Study (TLGS)", the prevalence

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of daily cigarette smoking was 10.6%.<sup>17</sup>

Since the trend of diseases in Iran has changed in the past 30 years and health priority has been directed toward noncommunicable diseases, there exists the need for new comprehensive studies on smoking in order to provide necessary information for future planning.<sup>18</sup> The present study is part of a survey on ophthalmologic health indexes in residents of Tehran in order to determine the prevalence of smoking at different ages in males and females over the age of 15 years.

## Materials and Methods

This cross-sectional population-based study was part of the "Tehran Eye Study (TES)". The methodologic details of the study have previously been published and will be briefly reviewed here.<sup>19</sup>

### Study population

Target population in this study was all people who had lived in Tehran for at least one year since 2002. The study sample was selected using multistage stratified cluster sampling from the population of Tehran. The stratification of the sample was based on the number of households in each municipal area of Tehran. In each cluster, interviewers went to the first house, introduced themselves and the project to the members of the family, and invited all members over one year of age to the eye clinic for a complete ophthalmologic check-up. Then, they continued clockwise to choose nine more households in the neighborhood. Transportation fee was paid to all participants so that they could be interviewed and examined at the eye clinic.

Cigarette smoking was assessed through a face to face interview; all individuals who admitted to smoking at the present time were introduced as active smokers and those who had previously quit smoking were introduced as past smokers (abstinence from smoking). In all participants, daily cigarette smoking was assessed. People who smoked more than 100 cigarette-days were considered smokers and the pack-year was used to evaluate the severity of smoking in which, each pack-year was 7300 cigarettes a year or in other words, 20 cigarettes daily.

### Statistical analysis

The prevalence of present and past smokers was calculated with 95% confidence intervals (CIs).

Also, the prevalence of gender, age, education, ethnicity, and marital status was measured. In calculating standard errors and 95% CIs, the cluster sampling design was taken into account. All estimations were directly standardized for age and gender according to the 1996 Tehran population census data. Multiple logistic regression was used to evaluate the relationship between gender, age, education, ethnicity, marital status, and present and past smoking. Odds ratios (ORs) and 95% CIs were reported. Linear regression was used to evaluate the relationship between smoking cigarette (pack-year) and other factors.

## Results

Between August and December 2002, 4565 of the 6497 eligible individuals in the sample completed the interview (a participation rate of 70.3%). This report presents data of 3396 people who were over 15 years of age. Female participants comprised 60.7% and male ones comprised 39.3% of the population. The mean age of male and female participants was 38.4 and 35.9 years, respectively. Out of them, 79.9% were Persian, 16.8% were Turk, 1.4% were Kurd, 0.3% were Arab, 1.2% were Armenian, and 0.3% were Afghan. Some 28.3% were singles, 64.8% were married, and 6.9% were divorced or widowed. Education-wise, 7.8% were illiterate, 10.4% had elementary education, 12.6% had mid-school education, 48.8% had high-school education, and 20.4% had university education.

The prevalence of cigarette smoking in Tehran was 11.9% (95%CI, 10.6 – 13.3). Table 1 shows that men smoked more than women ( $P < 0.001$ ). The median age of the smokers in the present study was 42 years. The prevalence of smoking increased from 3.4% in the age group of 15 – 24 to 20.6% in age group of 45 – 54 (OR=1.07; 95% CI, 1.06 – 1.08) and decreased significantly from 55 years of age onwards (Table 1). The association between smoking and age was statistically significant ( $P < 0.001$ ). Smoking increased with age, and had an interaction with gender ( $P < 0.001$ ), that is, the association between age and smoking is stronger in males (OR=1.024; 95%CI, 1.017 – 1.031) than in females (OR=1.015; 95%CI, 1.006 – 1.024). In general, the prevalence of smoking reached its peak in both genders in the age group of 45 – 54.

We also found out that education had a direct association with cigarette smoking. Table 2 shows

**Table 1.** The prevalence of smoking and abstinence from smoking in Tehran according to age and gender.

		Current smoker			Past smoker	
		Number	% (95%CI)	Design effect	% (95%CI)	Design effect
Male	15 – 24	389	6.1 (3.2 – 9.1)	1.64	0.4 (0.04 – 5.62)*	1.47
	25 – 34	234	23.0 (17.6 – 28.4)	1.31	1.2 (0.37 – 6.3)*	1.18
	35 – 44	237	32.3 (26.3 – 38.3)	1.06	3.4 (0.5 – 6.2)	1.61
	45 – 54	200	34.6 (28.1 – 41.0)	0.79	4.2 (1.1 – 7.3)	1.02
	55 – 69	187	23.5 (16.8 – 3.0)	0.89	8.0 (4.2 – 11.8)	0.72
	+70	88	12.5 (4.9 – 20.1)	0.70	10.2 (3.9 – 16.5)	0.58
Female	15 – 24	654	0.9 (0.1 – 1.7)	1.39	0	
	25 – 34	384	3.2 (1.3 – 5.0)	1.18	0	
	35 – 44	414	5.8 (3.5 – 8.1)	0.92	1.1 (0 – 2.1)	1.02
	45 – 54	350	6.6 (3.6 – 9.5)	0.97	0.9 (0.2 – 7.2)*	0.75
	55 – 69	188	0.8 (19.0 – 3.3)*	0.76	1.7 (0.5 – 1.5)*	1.04
	+70	71	0		1.4 (2.0 – 5.1)*	1.10
Both genders	15 – 24	1043	3.4 (1.8 – 4.9)	2.07	0.2 (0.02 – 2.1)*	1.90
	25 – 34	618	13.9 (10.8 – 17.0)	1.48	0.6 (0.2 – 1.9)*	1.51
	35 – 44	651	19.4 (15.9 – 22.9)	1.29	2.2 (0.7 – 3.8)	1.76
	45 – 54	550	20.6 (16.8 – 24.5)	1.00	2.5 (0.9 – 4.2)	1.20
	55 – 69	375	13.1 (9.2 – 17.1)	1.18	5.1 (2.9 – 7.3)	0.86
	+70	159	6.5 (2.4 – 10.6)	0.91	6.0 (2.1 – 99)	0.90
All ages	Male	1335	20.6 (18.2 – 23.1)	1.67	2.8 (1.9 – 3.7)	1.40
	Female	2061	2.9 (2.2 – 3.7)	0.93	0.5 (0.2 – 0.9)	0.98
<b>Total</b>		<b>3396</b>	<b>11.9 (10.6 – 13.3)</b>	<b>1.56</b>	<b>1.7 (1.2 – 2.2)</b>	<b>1.40</b>

\* 95% CI has been calculated through binomial distribution.

that in a single variable analysis, the prevalence of smoking changed from 3.8% in illiterate people to 12.9% in people with university education ( $P<0.001$ ). Univariable analysis also showed that Kurds (Table 2) and married people smoked significantly more than others (Tables 2 and 3).

The age to start smoking was at least 10 years, with a mean ( $\pm$ SD) of 25.5 $\pm$ 8.5 years. Smokers smoked 11.6 $\pm$ 9.0 cigarettes a day. Men smoked 12.7 $\pm$ 9.2 cigarettes per day while women smoked 7.0 $\pm$ 6.1 cigarettes per day. The mean number of cigarettes per day was significantly more in men than in women ( $P<0.001$ ). On average, participants aged 15 – 24 smoked 6.2 cigarettes a day while participants aged 45 – 69 smoked the highest number of cigarettes a day (14.0).

Pack-year index was used to show the severity of smoking. The participants smoked 209 pack-years, which was significantly higher in men (Table 4). Furthermore, pack-year index significantly increased up to 69 years ( $P<0.002$ ). Except for age groups 25 – 34 and 55 – 69, pack-

year was higher in men than in women ( $P<0.001$ ). Pack-year index significantly decreased as education increased in smokers in a way that for each year of education, a decrease of 0.02 pack-years was seen ( $P<0.001$ ). This index was significantly higher in married people ( $P<0.001$ ). The association between smoking and age, gender, education, marital status, and ethnicity were assessed using a multiple logistic regression. Gender (OR=9.8; 95%CI, 7.3 – 13.1) and marital status (OR=3.1; 95%CI, 2.04 – 4.6) remained as smoking risk factors in the model.

Some 1.7% of the study population (95%CI, 1.2 – 2.2) were past smokers, who had given up smoking. This figure was significantly higher in men than in women and increased with age ( $P<0.001$ , Table 1). The mean age of abstinence from smoking was 54.4 $\pm$ 15 years. Abstinence from smoking was not significantly correlated with education or ethnicity, but was higher in married people than in single ones ( $P<0.002$ ) (Tables 2 and 3).

**Table 2.** The prevalence of smoking and abstinence from smoking in Tehran according to literacy, ethnicity, and marital status.

		Number	Current smoker %(95%CI)	Design effect	Past-smoker % (95%CI)	Design effect
Literacy	Illiterate	266	3.8 (1.3 – 6.4)	0.95	2.8 (0 – 5.6)	1.58
	Elementary school	353	12.2 (8.6 – 15.9)	0.98	1.9 (0.3 – 3.6)	1.09
	Mid- school	427	15.6 (11.3 – 19.8)	1.41	2.4 (0.9 – 3.9)	0.97
	High school	1658	11.6 (9.7 – 13.5)	1.51	1.3 (0.7 – 2)	1.38
	University	691	12.9 (9.8 – 16.0)	1.67	1.6 (0.5 – 2.7)	1.49
Ethnicity	Persian	2713	11.5 (10.1 – 12.9)	1.37	1.7 (1.1 – 2.3)	1.38
	Turk	572	12.7 (9.3 – 16.1)	1.46	1.5 (0.3 – 2.6)	1.26
	Kurd	48	30.7 (13.5 – 47.9)	1.84	1.7 (2.0 – 4.1) *	0.94
	Armenian	40	16.4 (0.1 – 32.7)	1.89	2.6 (2.0 – 6.3) *	1.12
Marital status	Single	960	6.3 (4.2 – 8.4)	2.06	0.3 (0.07 – 2.1)	1.63
	Married	2200	15.4 (13.6 – 17.3)	1.42	2.4 (1.6 – 3.2)	1.45
	Others	236	5.6 (2.2 – 9)	1.13	1.6 (0 – 3.2)	0.83
<b>Total</b>		<b>3396</b>	<b>11.9 (10.6 – 13.3)</b>	<b>1.56</b>	<b>1.7 (1.2 – 2.2)</b>	<b>1.40</b>

\* 95%CI has been calculated through binomial distribution.

## Discussion

The main purpose of the TES held in 2002, an urban-based study according to the Tehran's population, was to study the population's visual impairments. In this study, medical histories of the patients and cigarette smoking as well as ophthalmologic examinations were assessed. Thus, the selection bias in this study was minimized due to the participants participating for eye examination, but some limitations should be considered.

In this study, the only investigated factor on the population was if they smoked or not; thus, smoking as a hobby (for fun), social smoking, or under special circumstances was not considered.

Due to the fact that all family members were interviewed together, we faced an increase in the information bias in some members such as the youngsters and teenagers; therefore, the results on youngsters and even university students were underestimated.

The prevalence of cigarette smoking was 11.9% in the population of Tehran. This rate is lower in our study compared with 14.6% reported in Mohammad's study in 1999.<sup>16,17</sup>

The 10.6% prevalence rate reported in the "Tehran Lipid and Glucose Study",<sup>17</sup> is lower than our findings, although both studies, investigated the urban population of Tehran. This could be the result of various definitions and different classifications in the two studies.

**Table 3.** The association between smoking and abstinence in the study population according to the studied variables.

		Current smoker	Past smoker
		Odds ratio (95%CI)	Odds ratio (95%CI)
Age	15 – 24	1	1
	25 – 34	4.63 (2.74 – 7.83)	3.74 (0.38 – 37.20)
	35 – 44	6.90 (4.05 – 11.76)	13.64 (1.66 – 111.91)
	45 – 54	7.44 (4.33 – 12.77)	15.34 (1.89 – 124.70)
	55 – 69	4.32 (2.48 – 7.54)	31.96 (4.17 – 244.75)
	+70	1.99 (0.86 – 4.61)	37.82 (4.67 – 306.51)
Gender	Female	1	1
	Male	8.57 (6.47 – 11.36)	5.54 (2.71 – 11.31)
Literacy	Illiterate	1	1
	Elementary school	3.49 (1.67 – 7.28)	0.69 (0.18 – 2.67)
	Mid- school	4.61 (2.25 – 9.46)	0.86 (0.26 – 2.90)
	High school	3.30 (1.60 – 6.78)	0.47 (0.15 – 1.50)
	University	3.71 (1.81 – 7.60)	0.56 (0.16 – 1.94)
Ethnicity	Persian	1	1
	Turk	1.12 (0.81 – 1.56)	0.86 (0.37 – 1.98)
	Kurd	3.42 (1.49 – 7.83)	1.02 (0.13 – 8.10)
	Armenian	1.51 (0.47 – 4.92)	1.55 (0.18 – 13.42)
Marital status	Single	1	1
	Married	2.7 (1.85 – 3.95)	8.45 (1.96 – 36.49)
	Others	0.88 (0.43 – 1.82)	5.65 (0.98 – 32.71)

**Table 4.** The severity of smoking based on pack-year index in the study population according to age and gender.\*

Age groups	Male	Female	All
15 – 24	0.33 ± 0.25	0.18 ± 0.08	0.32 ± 0.24
25 – 34	0.45 ± 0.42	0.38 ± 0.28	0.44 ± 0.41
35 – 44	0.63 ± 0.40	0.26 ± 0.23	0.57 ± 0.40
45 – 54	0.70 ± 0.44	0.42 ± 0.34	0.66 ± 0.44
55 – 69	0.74 ± 0.51	0.75 ± 0.30	0.74 ± 0.50
+70	0.51 ± 0.33	1 ± 0	0.54 ± 0.34
<b>Total</b>	<b>0.58 ± 0.44</b>	<b>0.36 ± 0.3</b>	<b>0.56 ± 0.43</b>

\* Mean ± standard deviation.

Details of cigarette smoking were not assessed in this study; an individual, who smokes 100 cigarettes within 100 days for fun, was defined as a smoker while the TLGS defines such a person as an occasional smoker.

Although regions with prevalence rates lower than Tehran could be found such as 7% in Oman, most studies have shown higher prevalence rates compared with our findings in Tehran. Some reports from other regions are as follows: the USA: 20%,<sup>20</sup> Italy: 28%,<sup>21</sup> Mongolia: 9.2%,<sup>9</sup> Ukraine: 66.8%,<sup>22</sup> Egypt: 40%,<sup>23</sup> Russia: 63%,<sup>24</sup> India: 15.6%,<sup>25</sup> Kuwait: 34.4%,<sup>26</sup> and Pakistan: 14.2%.<sup>13</sup>

The prevalence of cigarette smoking in the age group 15 to 24 was determined to be 3.4% that indicates approximately lower rates at these ages compared with other studies.<sup>27-32</sup>

The prevalence at this age was reported to be 4.8% and 3.2% in 1991 and 1999 by Mohammad et al., respectively.<sup>15,16</sup> Considering that at this age, participants mostly include high school and university students, the reports from these groups can be compared; for example, Ziaee et al.<sup>33</sup> reported the prevalence of cigarette smoking in the high school students exceeding 7.2% and 1% for boys and girls, respectively. In a study by Masjedi et al.<sup>34</sup> on university students in Tehran, a prevalence of 16.3% was reported.

There is also another study performed by Heidari et al.,<sup>35</sup> showing a cigarette smoking prevalence of 4.3% in high-school students. They also demonstrated that 28.2% of the population smoked as a hobby.

Due to the whole family integrated interview, underestimation of the prevalence in younger ages was expected since 15- to 24-year-old family members do not express their real smoking status. However, in addition to the effects of cultural, environmental, and individual factors on the low prevalence of smoking, this information bias should not be neglected. Yet, there are studies that report this rate to be higher than our findings. The

USA and Brazil have reported this rate to be 43.7% and 14.7%, respectively.<sup>36</sup>

Although many studies in and out of Iran report higher prevalence rates than our findings.<sup>13-16,24-26,37</sup> there are some studies that report lower figures though, such as that in Ethiopia with a rate of 2.7%.<sup>8</sup> In addition to the effects of cultural, environmental, and personal factors on the low prevalence of smoking, the information bias that underestimates this figure should be considered. There are some reports from the USA, Brazil, and Malaysia that report the prevalence of smoking in the 15 – 24 age group to be 43.7%, 14.7%, and 29.7%, respectively. These figures are so much higher than the figure for Tehran and it seems that smoking in this age group in Tehran is less frequent.<sup>36,38</sup>

Table 1 shows that smoking significantly increased from 3.4% in the age group 15 – 24 to 20.6% in the age group 45 – 54 and then decreased again. Most of the studies support the fact that smoking increases up to the fifth and sixth decade of life and then decreases.<sup>15</sup> The rate of abstinence from smoking showed an increase from 0.6% in the age group 15 – 24 to 5% in the individuals over 55, which supports this finding. Some chronic diseases and higher rate of mortality after the age of 50 can also explain the decrease in smoking.

Based on our findings, the mean age of starting smoking was 25.5 years in the citizens of Tehran. According to the National Health and Disease Survey, about 66% of people stated that they had started smoking when they were 15 – 24 years of age.<sup>15</sup> Comparison between these findings and those in some other countries shows that residents of Tehran start smoking at an older age.<sup>36</sup> However, people under the age of 25 might not have told the truth, which can cause this higher age of start in our result. Independence at adolescence and facing some cultural and social issues such as university, military service, and marriage can set grounds for smoking. Since smoking can pave the way for drugs, the less the age of starting smoking,

the higher would be the risk of tendency toward drugs.<sup>39</sup> On the other hand, people graduate from the university in most of the fields by the age of 25; therefore, unemployment can be a cause of tendency to smoking. However, there are no studies proving this hypothesis, which is a potential idea for further studies on the predisposing factors on the initiation of smoking.

Similar to other studies, smoking was more prevalent in men and gender had an interaction with age. Some studies showed that age was a factor that nears prevalence of smoking in men and women. The difference in the prevalence of smoking in men and women in other countries is much less than that in the present study.<sup>8,23</sup>

In the present study, smoking in the residents of Tehran is less than that in previous study in Tehran. However, healthcare officials should consider healthcare and educational services in this regard to further reduce the rate smoking.

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