

# Population Survey of Knowledge about Oral Cancer and Related Factors in the Capital of Iran

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**Abstract** Knowledge about oral cancer risk factors and signs is thought to improve prevention and early diagnosis, and in turn, increases survival. In this population-based survey, knowledge about oral cancer was assessed in Iran. A total of 1800 self-administered questionnaires (collecting sociodemographic data and questions regarding oral cancer risk factors and signs) were distributed through random sampling. Final scores ranged between 0 and 15 for the risk factors and 0–11 for the signs. Scores below the median indicated a low level of knowledge, scores representing the third quartile of correct answers indicated a moderate level of knowledge, and scores representing the upper quartile indicated a high level of knowledge. Statistical tests were used for analysis of knowledge level in different sociodemographic categories. A total of 1312 participants completed the questionnaires. The average of knowledge scores for risk factors was  $5.3 \pm 3.0$  and for signs was  $4.5 \pm 2.9$ . Overall, 75 and 56% respectively were able to identify major risk factors

(smoking and alcohol); 23.5% could not define any related signs and symptoms. Dividing scores into quartiles indicated that three out of four people had “low” knowledge about risk factors and 58% had “low” knowledge about signs and symptoms. Females and highly educated people had more knowledge of oral cancer. Significant difference was found between job and level of knowledge ( $P = 0.001$ ). This survey revealed that public knowledge of oral cancer was not satisfactory in Iran. Efforts should be done to inform and educate people with risk factors, initial clinical presentation, and symptoms, in order to improve prevention and promote early diagnosis.

**Keywords** Knowledge · Public · Oral cancer

## Introduction

Cancer is a major health problem with an estimation of over 14 million cases around the world based on a recent international agency of research on cancer report [2] and an expectation to increase to 24 million cases by 2035 [1, 2]. Also, cancer is the third leading cause of death in Iran [3]. Oral cancer cases (which affects the oral cavity including the tongue, floor of the mouth, buccal mucosa, gingiva, palate, and lips) are estimated to be over 300,000, representing 2.1% of all new cancers in the latest data in the world [1, 4]. In 2017, oral cavity and pharynx cancer has been estimated as the ninth leading cancer type in men in the USA, representing 4% of all new cases of cancers [5]. In a recent global data, the incidence of lip and oral cavity cancers was reported to be 2.2 and 1.8 in 100,000 for males and females, respectively, and the mortality rate was estimated at 0.68/100,000 in Iran [6].

Over 90% of oral cancers arise from the squamous epithelium that results in oral squamous cell carcinomas (OSCCs) [7], which are primarily linked to habits of tobacco, alcohol,

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and betel use. Other possible factors are human papillomavirus (HPV) infection, family history and genetic factors, diet, and immune-suppression; and ultraviolet light is implicated in lip cancer. Some reports also stated that socioeconomic status (SES) is influential [8, 9].

OSCC survival rates are about 80% if diagnosed at an early stage; however, it is less than 30% in cases with advanced stage diagnosis [10]. Although oral cancer examination can be done without discomfort to patients due to the accessibility of the oral cavity, lesions are diagnosed at an advanced stage in more than two-thirds of patients; thus, the survival rate is low [11].

In Iran, the 5-year survival of oral cancer patients is less than 50%. This low survival has been thought to be due to the diagnostic delay—the mean time from the onset of symptoms to the final diagnosis—as reported by Sargeran (2015) which is at 7.2 months [12]. They indicated that this delay is higher than that reported in many other studies and suggested that the lack of, or insufficient knowledge about oral cancer, might be one of the reasons [12]. Other studies around the world also mentioned the lack of public awareness of risk factors, signs, and symptoms associated with oral cancer as a potent barrier for the early detection of lesions [10].

Since lifestyle factors such as tobacco and drinking alcohol are also important risk factors, awareness of oral cancer risks might motivate individuals to change their behaviors and reduce their probability of having cancer [10, 13]. Previous studies about oral cancer knowledge in Iran have been done in defined groups of people, especially in patients attending at dental clinics in different locations (North, Central, South provinces) with inconsistent results [6, 14–17]. Little is known about public oral cancer knowledge in Iran, and to the best of our knowledge, there is no population-based study in Tehran. The aim of this survey was to determine the public knowledge about oral cancer as a baseline data (in the capital city of Iran) to use for effective primary preventive programs in future.

## Methods

This cross-sectional study was conducted in the capital city of Iran, Tehran, from 2016 to 2017 using self-administered questionnaires.

## Ethics

The research project was approved by the Shahid Beheshti University of Medical Sciences, Tehran, Iran, Ethics Committee. The purpose of the study was fully explained in the questionnaire, and responses to the questions were on a voluntary basis. All participants were assured of anonymity and confidentiality.

## Questionnaire

The questionnaire was designed with an adaptation of previous valid questionnaires of oral cancer knowledge [18, 19]. We did some modification considering the local cultural, environmental, and language environment. Psychometric properties have been evaluated for the modified questionnaire. For face validity, we set up an expert panel of six oral medicine and community oral health specialists for finding any “ambiguity,” “difficulty,” and “irrelevancy” in phrases and changes applied. Then, we evaluated content validity ratio (CVR) and content validity index (CVI), using opinions of 10 experts in oral medicine and community oral health. Items with CVR score more than 0.59 and CVI score more than 0.79 were considered as acceptable items. Sixty volunteer participants (invited from patients attending the dental school for routine dental checkups) completed the questionnaire once, and again 2 weeks later for test-retest reliability (Cronbach’s alpha coefficient was 0.81 and Infraclass correlation coefficient (ICC) was 0.88). Eventually, the final Persian language questionnaire fitted onto a double-sided plus one single A4 paper sheet stapled together. The purpose of the study and instructions were explained at the beginning of the questionnaire. Participants were requested to use their own knowledge, without any help from online resources. The questionnaire included demographic and socioeconomic questions (age, gender, education, and employment status), 15 questions about knowledge of risk factors and 11 questions about signs and symptoms of oral cancer including positive and negative questions. All knowledge questions were close-ended with “yes,” “no,” and “do not know” options. Box 1 shows the final questionnaire. For analysis of risk factors and signs’ knowledge scores, each correct answer was allocated a score of 1, and for incorrect answers, including “do not know”, zero was assigned. Thus, the final scores for each participant ranged between 0 and 15 for risk factor knowledge and between 0 and 11 for the sign and symptom knowledge. Scores were also divided into quartiles. Scores below the median indicate a low level of knowledge, scores representing the third quartile of correct answers indicate a moderate level of knowledge, and scores representing the upper quartile indicate a high level of knowledge [20].

## Sampling and Participation

According to previous studies in Iran in recent years [6] that considered 16% for the percentage of knowledgeable patients (with regard to the risk factors of oral cancer) for the sampling formula, it was estimated that 1000 participants should be enough for the survey. Additional sampling was added in order to compensate losses and refusals.

The study population comprised adult people who were parents’ of public primary school students in Tehran, Iran.

**Box 1** Final questions

## Knowledge of risk factors

1. Using tobacco (smoking cigarettes, pipe, hookah or chewing (+))
2. Being over 60 years of age (+)
3. Drinking alcohol almost every day (+)
4. Spending time in the severe sunlight (+)
5. Sexually transmitted virus human papillomavirus (+)
6. Having a family member with mouth or throat cancer (+)
7. Eating spicy foods (−)
8. Eating and drinking hot foods (−)
9. Lip and cheek biting habit (−)
10. Long term using artificial teeth (−)
11. Being overweight (−)
12. Pollution in the air (−)
13. Allergy to foods and medicine (−)
14. Not eating enough fruits and vegetables (+)
15. Untreated tooth caries (−)

## Knowledge of signs

1. White or red patches in mouth that do not go away (+)
2. Non-healing ulcer in the mouth lasting more than a month (+)
3. Long-lasting swelling or growth in mouth (+)
4. Small ulcer that healing in 2 weeks (−)
5. Having difficulty or pain in swallowing (+)
6. Mouth blisters that are healing and recurring (−)
7. Hoarseness or change in voice that does not go away (+)
8. Immediate weight loss (+)
9. Discomfort and soreness in the mouth that does not go away (+)
10. Tooth sensitivity to hot or cold (−)
11. Long-lasting swelling in the neck or sore throat that does not go away (+)

Tehran is the capital city with a population of 8,737,510, according to the Iran Census 2016 and is located in the north-central part of the country. The sampling method was a multi-stage stratified random technique. Firstly, from the 22 municipal regions in Tehran and according to a geographic location in the South, East, West, and North, four regions were selected. Then, considering the average population, one or two schools were randomly selected from each region school list and the parents were invited from each school.

**Study Design**

After obtaining the necessary permits, a total of 1800 invitations were distributed to parents at the school to reach the best sample size. Participants were invited, and if willing to take part, signed the consent form for participation.

Participants were asked to return the filled questionnaire on the same day, but without any time restrictions. We excluded any illiterate persons due to the self-administered nature of the questionnaire. A brochure containing information about oral and lip cancer were provided to all parents in defined schools after finishing the study. This brochure was approved by the panel expert of community oral health and oral medicine specialists in Shahid Beheshti University of Medical Sciences, Tehran, Iran.

**Outcome Variables**

Knowledge about oral cancer risk factors, signs, and symptoms were collected through a numerical scale. For each correct response for the components of the questionnaire, one point was assigned. We summed up the scores of each

question in the risk factor category (ranging from 0 to 15) and signs and symptoms category (ranging from 0 to 11).

**Independent Variables**

Sex, age, educational attainment, and employment status were the independent variables. Educational attainment was recorded as years of study successfully completed and then categorized into groups according to the years of study of up to 11 (less than high school diploma), 12 years (high school diploma), or more than 12 years (greater than high school diploma). Age was recorded as date of birth, and then, it was categorized, similar to most of the previous studies [1, 10], to enable more accurate comparison and analysis. It was categorized into groups of 25–35, 35–45, and >45 years. Due to higher rates of oral cancer in older adults (>45), we hypothesized that they might have different knowledge levels about oral cancer. We did not categorize elder people due to the limited number of participants in this category. Employment status was divided into three groups of unemployed, employed, and others (including students, housewives, and retired). Then, the employed group were further subdivided into labor and related, employed (public or private), self-employed, and professionals.

**Statistics**

Data was coded and processed by SPSS (version 22) software. Distribution of demographic data and the correct responses to questions were analyzed and tabulated. Statistical tests, including ANOVA and independent sample *t* test, and post hoc tests were used for analysis of the level of knowledge in

different age groups, gender, education levels, and employment status.  $P < 0.05$  was considered statistically significant in the survey.

**Results**

Out of 1800 parents, 1312 completed questionnaires were returned (overall response rate = 72.8%). Overly, 38% of participants were male and 62% were female with the average age of  $37.8 \pm 9.02$ . More than 30% of participants had more than a high school diploma (12 years) education. Only 2.1% was unemployed at the time of the study. Table 1 shows the demographic background of participants (Table 1). The average of knowledge scores for risk factors was  $5.3 \pm 3.0$  and for sign and symptoms was  $4.5 \pm 2.9$ . Figure 1 indicates the frequency of responses for each question about risk factors of oral cancer, and Fig. 2 indicates the frequency of responses for each question about signs and symptoms of oral cancer separately. From all respondents, 75 and 56% of participants were able to correctly identify two major risk factors (smoking and alcohol), respectively; and 47% mentioned both correctly. Knowledge about genetic, HPV, and fresh vegetables were in the next order. People were less informed about the risk of older age, and sunlight, and had a misconception about hot food and tooth caries as risk factors for oral cancer. Overall, 11.9% could not define any related risk factors. Out of all the participants, 23.5% could not define any related signs and symptoms of oral cancer. However, more than 50% of parents correctly defined mouth swelling, long-lasting ulcers, and white or red patches as a sign

of oral cancer; the lowest knowledge was about the change in voice (28%). Also, the highest misconception about early signs of oral cancer was recurrent oral ulcers. The division of participants into quartiles, based on scores, is shown in Table 2. Three out of four people had “low” knowledge about risk, and 58.5% had “low” knowledge about signs and symptoms (less than 50% of the scores) (Table 2). The statistical test indicated that knowledge of oral cancer signs or risk factors was not significantly different between the different age categories. Male participants had less knowledge of oral cancer signs and risk factors ( $p < 0.05$ ). Statistical analysis showed knowledge of oral cancer signs and risk factors was more in highly educated people ( $P = 0.001$ ). In addition, there was a significant difference between different job categories in terms of level of knowledge about signs and risk factors ( $P = 0.001$ ). Post hoc test (Duncan) showed difference between knowledge about oral cancer risk factors in unemployed and labor and related occupation, and other job categories. Also, post hoc test (Duncan) indicated difference between knowledge of signs and symptoms in public/private employed and professionals, and unemployed and labor and related. Also, the multivariable analysis was performed to test the associated sociodemographic characteristic associated with knowledge of risk factors and signs and symptoms (keeping the variables with  $P$  value  $< 0.25$  in the model). Knowledge of oral cancer was still more in highly educated people after age and gender adjustment (Table 3).

**Discussion**

This cross-sectional study was conducted on 1312 parents of public primary school students. We chose this group of people because, first of all, public primary schools are almost evenly distributed in Tehran and stratified sampling is logical and convenient; secondly, this group of people will potentially be engaged with the next-generation health. The results of the present study showed that the level of oral cancer literacy is not satisfactory in a defined population in Iran. However, regarding the two main risk factors for oral cancer—tobacco and alcohol—three out of four people identified tobacco, and more than half of population could define alcohol as risk factors. Little was known about aging and sun exposure association with oral cancer. In terms of signs and symptoms, participants were more informed about mouth swelling and long-lasting ulcers. Almost one out of four of them could not define any related signs and symptoms of oral cancer.

In Iran, most of the recent studies on awareness of oral cancer risk factors and signs were on dental patients in limited geographic locations, with different sample sizes ranging from 320 to 783 people. The most correct answer about risk factors in those previous studies was about tobacco, ranging from 51 to 79%, which is comparable with the present study [6, 14, 15,

**Table 1** Demographic characteristics of participants

Variables	Frequency	Percentage
Age (years)		
25–35	318	28.2
35–45	644	57.1
>45	165	14.6
Gender		
Male	489	38.3
Female	788	61.7
Education		
Less than high school diploma	373	31.8
High school diploma	411	35.1
Greater than high school diploma	388	33.1
Employment status		
Unemployed	26	2.1
Labor and related	125	10.0
Self-employed	495	39.6
Employed (public or private)	370	29.6
Professional	80	6.4
Others	155	12.4

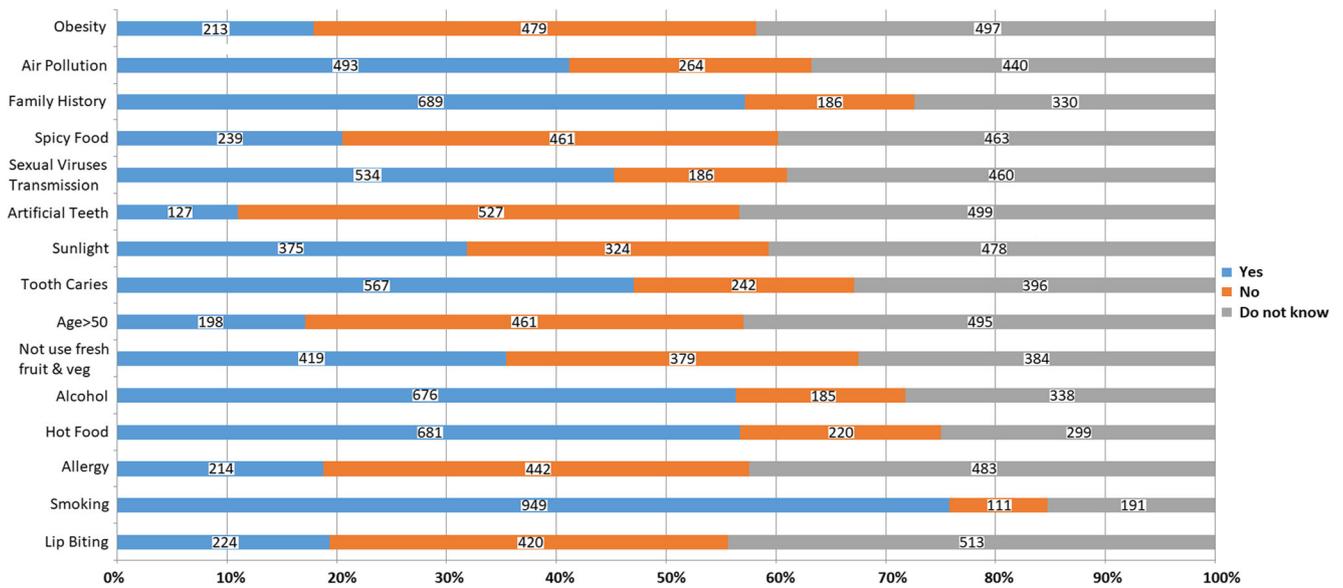


Fig. 1 Knowledge about oral cancer risk factor in each question

17]. Only Pakfetrat et al. (2010) in the northeast of Iran showed that about 16% of dental patients were aware of the link between oral cancers and smoking. It seems that this difference is due to the open-ended structure of Pakfetrat’s study questionnaire [16]. Acceptable knowledge of tobacco as a risk factor might be related to high levels of achievement in effective tobacco use surveillance and health warning labels about the danger of tobacco in Iran according to the WHO report [21].

All studies in Iran indicated lower knowledge of alcohol, ranging from 43 to 69% [6, 14, 15], except Pakfetrat that

mentioned around 7% awareness [16]. Questions about consumption of fruit and vegetables were only mentioned in two studies with 36–40% knowledge, the same as our results [6, 17]. None of these studies in Iran mentioned HPV as a risk factor in the questionnaire, maybe due to restrictions against the cultural background, and just one mentioned viral infection generally (correct answer = 48%) [17]. The results of this study indicated that 47% of participants were informed about this virus. The surveys mentioned poor knowledge of initial signs; however, according to the results of those surveys, it is obvious that people are more informed about the association

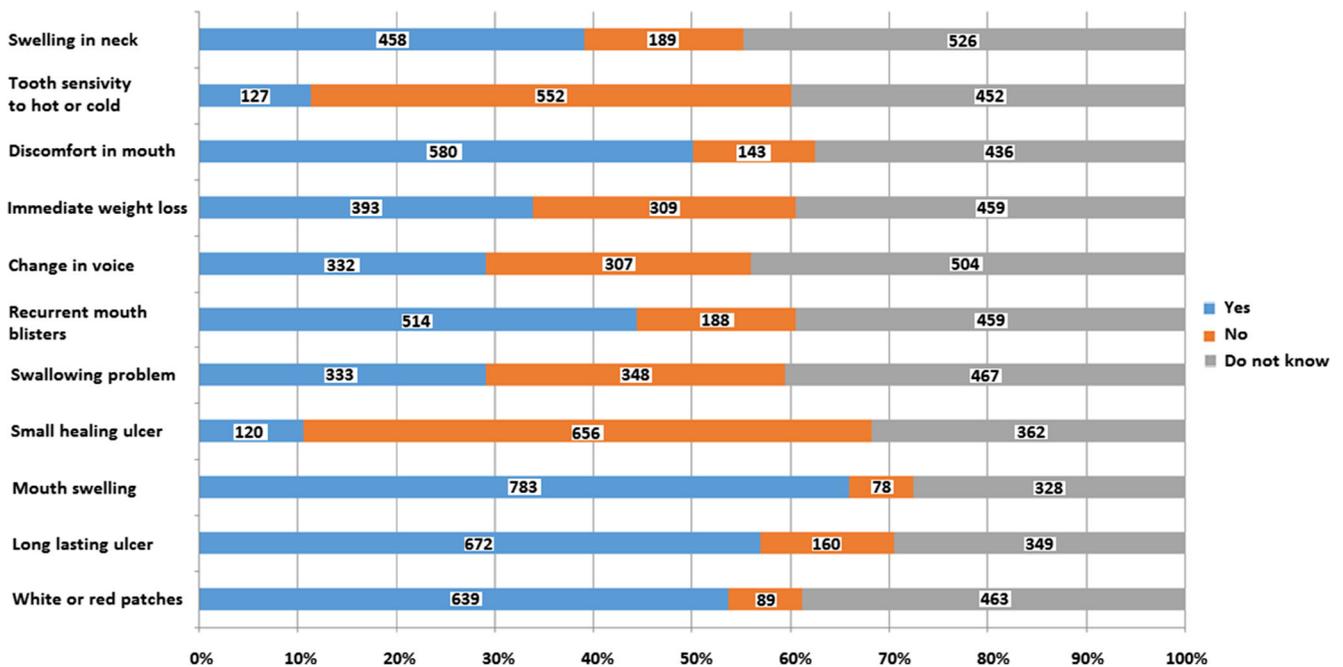


Fig. 2 Knowledge about oral cancer signs in each question

**Table 2** Level of knowledge about oral cancer risk factors and signs

Knowledge level	Low	Moderate	High	Total
<b>Risk factor</b>				
Frequency	963	317	11	1291
Percentage	(74.6%)	(24.6%)	(0.9%)	(100%)
<b>Sign</b>				
Frequency	755	377	104	1236
Percentage	(58.5%)	(29.2%)	(8.1%)	(100%)

between chronic ulcers and oral cancer than white or red patches. For instance, Andishe Tadibar et al. in the south of Iran reported chronic ulcers without pain (56.7%) as the most correct answers about related signs of oral cancer [15]. Regarding the relation between early diagnosis and treatment, raising knowledge of initial signs of oral cancer in Iran is essential. Association between sex, age, and awareness was inconsistent in previous studies in Iran; but most studies reported the relation between education level and awareness similar to this study [15, 17]. In the current study, we found a difference in knowledge among different employment status. Pakfetrat et al. (2010) also reported significant differences among people with different jobs regarding knowledge about oral cancer [16]. However, in a recent study in Iran, Razavi et al. (2015) could not define a significant difference among jobs [6]. That is might be due to different categorization for employment in different study.

Also, previous studies around the world in recent years indicated that knowledge levels of oral cancer were not high. However, greater public awareness of tobacco as a risk factor was reported compared with other potential risk factors, especially alcohol consumption [11, 22–24]. These results are relevant in developed countries like Australia as well. In Australia, Dost et al. (2016) evaluated knowledge of oral cancer risk factors among 1498 high-risk Australians and found that participants thought smoking (87.5%) to be the most common risk factors associated with oral cancer, while only half of the respondents were aware of the risk from alcohol consumption [8]. Also, public knowledge about preventable risk factors, like HPV, is considerably low. For instance, a study in Australia (2015) showed only 23% of participants were aware of HPV infection and oral cancer [1]. However, high HPV vaccine coverage in countries like Australia could potentially lower oral cancer prevalence, while there is no national immunization program for HPV in Iran.

Although most studies confirm the association between advanced stage oral cancer and mortality [12], most surveys from around the world reported low levels of public knowledge regarding the clinical presentation of oral cancer [23]. Hassona et al. in 2015 surveyed 1200 dental patients in Jordan and reported 24% of participants had no knowledge about any signs of oral cancer, and only around 44, 41, and 33% were able to correctly identify white/red patches, a long-standing swelling, and a non-healing ulcer, respectively, as possible signs of oral cancer [9]. In Australia (2015), the most recognized sign was reported as non-healing ulcers (49%) and only

**Table 3** Multivariate analysis for sociodemographic factors and knowledge of oral cancer

Dependent variables	Parameter	B	Std. Error	t	Sig.	95% confidence interval	
						Lower bound	Upper bound
Knowledge of risk factors	25–35	-.201	.327	-.615	.538	-.843	.441
	35–45	.257	.292	.879	.380	-.316	.829
	> 45	0 <sup>a</sup>	.	.	.	.	.
	Male	-.751	.204	-3.677	.000	-1.153	-.350
	Female	0 <sup>a</sup>	.	.	.	.	.
	Less than high school diploma	-1.899	.240	-7.908	.000	-2.370	-1.428
	High school diploma	-.956	.216	-4.426	.000	-1.380	-.532
Knowledge of signs and symptoms	Greater than high school diploma	0 <sup>a</sup>	.	.	.	.	.
	25–35	-.358	.322	-1.112	.266	-.990	.274
	35–45	.139	.286	.485	.628	-.423	.701
	> 45	0 <sup>a</sup>	.	.	.	.	.
	Male	-.630	.202	-3.111	.002	-1.027	-.232
	Female	0 <sup>a</sup>	.	.	.	.	.
	Less than high school diploma	-2.230	.238	-9.383	.000	-2.696	-1.763
High school diploma	-1.444	.213	-6.785	.000	-1.862	-1.027	
Greater than high school diploma	0 <sup>a</sup>	.	.	.	.	.	

<sup>a</sup> This parameter is set to zero because it is redundant

around 20% agree with the question oral cancer may present as a lump in the neck [1]. Posorski et al. (2014) in a study on awareness of signs (among senior citizens in Illinois, America) reported better results, but the study population was only 93 people. The most correct answer about early signs in that study was chronic ulcers (74%). Also, more than half of participants had knowledge of white patches and swelling in the throat or neck [18].

Education level was related to awareness in most surveys, in line with the current study [10, 18]. Hertramf et al. in a study in North Germany found differences in knowledge levels between people with different education levels and occupation and concluded that education, employment, and income are intertwined indicators. It means that higher level of education results in better employment and higher income [11]. However, some studies could not find any relation between education and awareness [9]. It might be due to the role of available online resources for general health learning.

Although attention to oral hygiene and caries prevention is important, misconception about the association to oral cancer could be scaremongering. Razavi et al. in 2015 reported about half of the studied population believes poor oral hygiene to be a risk factor for oral cancer in Iran [25]. Dost et al. in 2016 reported more than 60% of Australians mentioned poor oral hygiene as a risk factor for oral cancer, just after smoking [8]. They discussed that this misconception might be due to a belief that cleanliness is associated with good health. Although our questions were slightly different, in the current study, more than 40% agreed with tooth caries as an associated risk factor for oral cancer. Also, people should be informed that any lesion in the oral cavity is not a sign of cancer. The present study showed more than one out of three participants thought recurrent blisters could be signs of oral cancer.

In this study, we did not include persons with limited literacy—people who are not able to read/write or they did not have any years of schooling—but only 11 people (< 0.01%) did not complete the questionnaire due to limited literacy; therefore, it did not affect the results. Also, the sample selection was from parents of primary school students, so senior adults were not included in this study, and this was considered a limitation.

The focus of our study was oral cancer. Although assessing other cancer knowledge is also important, assessing knowledge of all cancers in one study would need an extensive questionnaire and could thus result in much lower response rates and lower accuracy. Also, knowledge about oral cancer signs is very important due to easy visualization by people, and that it is not matter of concern in most of the other cancers. However, further studies to assess other cancer knowledge and compare that with oral cancer knowledge has been suggested.

The unsatisfactory level of knowledge in this study which revealed public health policy makers in Iran should conduct

an active educational strategy for improving knowledge about cancer such as ability to recognize risk factors and clinical presentation of suspected lesions, promotion of preventive behaviors, and enhancement of early detection of cancer in primary care along with global cancer education.

## Conclusion

Considering the results of the present study, it is obvious that knowledge about tobacco is higher than other potential risk factors, and awareness of initial signs is very low and not acceptable in the capital city of Iran. Education is the most feasible approach for change, and efforts should include population-level education and information about habitual risk factors and initial signs and symptoms in order to promote early diagnosis.

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## Compliance with Ethical Standards

**Conflict of Interest** There is no conflict of interest.

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