# Knowledge, Attitude and Practice of General Dentists in Rasht City Regarding Oral Cancer

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**ABSTRACT**

**Aims** This study assessed the knowledge, attitude, and practice of general dentists in Rasht City, Iran, regarding oral cancer.

**Materials & Methods** This cross-sectional study was conducted on 129 randomly selected general dentists practicing in Rasht City, Iran in 2022. A researcher-designed questionnaire with four sections of demographics, knowledge (nine questions), attitude (seven questions), and practice (eight questions) was used for data collection after confirming its validity and reliability. Data were analyzed by the Chi-square test, Fisher's exact test, and Pearson's correlation coefficient (alpha=0.05).

**Findings** The mean knowledge score of the participants was 5.39±1.96 (out of nine). Most subjects (48.1%) had a moderate knowledge level. Knowledge level had a significant inverse correlation with age, time passed since graduation, and the attending university. The mean attitude score of the participants was 26.4±2.72 (out of 35) and most of them (65.9%) had a positive attitude in this regard. Attitude had no significant correlation with any sociodemographic variable. The mean practice score of the participants was 18.18±2.53 (out of 24), and the majority of them (63.6%) had a moderate practice regarding oral cancer. The practice had a significant correlation only with participation in continuing education courses (p<0.05). Practice and knowledge, and also attitude and knowledge had a significant positive correlation with each other.

**Conclusion** The knowledge and practice of the majority of general dentists in Rasht were moderate regarding oral cancer, which is alarming and calls for improvement in the quality of instruction and continuing education courses.

**Keywords** Mouth Neoplasms; Dentists; Knowledge; Professional Practice; Attitude

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# Introduction

Oral cancer is the most common malignant neoplasm of the head and neck region. Squamous cell carcinoma (SCC) accounts for over 90% of oral cancers [1]. The incidence of oral cancer has increased in many countries worldwide and is expected to reach 62% by the year 2035 [2]. Thus, oral cancer is turning into a global dilemma, and the rate of its related morbidity and mortality is on the rise. In the case of early detection and management of small and localized cancerous lesions, a survival rate of 70% to 90% may be expected. Therefore, dental clinicians play a fundamental role in the early detection of oral cancer [3]. They must be capable of diagnosing an oral neoplasm by precise examination and based on the patient's signs and symptoms and clinical features of the lesion. They should also be well aware of malignant or premalignant lesions and those with high potential for malignant transportation, and promptly refer such patients to specialists and specialized centers [4, 5].

In developing countries, oral cancer is the sixth most common cancer in males and the tenth most common cancer in females. It affects men three times more than women and accounts for 4% of all cancer types. Oral cancer is often diagnosed in advanced stages (stages III and IV). It affects a minimum of 9 million people and causes 5 million deaths annually. It is the second main cause of morbidity and mortality in many countries [6].

Discomfort is the most common symptom that forces patients to seek treatment. It is often present in over 85% of patients at the time of diagnosis. Also, such patients may be detected by the presence of a mass in their head or neck region. Dysphagia, odynophagia, otalgia, movement limitation, oral bleeding, cervical masses, and weight loss may occur as the disease progresses. Precise oral clinical examination along with careful evaluation of submandibular and cervical lymph nodes are imperative in such cases [7, 8].

Unlike many body organs, the oral cavity is easily accessible and its examination does not require a specific tool, and is not irritating for the patients [7]. Adequate knowledge about the normal oral soft tissue and normal anatomical variations that do not require any treatment as well as up-to-date information regarding asymptomatic precancerous lesions that are often neglected can play a pivotal role in early and correct diagnosis. Also, misdiagnosis of a cancerous lesion, such as oral squamous cell carcinoma (OSCC), as an aphthous or traumatic ulcer, can bring about catastrophic consequences. Thus, dental clinicians are expected to have comprehensive up-to-date knowledge about all forms of oral diseases, particularly oral cancer [6, 9].

Tissue changes in the form of red, white, or red and white lesions are often neglected by patients and may be missed by some dental clinicians as well [3, 5]. The prognosis of oral cancer depends on the age and general health status of the patient, the type and location of the lesion, and the response to treatment. The World Health Organization programs for oral and dental health include two approaches for the prevention of oral cancer: reduction of exposure to risk factors and early detection through screening; dental clinicians play a fundamental role in the latter approach [10].

Tobacco use and alcohol consumption are the most important etiologic factors in the development of OSCC [11, 12]. A positive history of a malignancy increases the risk of the development of a new malignancy. Also, the risk of oral cancer increases with age, and 95% of the cases are over 40 years of age. The tongue is the most common intraoral site of involvement followed by the floor of the mouth. OSCC often manifests as a small red painless area [3]. OSCC can be detected in the early stages of development by precise visual examination and palpation of oral mucosa [13]. General dentists should also be able to detect precancerous oral mucosal lesions, such as oral leukoplakia, erythroplakia, actinic cheilitis, and submucosal oral fibrosis, and promptly refer such patients to a specialist. As high as 90% of erythroplakia lesions histologically manifest severe epithelial dysplasia, carcinoma in situ, or invasive SCC [3]. Oral malignancies are often associated with high rates of morbidity and mortality. Thus, their early detection and prompt management can affect the patient's quality and quantity of life [4, 14].

The majority of oral cancers in Iran are detected in an advanced stage. Despite the advances in surgical techniques, radiotherapy, and chemotherapy, the five-year survival rate of patients has not significantly improved and remains below 60%. The five-year survival rate of oral cancer patients in Iran is estimated at 12% to 51%, which is discouraging compared to the rate in developing countries. Nonetheless, by early detection, this rate may be increased to 80% [15]. At present, early diagnosis through early detection of suspected lesions, especially erythroplakia and leukoplakia, is the best strategy to control the morbidity and mortality of oral cancer [8].

Since prevention of oral cancer through public knowledge enhancement and lifestyle changes is a slow and difficult process [16], early detection through screening is highly important to decrease related morbidity and mortality [9, 12]. Thus, this study aimed to assess the knowledge, attitude, and practice of general dentists practicing in Rasht City, Iran regarding oral cancer.

# Materials and Methods

This cross-sectional study was conducted on 129 general dentists practicing in Rasht City, Iran in 2022. The sample size was calculated to be 129 dentists assuming a 95% confidence interval, estimated error

of 0.5, and mean and standard deviation of practice score to be 20.4±2.9 in a pilot study. The inclusion criteria were general dentists practicing in Rash City, fluency in the Farsi language, and willingness to participate in the study. Incomplete questionnaires were excluded.

**Data Collection**

The participants were randomly selected from the list of practicing dentists in Rash City using a table of random numbers. A researcher-designed questionnaire was used for data collection, which included four sections demographics, knowledge (nine questions), attitude (seven questions), and practice (eight questions). The knowledge questions included 9 four-choice questions with only one correct answer. The knowledge score could range from 0 to 9. Each correct answer was allocated one score and each wrong answer was allocated zero score. Those with a total knowledge score >6 were considered to have a good knowledge level, those with a total score between 3 and 6 were considered to have a moderate knowledge level, and those with a total score of <3 were considered to have poor knowledge levels. The attitude questions were scored on a five-point Likert scale as totally agree/agree/no opinion/disagree/totally disagree. In general, the attitude of dental clinicians towards oral cancer was evaluated in seven items. There were eight practice questions that had three answer choices of always/sometimes/never. "Never" was scored zero, "sometimes" was scored one, and "always" was scored two. Thus, the total practice score could range from 0 to 16. Dental clinicians with a practice score > 10 were considered to have good practice, those with a total score between 5 and 10 were considered to have moderate practice, and those with a score <5 were considered to have poor practice. For knowledge, attitude, and practice, values <0.33 were considered poor, values between 0.33-0.66 were considered moderate, and values >0.66 were considered good.

To assess the content validity and face validity of the questionnaire, the opinions of a panel of 12 experts comprising the faculty members of the Oral Pathology, Oral Medicine, Oral and Maxillofacial Surgery, and Periodontics Departments of the School of Dentistry of Guilan University of Medical Sciences were used. They were requested to rate each question as necessary, beneficial but not necessary, and not necessary. To assess the content validity of the knowledge questions, the content validity ratio (CVR) was calculated to assess the necessity of each question. The range of change in CVR was 0.5 to 1. According to the Lawshe Table, a minimum CVR of 0.55 would be acceptable for a 12-member panel. Thus, the knowledge questions had acceptable CVR.

In an assessment of the content validity index (CVI), a 12-member panel was requested to rate each question using a four-point Likert scale of irrelevant, requiring significant revision, relevant but requiring revision, and completely relevant. For the knowledge questions, the lowest value was 92% and the highest value was 100%. Thus, the questions were valid in terms of relevance, simplicity, and clarity with a mean CVI of 0.99, 0.94, and 0.93, respectively.

In the assessment of content validity of the attitude questions, the range of change in CVR was 0.5 to 0.83. The questions in this section had acceptable CVR. The lowest and the highest CVI were found to be 92% and 100%, respectively. The questions were found to be valid in terms of relevance, simplicity, and clarity.

In the assessment of content validity of the practice questions, the range of change in CVR was found to be 0.67 to 0.83. All questions had acceptable CVR. CVI was calculated to be 100%. Thus, all questions were valid in terms of relevance, simplicity, and clarity with a mean CVI of 1.0 for all three parameters.

To assess the reliability of the questionnaire, a pilot study was conducted on ten general dentists. Since the knowledge variable can change over time, forms with variable order and items of questions were used with a short time interval. The intraclass correlation coefficient was calculated to be 0.870 for knowledge, 0.973 for attitude, and 0.968 for practice. In the test-retest reliability assessment, the correlation coefficient was found to be 82% for knowledge, 97.5% for attitude, and 97% for practice. Thus, the questionnaire had optimal reliability and reproducibility.

**Statistical Analysis**

Data were analyzed using SPSS version 26 (SPSS Inc., IL, USA). Pearson's correlation coefficient was used to analyze the correlation of knowledge, attitude, and practice scores. The Chi-square and Fisher's exact tests were applied to compare the knowledge level, attitude, and practice of dental clinicians based on their sociodemographic factors. The level of statistical significance was set at $p<0.05$.

# Findings

Table 1 presents the demographic information of the participants. A total of 129 dental clinicians participated in this study with almost equal number of males and females. The majority of them (58.1%) had their own private practice. In 58.1% of cases, over five years had passed since their graduation. The majority of dental clinicians (75.2%) had attended public dental schools. Also, 62.8% of dental clinicians had not participated in any continuing education course regarding oral cancer.

**Knowledge level**

The highest frequency of correct answers belonged to question one "What is the most common oral cancer?", where 80.6% (n=104) gave a correct response to this question. The frequency of correct answers was 55.8% (n=72) to question two "What is the manifestation of oral cancer in the oral cavity?". The frequency of correct answers was 75.2% (n=97) to question three "What is the most important risk

factor for oral cancer?". The frequency of correct answers was 43.4% (n=56) to question four "Which of the following may be an oral cancer in early stage?". The frequency of correct answers was 65.9% (n=85) to question five "Which clinical symptom may be associated with oral cancer?". The frequency of correct answers was 63.6% (n=82) to question six "Where is the most common site of occurrence of oral cancer?". The frequency of correct answers was 51.9% (n=67) to question seven "OSCC is more common at what age and in which gender?", and the frequency of correct answers was 64.3% (n=83) to question eight "What is the most commonly involved lymph node in oral cancer?". The lowest percentage of correct answers (n=49, 38%) was given to question nine "The five-year survival rate is higher for oral cancer involving what part of the oral cavity?".

The mean knowledge score of the participants was 5.39±1.96. Of all, 31% had a good knowledge level, 48.1% had moderate, and 20.9% had a poor knowledge level.

Dental clinicians had the lowest knowledge about question nine regarding the five-year survival rate (38%), question four regarding the primary stage of oral cancer (43.4%), and question seven regarding the most common age of involvement and gender (51.9%).

**Attitude**

Table 2 presents the attitude questions and the frequency of dental clinicians' responses to attitude questions.

The highest percentage of totally agree and agree responses were related to questions five (referral of patients), six (need for knowledge enhancement), and two (oral clinical examination of high-risk patients). Dental clinicians had the lowest agreement with question four (biopsy). The mean attitude score of dental clinicians was found to be 26.4±2.72 (range 16 to 31) out of 35. Of all, 65.9% (n=85) had a positive attitude, 33.3% (n=43) had a moderate, and 0.8% (n=1) had a negative attitude toward oral cancer.

Regarding referral of patients, of almost 99% of dentists who agreed with referral of patients, 68% agreed with referral to an oral medicine specialist, 22.2% agreed with referral to an oral and maxillofacial surgeon, 5.4% agreed with referral to an ear, nose, and throat doctor (ENT) specialist, 2.3% agreed to referral to a plastic surgeon, and 2.3% agreed with referral to other specialists.

**Table 1.** Demographic information of the participants

| Parameter | | | | No.(%) |
|---|---|---|---|---|
| Gender | Male | | | 66(51.2) |
| | Female | | | 63(48.8) |
| Mean age (years) | | | | 37±9 |
| Practice type | Private practice | | | 75(58.1) |
| | Public clinic | | | 41(31.8) |
| | Private practice and public clinic | | | 13(10.1) |
| Attending university | Foreign universities | | | 3(2.3) |
| | Public dental schools | | | 97(75.2) |
| | Islamic Azad University | | | 29(22.5) |
| Mean time passed since graduation | | | | 11±9 |
| Time passed since graduation | ≤ 5 years | | | 54(41.9) |
| | >5 years | | | 75(58.1) |
| | Total | | | 129(100.0) |
| Mean number of patients visited/day | | | | 7.55±3.84 |
| Time passed since graduation | ≤ 5 years | Have you ever attended continuing education courses on oral cancer? How many times? | No | 49(90.7) |
| | | | Yes | 5(9.3) |
| | >5 years | Have you ever attended continuing education courses on oral cancer? How many times? | No | 32(42.7) |
| | | | Yes | 43(57.3) |
| | Total | Have you ever attended continuing education courses on oral cancer? How many times? | No | 81(62.8) |
| | | | Yes | 48(37.2) |
| Mean number of times attending continuing education courses on oral cancer | | | | 0.81±1.60 |

**Table 2.** Attitude questions and the frequency of dental clinicians' responses to attitude questions

| Attitude questions | Totally disagree | Disagree | No opinion | Agree | Totally agree | Total |
|---|---|---|---|---|---|---|
| 1. Routine oral examination should be necessarily performed for all patients. | 0(0) | 28(21.7) | 00(0) | 73(56.6) | 28(21.7) | 129(100) |
| 2. Routine oral examination of high-risk patients is imperative. | 0(0) | 3(2.3) | 00(0) | 65(50.4) | 61(47.3) | 129(100) |
| 3. A general dentist should be able to easily detect the clinical appearance of oral cancer. | 0(0) | 21(16.3) | 0(0) | 72(55.8) | 36(27.9) | 129(100) |
| 4. A general dentist should perform a biopsy for cases suspected of malignancy. | 21(16.3) | 80(62.0) | 0(0) | 25(19.4) | 3(2.3) | 129(100) |
| 5. A general dentist should refer the patient in case of a suspected malignancy. | 1(0.8) | 1(0.8) | 00(0) | 77(59.7) | 50(38.8) | 129(100) |
| 6. I feel that I need to enhance my knowledge about oral cancer. | 3(2.3) | 12(9.3) | 0(0) | 98(76.0) | 16(12.4) | 129(100) |
| 7. Continuing education courses are sufficient for the knowledge enhancement of general dentists about oral cancer. | 41(31.8) | 00(0) | 00(0) | 00(0) | 88(68.2) | 129(100) |

**Table 3.** Practice questions and the frequency of the participants' responses to practice questions

| Practice questions | Never | Sometimes | Always | Total |
|---|---|---|---|---|
| 1. I ask all patients about a history of tobacco use, alcohol consumption, and oral cancer. | 11(8.5) | 60(46.5) | 58(45.0) | 129(100) |
| 2. I inform my patients about oral cancer risk factors and encourage them to quit risky habits. | 21(16.3) | 66(51.2) | 42(32.6) | 129(100) |
| 3. I schedule follow-up appointments for patients with oral cancer risk factors. | 25(19.4) | 70(54.3) | 34(26.4) | 129(100) |
| 4. I routinely examine the oral mucosa of patients no matter what their chief complaint is. | 20(15.5) | 65(50.4) | 44(34.1) | 129(100) |
| 5. I examine the tongue by using a sterile gauze and pulling it out. | 30(23.3) | 78(60.5) | 21(16.3) | 129(100) |
| 6. I carefully examine the tongue borders and floor of the mouth. | 15(11.6) | 79(61.2) | 35(27.1) | 129(100) |
| 7. When malignancy is suspected, I examine the head and neck lymph nodes of the patient as well. | 7(5.4) | 46(35.7) | 76(58.9) | 129(100) |
| 8. I perform an intraoral biopsy if malignancy is suspected. | 106(82.2) | 17(13.2) | 6(4.7) | 129(100) |

**Table 4.** Knowledge level of general dentists based on their demographic information

| Parameter | | Knowledge level | | | |
|---|---|---|---|---|---|
| | | Poor (<33.3%) | Moderate (33.3-66.6%) | Good (>66.6%) | p-Value (Chi-square test) |
| **Age** (year) | <30 | 4(7.7) | 27(51.9) | 21(40.4) | 0.024 |
| | 31-50 | 18(29.5) | 27(44.3) | 16(26.2) | |
| | >50 | 5(31.3) | 8(50.0) | 3(18.8) | |
| **Gender** | Male | 14(21.2) | 34(51.5) | 18(27.3) | 0.622 |
| | Female | 13(20.6) | 28(44.4) | 22(34.9) | |
| **Practice type** | Private practice | 20(26.7) | 31(41.3) | 24(32.0) | 0.320 |
| | Public clinic | 5(12.2) | 23(56.1) | 13(31.7) | |
| | Private practice and public clinic | 2(15.4) | 8(61.5) | 3(23.1) | |
| **Time passed since graduation** (year) | ≤5 | 7(13.0) | 26(48.1) | 21(38.9) | 0.049 |
| | ≤5 | 20(26.7) | 36(48.0) | 19(25.3) | |
| **Attending university** | Foreign universities | 0(0) | 3(100) | 0(0) | 0.004 |
| | Public dental schools | 17(17.5) | 43(44.3) | 37(38.1) | |
| | Islamic Azad University | 10(34.5) | 16(55.2) | 3(10.3) | |
| **Participation in continuing education courses** | No | 12(14.8) | 44(54.3) | 25(30.9) | 0.59 |
| | Yes | 15(31.3) | 18(37.5) | 15(31.3) | |

Regarding methods other than continuing education courses for knowledge enhancement, 34.1% suggested compact discs and digital versatile discs, 17.1% suggested more up-to-date university education, 14.6% suggested attractive posters with proper photographs and fonts, and 14.6% suggested self-study.

**Practice**
Table 3 presents the practice questions and the frequency of the participants' responses to practice questions. The majority of dental clinicians stated that they would "sometimes" ask the patients about tobacco use and alcohol consumption, talk about oral cancer risk factors with patients, schedule a follow-up for high-risk patients, routinely examine the oral mucosa, and examine the tongue borders and floor of the mouth. Also, most dental clinicians stated that they would "always" examine the lymph nodes in case of suspected malignancy. However, 82.2% stated that they would "never" perform a biopsy.
The mean practice score of dental clinicians was 18.18±2.53 out of 24 (range 12 to 24). Of all, 24% (n=31) had a good practice, 63.6% (n=82) had a moderate practice and 12.4% (n=16) had a poor practice.

**Correlation of Knowledge, Attitude, and Practice**
The practice score had a significant positive correlation with the knowledge score (r=0.147, p=0.049). The attitude score also had a significant positive correlation with the knowledge score (r=0.218, p=0.007). However, the correlation of attitude and practice scores was not significant (r=0.101, p=0.128).

**Knowledge level of general dentists based on their demographics**
As shown in Table 4, knowledge level had a significant correlation with age (p=0.024), attending university (p=0.004), time passed since graduation (p=0.049), and younger dentists, those who graduated less than five years ago, and those who graduated from public universities, had a significantly higher knowledge level than others.
As shown in Table 5, attitude had no significant correlation with any demographic factor (p>0.05).
As shown in Table 6, practice had a significant correlation only with participation in continuing education courses (P=0.004).

**Table 5.** Attitude of general dentists based on their demographic information

| Parameter | | Attitude | | | p-Value* |
|---|---|---|---|---|---|
| | | Negative | Moderate | Positive | |
| Age (year) | <30 | 1(1.9) | 14(26.9) | 37(71.2) | 0.460 |
| | 31-50 | 0(0) | 24(39.3) | 37(60.7) | |
| | >50 | 0(0) | 5(31.3) | 11(68.8) | |
| Gender | Male | 0(0) | 20(30.3) | 46(69.7) | 0.403 |
| | Female | 1(1.6) | 23(36.5) | 39(61.9) | |
| Practice type | Private practice | 0(0) | 28(37.3) | 47(62.7) | 0.474 |
| | Public clinic | 1(2.4) | 11(26.8) | 29(70.7) | |
| | Private practice and public clinic | 0(0) | 4(30.8) | 9(69.2) | |
| Time passed since graduation (year) | ≤5 | 1(1.9) | 16(29.6) | 37(68.5) | 0.439 |
| | >5 | 0(0) | 27(36.0) | 48(64.0) | |
| Attending university | Foreign universities | 0(0) | 0(0) | 3(100.0) | 0.529 |
| | Public dental school | 1(1.0) | 31(32.0) | 65(67.0) | |
| | Islamic Azad University | 0(0.0) | 12(41.4) | 17(58.6) | |
| Participation in continuing education courses | Yes | 1(1.2) | 28(34.6) | 52(64.2) | 0.813 |
| | No | 0(0.) | 15(31.3) | 33(68.8) | |

*Chi-square and Fisher's exact tests.

**Table 6.** Practice of general dentists based on their demographic information

| Parameter | | Practice | | | p-Value (Chi-square test ) |
|---|---|---|---|---|---|
| | | Poor | Moderate | Good | |
| Age (year) | <30 | 7(13.5) | 37(71.2) | 8(15.4) | 0.270 |
| | 31-50 | 6(9.8) | 37(60.7) | 18(29.5) | |
| | >50 | 3(18.8) | 8(50.0) | 5(31.3) | |
| Gender | Male | 6(9.1) | 40(60.6) | 20(30.3) | 0.166 |
| | Female | 10(15.9) | 42(66.7) | 11(17.5) | |
| Practice type | Private practice | 6(8.0) | 50(66.7) | 19(25.3) | 0.283 |
| | Public clinic | 7(17.1) | 26(63.4) | 8(19.5) | |
| | Private practice and public clinic | 3(23.1) | 6(46.2) | 4(30.8) | |
| Time passed since graduation (year) | ≤5 | 8(14.8) | 37(68.5) | 9(16.7) | 0.243 |
| | >5 | 8(10.7) | 45(60.0) | 22(29.3) | |
| Attending university | Foreign universities | 0(0) | 2(66.7) | 1(33.3) | 0.768 |
| | Public dental school | 11(11.3) | 61(62.9) | 25(25.8) | |
| | Islamic Azad University | 5(17.2) | 19(65.5) | 5(17.2) | |
| Participation in continuing education courses | Yes | 13(16.0) | 56(69.1) | 12(14.8) | 0.004 |
| | No | 3(6.3) | 26(54.2) | 19(39.6) | |

# Discussion

This study assessed the knowledge, attitude, and practice of general dentists practicing in Rasht City, Iran, in 2022 regarding oral cancer. The mean knowledge score of dental clinicians was 5.39±1.96 and the knowledge level of most participants (48.1%) was moderate. Accordingly, Motallebnejad and Hedayati [17] reported that the knowledge level of general dentists in Babol City, Iran about oral cancer was moderate. The same results were reported by Elteelty et al. [18]. Razavi et al. [8] reported that the majority of their participants had poor knowledge about oral cancer and only 34% had an acceptable knowledge level and responded correctly to at least 7 out of 13 questions. Also, Khattab et al. [13] reported generally low knowledge level of their participants while Nazar et al. [19] showed that 81.5% of their participants had a good knowledge level. Abdal et al. [11] reported that the mean knowledge score of their participants was higher than the national average level. It should be noted that the majority of the participants in the abovementioned two studies were new graduates. Variations in data collection tools, study populations, and demographic factors of participants can affect the results.

In the present study, the majority of the participants correctly answered the questions regarding the most

common type of oral cancer and the most important risk factors for oral cancer, which was in line with the reported literature in this regard [10, 12]. Also, 63.6% of dental clinicians reported that the tongue was the most common site of involvement, which was close to the results of Mehdizadeh et al. [20] (59.6%) and Azad et al. [7] (61.5%).

The present results indicated a significant inverse correlation between the knowledge level and age of the participants. Similar results were reported by Jboor et al., [10] which may be due to the prolongation of time passed since graduation, distancing from the academic environment, and less frequent self-study and participation in continuing education courses. However, some others found no significant correlation between the knowledge level and age of dental clinicians [11, 17, 18].

Similarly, a significant inverse correlation was found between knowledge level and time passed since graduation, which was expected and was in agreement with the available literature [8, 14, 21]. However, Saghafi et al. [4] found no such correlation. Knowledge level in the present study was also correlated with the attending university probably because most participants had attended public dental schools. Assessment of attitude in the present study showed that 65.9% had a positive attitude towards

oral cancer. Khattab *et al.* [13] reported a positive attitude in 50% and Eltelety *et al.* [18] showed a positive attitude in 45.8% of the participants in their study. It appears that more recent studies have reported improved attitudes in this regard probably due to greater attention paid in scientific communities to oral cancer and its early detection in recent years.

In the current study, 83.7% of the participants agreed with the statement that general dentists should be easily capable of detecting clinical manifestations of oral cancer similar to previous studies [5, 20]. Also, 78.3% of dentists were against biopsy by general dentists, and 98.4% agreed with referral of suspected cases to specialists. Moreover, 97% of the participants in the study by Jboor *et al.*, [10] and 70% of those in the study by Akhondi *et al.* [22] agreed with a referral of such cases. This finding can be due to inadequate experience and expertise, or the self-esteem of general dentists. Referral to a specialist can lead to earlier detection, definite diagnosis, and faster initiation of treatment, and can guarantee a better prognosis.

In the present study, 88.4% confessed that they did not have adequate knowledge about oral cancer. This rate was 84.9% in a study by Hashim *et al.*, [16]. In the study by Ekici *et al.*, [23] only 29.3% believed that they had sufficient knowledge about oral cancer. In contrast, Jboor *et al.* [10] and Alaizari and Al-Maweri [24] reported that 70% and 69.7% of their parents, respectively believed that they had sufficient knowledge about oral cancer. Differences in the reported results in this regard can be due to different study populations, the self-esteem of dentists based on the quality of education and training they received, and participation in continuing education courses.

The mean practice score of the participants was 18.18±2.53 in the present study and the majority of the participants (63.6%) had moderate practice while 24% had good practice. In the study by Eltelety *et al.*, [18] 48.4% had moderate and 29.4% had good practice. Khattab *et al.* [13] reported that 26.5% of their participants had good practice regarding oral cancer.

In the current study, 45% of dentists reported that they would "always" and 46.5% reported that they would "sometimes" ask about tobacco use, alcohol consumption, or oral cancer history of their patients. In a study by Kebabcıoğlu and Pekiner [12], 78.2% of dentists reported asking about tobacco use, 62.4% reported asking about alcohol consumption, and 88.2% reported asking about the oral cancer history of their patients. Similar results were reported by Eltelety *et al.* [18] and Gajendra *et al.* [25]. In the study by Mehdizadeh *et al.*, [20] 46% of dentists asked about cigarette smoking and substance abuse while 26.6% never asked such questions from their patients.

In the present study, 32.6% of the participants reported that they "always", and 51.2% reported that they "sometimes" talked about oral cancer risk factors with their patients and encouraged them to quit such habits. This rate was 84.4% in a study by Seoane *et al.*, [26] 68% in the study by Kebabcıoğlu and Pekiner, [12] and 48% in the study by Ekici *et al.* [23]. It appears that despite having sufficient knowledge about oral cancer risk factors, dental clinicians often have a suboptimal practice in informing their patients about such risk factors according to the present study and the available literature, which may be due to lack of time, financial incentives, or insurance coverage. Thus, further instructions in this respect are imperative in dental curricula and continuing education courses.

In the present study, 34.1% of dental clinicians reported that they always routinely examine the oral mucosa of their patients and 50.4% reported doing it sometimes. This rate was 70.7% and 50% in studies by Ekici *et al.* [23] and Mehdizadeh *et al.*, [20] respectively, and 37.5% and 31.5% in studies by Khattab *et al.* [13] and Khodaparast *et al.*, [6] respectively, which indicates insufficient expertise of dental clinicians and their poor knowledge about the significance of early detection of oral cancer. However, 94% of the participants in the study by Hertrampf *et al.* [27] believed that routine oral mucosal examination is necessary for patients over 40 years, which highlights their high knowledge level in this regard. This rate was 83.9% in a study by Akhondi *et al.* [22].

Regarding examination of head and neck lymph nodes, 58.9% reported doing it always and 35.7% reported doing it occasionally, which was consistent with the present results. This rate was 68.3% in the study by Alaizari and Al-Maweri [24], 37% in the study by Kebabcıoğlu and Pekiner, [12] and 23% in the study by Razavi *et al.* [8]. In the study by Khattab *et al.*, [13] 26.5% of dentists reported lymph node examination only in cases with relevant complaints.

In the present study, 64.3% of the participants had good knowledge about lymph node metastasis of oral cancer and the majority of them had optimal practice in this regard, which highlights the positive effect of enhanced knowledge on improved attitude and practice.

Also, 82.2% of general dentists in the present study reported that they would never perform a biopsy; this rate was 74% in a study by Sousa *et al.* [28]. In the study by Ekici *et al.*, [23] only 34.7% reported that they would perform a biopsy. It appears that the majority of dental clinicians prefer to refer such patients to a specialist for biopsy.

In the present study, the practice of the participants had a significant positive correlation only with participation in continuing education courses. Similar results were reported by Eltelety *et al.* [18]. A significant positive correlation was also found between knowledge and practice, and also knowledge and attitude, which was in agreement with the previous literature [13, 18].

Using a self-reported questionnaire was a limitation of this study due to the possibility of self-report bias. Future studies with a larger sample size are required on general dentists nationwide to better elucidate this topic.

## Conclusion

The knowledge and practice of the majority of general dentists in Rasht city is moderate regarding oral cancer, which is alarming and calls for improvement of the quality of instruction of dental students and continuing education courses for knowledge enhancement of graduates.

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