# Evaluation of Knowledge and Attitudes of Dentists and Dental Students about Oral Cancer

## *Diş Hekimleri ve Diş Hekimliği Öğrencilerinin Ağız Kanserine İlişkin Bilgi ve Tutumlarının Değerlendirilmesi*

Dicle ALTINDAL[1]
[1] Van Yüzüncü Yıl University, Faculty of Dentistry, Department of Periodontology, Van, Türkiye

Filiz ACUN KAYA[2]
[2] Dicle University, Faculty of Dentistry, Department of Periodontology, Diyarbakır, Türkiye

**ABSTRACT**

**Objective:** This study aimed to evaluate the knowledge and negative attitudes of dentists and 4th-grade and 5th-grade students of dentistry towards oral cancer (OC).

**Methods:** The study was conducted on 417 individuals consisting of 100 dentists, 186 5th-grade, and 131 4th-grade students. The questionnaire included questions on demographic characteristics, 10 questions measuring their knowledge about OC risk factors (knowledge-risk factors), 5 questions measuring their knowledge regarding the diagnosis of OC (knowledge-diagnostic procedures), and 11 questions assessing their attitudes towards OC (negative attitudes).

**Results:** While there is no significant difference between dentists and 5th-grade students in knowledge-risk factors and knowledge-diagnostic procedures total scores, the total score of the 4th-grade students was statistically significantly different from these groups ($P =.001$). Looking at the negative attitudes total score, there is no significant difference between 5th and 4th-grade students, while total score of dentists was observed a statistically significant difference ($P=.001$). While knowledge-risk factors and knowledge-diagnostic procedures total scores were significantly and positively correlated ($r=.287$, $P<.05$), negative attitudes total score showed a significant negative correlation with knowledge-risk factors total score ($r=.103$, $P<.05$). Deficiencies were observed regarding the clinical characteristics of the prior oral lesion among participants. The group who considered leukoplakia and erythroplakia most likely to become precancerous lesions were 5th-grade students by 81.7%. Most participants indicated their need for further training, especially on OC and screening.

**Conclusion:** In the study, deficiencies were observed in the groups about OC. Therefore, deficiencies should be assessed comprehensively at regional and national levels, and it should be addressed.

**Keywords:** Dental student, dentists, knowledge, mouth neoplasms, risk factors, squamous cell carcinoma.

**ÖZ**

**Amaç:** Bu çalışmada diş hekimleri ile diş hekimliği 4. ve 5. sınıf öğrencilerinin ağız kanserine (AK) yönelik bilgi ve olumsuz tutumlarının değerlendirilmesi amaçlandı.

**Yöntemler:** Araştırma 100'ü diş hekimi, 186'sı 5. sınıf ve 131'i 4. sınıf öğrencisi olmak üzere 417 kişi üzerinde gerçekleştirildi. Ankette demografik özelliklere ilişkin sorular, AK risk faktörleri (bilgi-risk faktörleri) hakkındaki bilgilerini ölçen 10 soru, AK tanısına (bilgi-teşhis prosedürleri) ilişkin bilgilerini ölçen 5 soru ve AK'ye yönelik tutumlarını (olumsuz tutumlar) değerlendiren 11 soru yer aldı.

**Bulgular:** Diş hekimleri ve 5. sınıf öğrencileri arasında bilgi-risk faktörleri ve bilgi-teşhis prosedürleri toplam puanları arasında anlamlı bir fark bulunmazken, 4. sınıf öğrencilerinin toplam puanları bu gruplardan istatistiksel olarak anlamlı derecede farklıydı ($P =,001$). Olumsuz tutumlar toplam puanına bakıldığında 5. ve 4. sınıf öğrencileri arasında anlamlı bir fark bulunmazken, diş hekimlerinin toplam puanları istatistiksel olarak anlamlı farklı idi ($P =,001$). Bilgi-risk faktörleri ve bilgi-teşhis prosedürleri toplam puanları anlamlı ve pozitif yönde korelasyon gösterirken ($r=,287$, $P<,05$), olumsuz tutumlar toplam puanı ile bilgi-risk faktörleri toplam puanı arasında anlamlı ve negatif korelasyon bulundu ($r=,103$, $P< ,05$). Katılımcılar arasında eski oral lezyonun klinik özelliklerine ilişkin eksiklikler gözlendi. Lökoplaki ve eritroplaki'nin kanser öncesi lezyonlara dönüşme olasılığını en fazla düşünen grup %81,7 ile 5. sınıf öğrencileri oldu. Katılımcıların çoğu, özellikle AK ve tarama konusunda daha fazla eğitime ihtiyaçları olduğunu belirtti.

**Sonuç:** Araştırmada gruplarda AK konusunda eksiklikler gözlendi. Bu nedenle eksiklikler bölgesel ve ulusal düzeyde kapsamlı bir şekilde değerlendirilmeli ve giderilmelidir.

**Anahtar Kelimeler:** Diş hekimliği öğrencisi, diş hekimi, bilgi, ağız neoplazmaları, risk faktörleri, yassı hücreli karsinom

## INTRODUCTION

Oral cancer (OC) is defined as any malignant neoplasm of the lips and oral cavity and is referred to by the codes C00-C06 in the 10th revision of the International Classification of Diseases [ICD-10].[1, 2] The global

incidence of three type of cancer (lip, oral cavity, and pharyngeal cancer), which accounts for 3.8% of all cancer cases, is projected to increase by 62% by 2035 due to possible changes in demographic characteristics.[3] In a review of studies limited to Asian populations, the prevalence of OC was reported as 8.5 per 100,000 people per year.[4] In most countries, mortality rates due to OC are estimated at 3-4 per 100,000 male and 1.5-2 per 100,000 female.[2] Squamous cell carcinoma (SCC), a particularly malignant type of this disease, accounts for more than 90% of oral malignancies in the upper respiratory-digestive tract.[2,5] In this type of cancer, the annual incidence of secondary tumors was reported to be between 3% and 7%, an extremely high rate compared to several malignancies.[5] In addition, precancerous malignant diseases such as leukoplakia and erythroplakia are responsible for the increased risk of cancer development.[6]

Early diagnosis is critical in OC. A diagnosis delayed by more than one month significantly increases the risk of developing advanced OC.[7] This is because the likelihood of having advanced-stage cancer is 30% lower in patients diagnosed early compared to individuals with delayed diagnosis.[7] Insufficient knowledge about OC may also lead to delayed diagnosis. It was proven that the diagnostic ability of primary health care professionals is directly related to their knowledge regarding OC.[8] In this regard, dentists and dental students, who will be the future dental health workforce, play a vital role. Since they can easily access the oral cavity, they have an ideal advantage for opportunistic scans in diagnosing OC. Consequently, reducing the diagnostic delay in OC or precancerous lesions may be related to regular visits to dental clinics and opportunistic screening.[9] Nevertheless, negative attitudes and insufficient knowledge of the dentist may cause delayed diagnosis or underdiagnosis of OC.

Deficiencies were found in informing patients about the risk factors and symptoms of OC.[10] According to a recent study conducted among 130 dentists, more than half of the participants reported that they did not perform a special examination for identifying OC in asymptomatic patients aged 40 years and older.[11] The same participants reported that lack of training was a critical factor in performing a thorough OC examination.[11] In addition, the studies conducted with dental students and dental hygienists concluded that there were deficiencies in attitudes and awareness regarding OC, and training programs should be developed.[12-16] These results suggest that there is an alarming lack of awareness about OC.[2] Consequently, this study aimed to evaluate the knowledge and negative attitudes towards OC among dentists and 4th and 5th-grade dental students actively treating patients and identify the points considered insufficient. In this study, it was tried to determine the differences or deficiencies in the performances of dentistry and 4th and 5th- grade dentists regarding OC.

## METHODS

Ethics committee approval of this study was obtained from Van Yuzuncu Yil University Non-Interventional Clinical Research Ethics Committee with decision number 2023/07-11 (14.07.2023). The study was designed as a joint study of the Periodontology departments of the Faculties of Dentistry at Van Yuzuncu Yil and Firat Universities. After the participants were informed about the purpose, scope, and method of the study, participants who agreed to participate in the face-to-face questionnaire were included. Dentists who did not agree to participate in the study, who responded to the questionnaire incompletely, or who did not actively treat patients for various reasons, and 1st, 2nd, and 3rd-year dental students were excluded.

The first part of the questionnaire included questions on demographic characteristics. The second part consisted of 10 questions measuring participants' knowledge about OC risk factors (knowledge-risk factors), the third part consisted of 5 questions measuring their knowledge of OC diagnosis procedures (knowledge-diagnosis procedures), and the final part consisted of 11 questions assessing participants' attitudes towards OC (negative attitude). The questions of the questionnaire were prepared from the questions used in previous studies.[10, 17-21] The study was initiated after 7 dentists and 12 dental students who were not included in the study read the questions, and the comprehensibility of the questionnaire was tested.

The questions regarding OC risk factors were answered as "yes, no, or don't know." The responses of each participant were evaluated separately, and the total score of the knowledge-risk factors was calculated. Each correct answer was scored 1 point.[22] The total score represented the total score of OC-risk knowledge for that participant (minimum 0, maximum 10 points). A higher score represented a higher level of knowledge-risk factors.

In the questions on OC diagnosis, the responses of each participant were evaluated separately, and the total score of the participant's diagnostic knowledge was calculated by assigning 1 point for each correct answer (minimum 0, maximum 5 points). A higher score represented a higher level of OC-diagnostic knowledge procedures.

The answers to the questions assessing attitudes about OC were given on a 5-point Likert-type scale, consisting of strongly agree, agree, undecided, disagree, and strongly disagree.[22] The total score for OC was calculated based on the following points: Strongly agree=1, agree=2, undecided=3, disagree=4, and strongly disagree=5 (minimum 11, maximum 55). Therefore, a high score expressed the negative attitudes of the participants about OC. A lower score represented a more positive attitude towards OC.

### Statistical analysis

Descriptive statistics for the continuous variables were presented as mean, standard deviation, minimum and maximum values while count and percentages for categorical variables. One-way ANOVA was performed for the comparison of group means. Duncan multiple comparison test was also used to identify different groups. Pearson correlation analysis was carried out to examine linear relationships among the continuous variables while Chi-square test was performed to determine the relationship between categorical variables. In addition, Non-linear principal component analysis was performed to determine the configuration of the relationship between categories of variables in 2-dimensional space. Statistical significance level was considered as 5% and SPSS (ver: 21) statistical program was used for all statistical computations.

## RESULTS

The study included 100 dentists (mean age 29.91 ± 5.485), 186 5th-grade students (mean age 23.24 ± 1.144), and 131 4th-grade students (mean age 22.46 ± 1.223), totalling 417 participants (Table 1). The length of experience was between 4.930 ± 5.481 years (minimum 1 year, maximum 35 years).

The data related to the mean total scores of knowledge-risk factors, knowledge-diagnostic procedures, and negative attitudes among the groups are presented in Table 1. Significant differences were found between the groups in terms of the mean total scores (P=.001). While there is no significant difference between dentists and 5th-grade

students in knowledge-risk factors and knowledge-diagnostic procedures total scores, the total score of the 4th-grade students was statistically significantly different from these groups. Accordingly, dentists and 5th-grade students achieved similar scores in knowledge-risk factors total score and knowledge-diagnostic procedures total score, while 4th-grade students scored lower. Looking at the negative attitudes total score, there is no significant difference between 5th and 4th-grade students, while total score of dentists was observed a statistically significant difference. Accordingly, 5th and 4th-grade students had similar total scores, while dentists scored significantly lower.

**Table 1.** The data related to the mean total scores of ages, knowledge-risk factors, knowledge-diagnostic procedures, and negative attitudes among the groups

| | | n | Mean | Std. Dev. | Min. | Max. | *P* |
|---|---|---|---|---|---|---|---|
| Age | Dentists | 100 | 29.91 a | 5.485 | 22 | 59 | |
| | 5th grade students | 186 | 23.24 b | 1.144 | 21 | 28 | .001* |
| | 4th grade students | 131 | 22.46 b | 1.223 | 20 | 28 | |
| | Total | 417 | 24.59 | 4.154 | 20 | 59 | |
| Knowledge risk factors (Total score) | Dentists | 100 | 8.05 a | 1.175 | 4 | 10 | |
| | 5th-grade students | 186 | 7.96 a | 1.438 | 0 | 10 | .001* |
| | 4th-grade students | 131 | 7.10 b | 1.528 | 1 | 10 | |
| | Total | 417 | 7.71 | 1.467 | 0 | 10 | |
| Knowledge diagnostic procedures (Total score) | Dentists | 100 | 3.17 a | 1.111 | 0 | 5 | |
| | 5th-grade students | 186 | 3.16 a | 0.951 | 1 | 5 | .001* |
| | 4th-grade students | 131 | 1.80 b | 1.286 | 0 | 5 | |
| | Total | 417 | 2.74 | 1.270 | 0 | 5 | |
| Negative attitude (Total score) | Dentists | 100 | 26.16 b | 6.055 | 12 | 41 | |
| | 5th-grade students | 186 | 28.02 a | 5.802 | 11 | 43 | .001* |
| | 4th-grade students | 131 | 27.82 a | 6.119 | 13 | 49 | |
| | Total | 417 | 27.51 | 5.998 | 11 | 49 | |

a, b: Different lowercase represents statistically significant differences among the groups
Statistically significant difference at *P<.05

Categorical principal components analysis was conducted to determine the structure of the relationship between the variables (the explanatory value of the first dimension was 32.7% and the second dimension 18.96%. The two dimensions had a total explanatory value of 51.66%) (Figure 1). According to the first dimension, female dentists aged between 25 and 59 years tended to have lower negative attitudes total scores and higher knowledge-diagnostic procedures and knowledge-risk factors total scores. The 4th and 5th-grade dental students tended to have lower scores in knowledge-diagnostic procedures and knowledge-risk factors total scores and higher scores in terms of negative attitudes total scores. In the second dimension, the 4th and 5th-grade male dental students between 20 and 24 years of age were observed to have higher negative attitudes total scores.

While knowledge-risk factors and knowledge-diagnostic procedures total scores were significantly and positively correlated (r=0.287, *P*<.05), negative attitudes total score showed a significant negative correlation with knowledge-risk factors total score (r=0.103, *P*<.05) and a non-significant negative correlation with knowledge-diagnostic procedures total score (r=0.035, *P*>.05) (Table 2, Figure 1).

The data related to the comparison of age and mean total scores between genders within the group are presented in Table 3. As presented in the table, no significant difference was observed between

genders among dentists regarding all three total scores. In 5th-grade students, a significant difference was found in the mean total scores of knowledge-diagnostic procedures and negative attitudes between genders (*P*=.026, *P*=.037, respectively). Accordingly, female scored higher in knowledge-diagnostic procedures and negative attitude total scores compared to male. In 4th-grade students, a significant difference between genders was found only in the mean total score of knowledge-diagnostic procedures (*P*=.001). Accordingly, female scored higher in knowledge-diagnostic procedures total score compared to male.

**Table 2.** Correlation between total score averages of knowledge-risk factors, knowledge-diagnostic procedures and negative attitude

| | Knowledge-risk factors (Total score) | Knowledge-diagnostic procedures (Total score) | Negative attitude (Total score) |
|---|---|---|---|
| Knowledge-risk factors (Total score) | 1 | | |
| Knowledge-diagnostic procedures (Total score) | .287** | 1 | |
| Negative attitude (Total score) | -.103* | -.035 | 1 |

Statistically significant difference at *P<.05
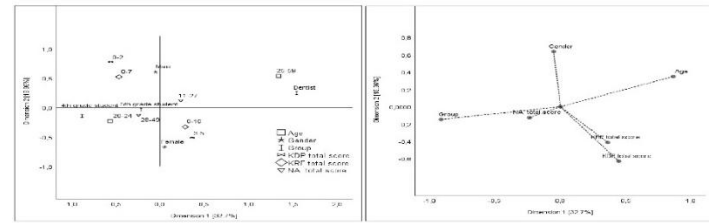


**Figure 1.** The relationship between the variables with categorical principal components analysis
(KDP: knowledge-diagnostic procedures, KRF: knowledge-risk factors,
NA: negative attitude)

The responses to each question on knowledge-risk factors and comparisons between groups are presented in Table 4. No statistically significant difference was found between the groups in terms of responses to the questions on smoking, autoimmunity, obesity, prior oral cancer lesion, and chronic infection among OC risk factors. A statistically significant difference was determined between the groups in the responses to the questions about alcohol consumption, sun exposure, viral infection (e.g., HPV), nutrition diet (e.g., low consumption of fruits and vegetables), and advanced age (*P*<.05).

Responses regarding OC knowledge-diagnostic procedures and comparisons between groups are presented in Figures 2 and 3. The most common involvement sites of OC were reported as the floor of the mouth and under the tongue by 71% of dentists, 52.7% of 5th-grade students, and 34.4% of 4th-grade students. The group who considered leukoplakia and erythroplakia most likely to become precancerous lesions were the 5th-grade students by 81.7%. On the other hand, 49% of the 4th-grade students responded with "Don't know." While the majority of dentists (93%) and 5th-grade students (98.9%) responded to the most common type of OC as SCC, only 44.3% of the 4th-grade students responded the same, and 35.1% of the 4th-grade students responded with "Don't know." According to 68.3% of the 5th-grade students, the age group in which OC was most frequently diagnosed was

**Table 3.** The data related to the comparison of age and mean total scores between genders within the group

| Dentists | | n | Mean | Std. Dev. | Min. | Max. | *P* |
|---|---|---|---|---|---|---|---|
| Age | Female | 55 | 29.91 | 5.264 | 22 | 46 | .999 |
| | Male | 45 | 29.91 | 5.803 | 24 | 59 | |
| | Total | 100 | 29.91 | 5.485 | 22 | 59 | |
| Knowledge-risk factors | Female | 55 | 7.96 | 1.217 | 5 | 10 | .419 |
| (Total score) | Male | 45 | 8.16 | 1.127 | 4 | 10 | |
| | Total | 100 | 8.05 | 1.175 | 4 | 10 | |
| Knowledge-diagnostic procedures | Female | 55 | 3.07 | 1.136 | 0 | 5 | .335 |
| (Total score) | Male | 45 | 3.29 | 1.079 | 0 | 5 | |
| | Total | 100 | 3.17 | 1.111 | 0 | 5 | |
| Negative attitude | Female | 55 | 26.13 | 6.034 | 12 | 38 | .953 |
| (Total score) | Male | 45 | 26.20 | 6.148 | 12 | 41 | |
| | Total | 100 | 26.16 | 6.055 | 12 | 41 | |
| **5th-grade students** | | | | | | | |
| Age | Female | 79 | 22.90 | 0.841 | 21 | 25 | .001* |
| | Male | 107 | 23.50 | 1.269 | 21 | 28 | |
| | Total | 186 | 23.24 | 1.144 | 21 | 28 | |
| Knowledge-risk factors (Total score) | Female | 79 | 8.16 | 1.213 | 5 | 10 | .100 |
| | Male | 107 | 7.81 | 1.573 | 0 | 10 | |
| | Total | 186 | 7.96 | 1.438 | 0 | 10 | |
| Knowledge-diagnostic procedures | Female | 79 | 3.34 | 0.861 | 1 | 5 | .026* |
| (Total score) | Male | 107 | 3.03 | 0.995 | 1 | 5 | |
| | Total | 186 | 3.16 | 0.951 | 1 | 5 | |
| Negative attitude | Female | 79 | 29.05 | 5.602 | 11 | 40 | .037* |
| (Total score) | Male | 107 | 27.26 | 5.856 | 11 | 43 | |
| | Total | 186 | 28.02 | 5.802 | 11 | 43 | |
| **4th-grade students** | | | | | | | |
| Age | Female | 65 | 22.29 | 1.271 | 20 | 27 | .124 |
| | Male | 66 | 22.62 | 1.160 | 21 | 28 | |
| | Total | 131 | 22.46 | 1.223 | 20 | 28 | |
| Knowledge-risk factors (Total score) | Female | 65 | 7.20 | 1.416 | 5 | 10 | .456 |
| | Male | 66 | 7.00 | 1.636 | 1 | 10 | |
| | Total | 131 | 7.10 | 1.528 | 1 | 10 | |
| Knowledge-diagnostic procedures | Female | 65 | 2.23 | 1.196 | 0 | 5 | .001* |
| (Total score) | Male | 66 | 1.38 | 1.237 | 0 | 5 | |
| | Total | 131 | 1.80 | 1.286 | 0 | 5 | |
| Negative attitude | Female | 65 | 28.03 | 5.291 | 17 | 41 | .703 |
| (Total score) | Male | 66 | 27.62 | 6.872 | 13 | 49 | |
| | Total | 131 | 27.82 | 6.119 | 13 | 49 | |

Statistically significant difference at *$P$<.05

**Table 4.** The responses to each question on knowledge-risk factors and comparisons between groups

| | | Group n (%) | | |
|---|---|---|---|---|
| | | Dentists | 5th-grade students | 4th-grade students |
| Smoking | Yes | 100 (100%) | 184 (98.9%) | 127 (96.9%) |
| | No | 0 (0%) | 2 (1.1%) | 4 (3.1%) |
| | I don't know | 0 (0%) | 0 (0%) | 0 (0%) |
| | *P*= .133 | | | |
| Alcohol | Yes | 94 (94%) | 168 (90.3%) | 97 (74%) |
| | No | 4 (4%) | 13 (7%) | 17 (13%) |
| | I don't know | 2 (2%) | 5 (2.7%) | 17 (13%) |
| | *P*= .001* | | | |
| Sun exposure | Yes | 76 (76%) | 144 (77.4%) | 66 (50.4%) |
| | No | 10 (10%) | 12 (6.5%) | 23 (17.6%) |
| | I don't know | 14 (14%) | 30 (16.1%) | 42 (32.1%) |
| | *P*= .001* | | | |
| Viral infection (e.g. HPV) | Yes | 90 (90%) | 170 (91.4%) | 110 (84%) |
| | No | 3 (3%) | 11 (5.9%) | 6 (4.6%) |
| | I don't know | 7 (7%) | 5 (2.7%) | 15 (11.5%) |
| | *P*=.028* | | | |
| Nutrition diet (e.g. low consumption of fruits and vegetables) | Yes | 67 (67%) | 149 (80.1%) | 92 (70.2%) |
| | No | 14 (14%) | 20 (10.8%) | 25 (19.1%) |
| | I don't know | 19 (19%) | 17 (9.1%) | 14 (10.7%) |
| | *P*=.025* | | | |
| Advanced age | Yes | 80 (80%) | 148 (79.6%) | 73 (55.7%) |
| | No | 11 (11%) | 23 (12.4%) | 26 (19.8%) |
| | I don't know | 9 (9%) | 15 (8.1%) | 32 (24.4%) |
| | *P*=.001* | | | |
| Autoimmune | Yes | 92 (92%) | 162 (87.1%) | 110 (84%) |
| | No | 6 (6%) | 6 (3.2%) | 6 (4.5%) |
| | I don't know | 2 (2%) | 18 (9.7%) | 15 (11.5%) |
| | *P*=.081 | | | |
| Obesity | Yes | 44 (44%) | 101 (54.3%) | 79 (60.3%) |
| | No | 24 (24%) | 40 (21.5%) | 26 (19.8%) |
| | I don't know | 32 (32%) | 45 (24.2%) | 26 (19.8%) |
| | *P*=0.152 | | | |
| Prior oral cancer lesion | Yes | 98 (98%) | 176 (94.6%) | 127 (96.9%) |
| | No | 0 (0%) | 6 (3.2%) | 0 (0%) |
| | I don't know | 2 (2%) | 4 (2.2%) | 4 (3.1%) |
| | *P*=.096 | | | |
| Chronic infection | Yes | 84 (84%) | 143 (76.9%) | 109 (83.2%) |
| | No | 7 (7%) | 19 (10.2%) | 8 (6.1%) |
| | I don't know | 9 (9%) | 24 (12.9%) | 14 (10.7%) |
| | *P*=.506 | | | |

Statistically significant difference at * *P*<.05

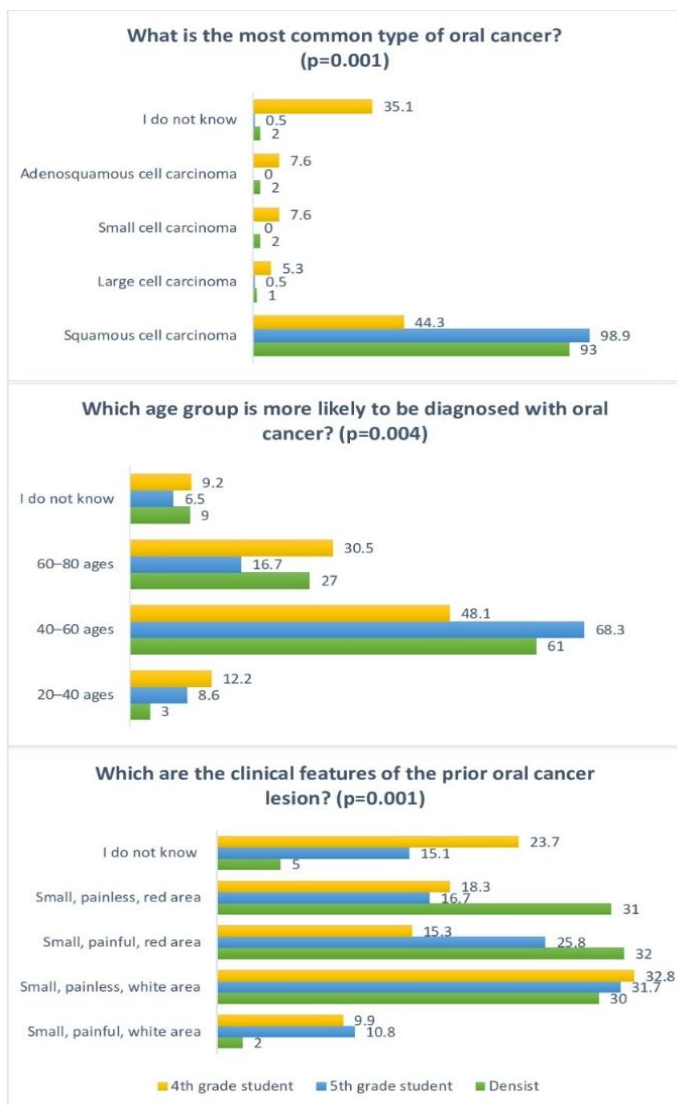**Table 5.** The responses regarding attitudes about oral cancer and comparisons between the groups

| | Group | Strongly agree | Agree | Undecided | Disagree | Strongly disagree |
|---|---|---|---|---|---|---|
| I report to my patients with suspicious oral lesions | Dentists | 70 (70%) | 28 (28%) | 1 (1%) | 1 (1%) | 0 (%) |
| | 5th-grade students | 101 (54.3%) | 70 (37.6%) | 10 (5.4%) | 5 (2.7%) | 0 (%) |
| | 4th-grade students | 70 (53.4%) | 50 (38.2%) | 10 (7.6%) | 1 (0.8%) | 0 (%) |
| | *P*=.05 | | | | | |
| I give my patients adequate information about oral cancer risk factors | Dentists | 16 (16%) | 30 (30%) | 30 (30%) | 24 (24%) | 0 (%) |
| | 5th-grade students | 28 (15.1%) | 63 (33.9%) | 65 (34.9%) | 27 (14.5%) | 3 (1.6%) |
| | 4th-grade students | 30 (22.9%) | 44 (33.6%) | 34 (26%) | 22 (16.8%) | 1 (0.8%) |
| | *P*=.231 | | | | | |
| I give my patients enough information about the signs and symptoms of oral cancer | Dentists | 11 (11%) | 29 (29%) | 37 (37%) | 23 (23%) | 0 (0%) |
| | 5th-grade students | 20 (10.8%) | 54 (29%) | 70 (37.6%) | 40 (21.5%) | 2 (1.1%) |
| | 4th-grade students | 25 (19.1%) | 43 (32.8%) | 32 (24.4%) | 28 (21.4%) | 3 (2.3%) |
| | *P*=.145 | | | | | |
| I have received sufficient training to perform an oral cancer examination | Dentists | 12 (12%) | 24 (24%) | 33 (33%) | 20 (20%) | 11 (11%) |
| | 5th-grade students | 11 (5.9%) | 22 (11.8%) | 66 (35.5%) | 63 (33.9%) | 24 (12.9%) |
| | 4th-grade students | 4 (3.1%) | 9 (6.9%) | 39 (29.8%) | 43 (32.8%) | 36 (27.5%) |
| | *P*=.001* | | | | | |
| I received sufficient training for patient's lymph node palpation | Dentists | 18 (18%) | 37 (37%) | 30 (30%) | 8 (8%) | 7 (7%) |
| | 5th-grade students | 12 (6.5%) | 54 (29%) | 51 (27.4%) | 47 (25.3%) | 22 (11.8%) |
| | 4th grade students | 5 (3.8%) | 31 (23.7%) | 34 (26%) | 39 (29.8%) | 22 (16.8%) |
| | *P*=.001* | | | | | |
| I request my patient for laboratory tests in case of suspicious lesions | Dentist | 22 (22%) | 28 (28%) | 23 (23%) | 19 (19%) | 8 (8%) |
| | 5th-grade students | 14 (7.5%) | 41 (22%) | 46 (24.7%) | 46 (24.7%) | 39 (21%) |
| | 4th-grade students | 19 (14.5%) | 46 (35.1%) | 26 (19.8%) | 28 (21.4%) | 12 (9.2%) |
| | *P*=.001* | | | | | |
| I am knowledgeable about self-examination techniques for diagnosing oral cancer | Dentists | 7 (7%) | 22 (22%) | 25 (25%) | 34 (34%) | 12 (12%) |
| | 5th grade students | 10 (5.4%) | 40 (21.5%) | 55 (29.6%) | 54 (29%) | 27 (14.5%) |
| | 4th grade students | 4 (3.1%) | 19 (14.5%) | 40 (30.5%) | 42 (32.1%) | 26 (19.8%) |
| | *P*= .439 | | | | | |
| I examine my patients aged 40 and over for oral cancer or refer them to a specialist for this examination. | Dentist | 10 (10%) | 18 (18%) | 28 (28%) | 34 (34%) | 10 (10%) |
| | 5th-grade students | 15 (8.1%) | 39 (21%) | 51 (27.4%) | 67 (36%) | 14 (7.5%) |
| | 4th-grade students | 13 (9.9%) | 46 (35.1%) | 29 (22.1%) | 32 (24.4%) | 11 (8.4%) |
| | *P*=.082 | | | | | |
| I refer my patient with suspicious lesion to the oral and maxillofacial surgery department | Dentists | 62 (62%) | 28 (28%) | 3 (3%) | 5 (5%) | 2 (2%) |
| | 5th-grade students | 82 (44.1%) | 88 (47.3%) | 6 (3.2%) | 10 (5.4%) | 0 (0%) |
| | 4th-grade students | 47 (35.9%) | 63 (48.1%) | 11 (8.4%) | 8 (6.1%) | 2 (1.5%) |
| | *P*=.002* | | | | | |
| I refer my patient with suspicious lesion to the periodontology department | Dentists | 38 (38%) | 30 (30%) | 11 (11%) | 15 (15%) | 6 (6%) |
| | 5th grade students | 54 (29%) | 94 (50.5%) | 23 (12.4%) | 14 (7.5%) | 1 (0.5%) |
| | 4th grade students | 48 (36.6%) | 64 (48.9%) | 10 (7.6%) | 6 (4.6%) | 3 (2.3%) |
| | *P*=.001* | | | | | |
| Dentists need more education about and screening for oral cancer | Dentists | 76 (76%) | 21 (21%) | 3 (3%) | 0 (0%) | 0 (0%) |
| | 5th-grade students | 134 (72%) | 42 (22.6%) | 6 (3.2%) | 2 (1.1%) | 2 (1.1%) |
| | 4th-grade students | 95 (72.5%) | 29 (22.1%) | 4 (3.1%) | 1 (0.8%) | 2 (1.5%) |
| | *P*=.951 | | | | | |

Statistically significant difference at * *P*<.05
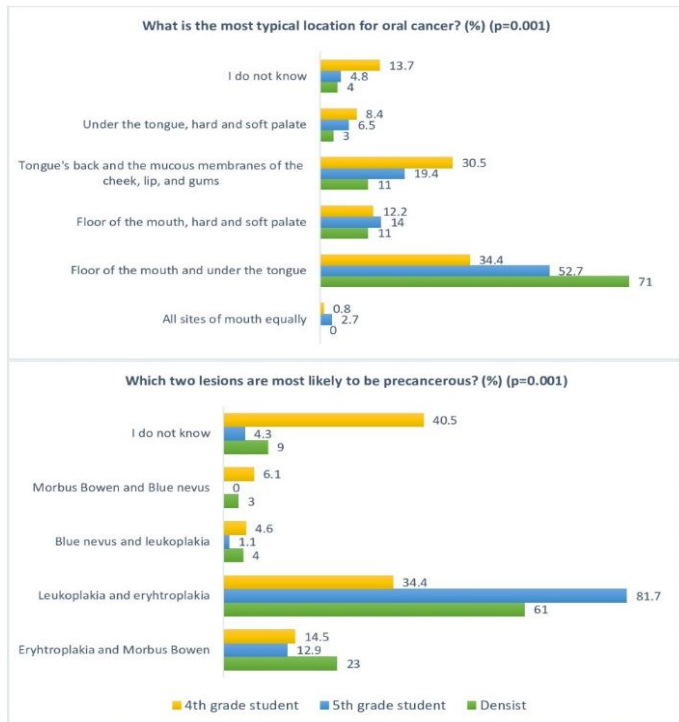


**Figure 2.** Responses regarding OC knowledge-diagnostic procedures and comparisons between groups

40-60 years, while this rate was 48.1% among the 4th-grade students and 61% among dentists. The clinical features of the prior OC lesion were described as a "small, painless, and red area" by 31% of the dentists, 16.7% of the 5th-grade students, and 18.3% of the 4th-grade students. The responses regarding attitudes and comparisons between the groups are presented in Table 5. Among the participants, 33% of the dentists and 35.5% of the 5th-grade students responded to having received sufficient training for an OC examination with "undecided," while 32.8% of the 4th-grade students responded with "disagree." While 37% of dentists and 29% of the 5th-grade students agreed that they had sufficient training on lymph node palpation, 29.8% of the 4th-grade students disagreed. The most common response to requesting laboratory tests in case of suspicious lesions was 'agree' among dentists and the 4th-grade students, whereas it was 'undecided' and 'disagree' among the 5th-grade students. In all three groups, the majority of the participants responded with "strongly agree" to the need for further training.

**Figure 3.** Responses regarding OC knowledge-diagnostic procedures and comparisons between groups

## DISCUSSION

This study aimed to investigate the knowledge and attitudes of dentists and dental students about OC and identify the deficiencies. When the negative attitude total score was examined, it was observed that there was a statistically significant difference between the total score of dentists. The 4th-grade students were observed to be insufficient in questions about the risk factors and in terms of the total score. Insufficiency was observed in some responses. Most participants expressed the need for further training on OC and screening.

The risk factors regarding OC have been listed as smoking, alcohol consumption, human papillomavirus (HPV), and chronic inflammation.[5,23] Autoimmune-related diseases have also been associated with an increased risk of OC.[24] Diet and nutrition have been reported to be associated with the risk of cancer development.[25] Frequent consumption of some fruits and vegetables has been associated with a reduced risk of OC and pharyngeal cancer.[25] Excessive sun ultraviolet (UV) light has been reported as a cause of lip cancer and actinic cheilitis, which can develop into oral SCCs.[25] In addition, OC has been reported to be more common in individuals over 40 years of age compared to

younger individuals.[5] The practitioners' knowledge-risk factors about OC coincided with previous studies.[10,18] However, 4th-grade students were found to be incompetent in our study, particularly regarding the questions on risk factors and the total score.

The most common site prevalence of OC may vary according to countries, habits, and geographies. While the tongue accounts for 40-50% of OC in Europe and the USA, the buccal mucosa has been reported as the most common site of OC in Sri Lanka.[2] In this study, dentists reported the floor of the mouth and under the tongue as the most common sites of OC by 71%. This percentage was lower among dental students. It was determined as 37.1% by Kebabcioglu and Pekiner,[10] and 85% by Joseph et al.[20] among the dentists. On the other hand, Keser and Pekiner[18] reported this rate as 44.4% among the 5th-year students.

Leukoplakia and erythroplakia have been considered among the potential malignancy diseases of the oral mucosa.[6, 23] In a study conducted in Italy, 53.8% of dentists responded the same while,[26] Joseph et al.[20] reported as 93.2%. According to Clovis et al.,[27] 76% of participants reported that these two lesions were the most likely to be associated with OC, regardless of the rank order. In our study, 61% of the dentists and 81.7% of the 5th-grade students reported these two diseases as precancerous lesions. On the other hand, this rate was determined to be lower among the 4th-grade students.

SCC is the most common malignant type of cancer of the oral cavity.[5] Taneja et al.[28] reported this rate among dental graduates as 48%, Kebabcioglu and Pekiner as 64.7%,[10] Collela et.al.[26] as 50.5%, and Clovis et al.[27] as 83.4%. In our study, both in the dentists and the 5th-grade students, the majority responded correctly. Nevertheless, the rate of correct responses was 44.3% and responses with "Don't know" was 35.1% among the 4th-grade students.

According to the 2005-2017 records of a cancer center, the majority of patients diagnosed with OC were over 45 years of age.[29] In our study, the most common response to the age group in which OC was diagnosed most frequently was between 40 and 60 years of age in all three groups. It was also the most common response in the studies conducted by Kebabcioglu and Pekiner[10] and Keser and Pekiner.[18]

The diversity of responses in our study regarding the clinical features of the prior oral lesion was noteworthy. While the dentists responded with three different options, the most common response among the 4th and 5th-grade students was a "small, painless, and white area." Kebabcioglu and Pekiner[10] reached similar conclusions to our study. Clovis et al.[27] reported that the majority of the participants (77.3%) responded correctly to the emergence of early OC lesions as "small, painless, and red lesions."

In our study, the most common response to receiving sufficient training to perform OC examination was "undecided" among the dentists and the 5th-grade students, whereas it was "disagree" among the 4th-grade students. In a study conducted in our country, 69.3% of those who graduated before 2000 and 41.3% of those who graduated after 2000 reported as 'weak or very poor' for the education they received at university on OC.[30] According to these results, it can be expressed that participants need various arrangements regarding OC education.

The percentage of participants who agreed that the patient was sufficiently trained on lymph node palpation was high among the dentists and the 5th-grade students; however, the response with "disagree" was more common among the 4th-grade students. In a study involving intern dentistry students and academic staff, the majority of participants stated that they had received sufficient training for lymph examination.[31] The low number of participants in this study may have

caused a difference from our results. In additional, half of the dentists had positive attitudes (strongly agree and agree) towards requesting laboratory tests in case of doubt, while the rate of participants with positive attitudes was higher among the 4th-grade students compared to the 5th-grade students.

Most participants in this study indicated their need for further training, especially on OC and screening. Similar to our study, previous study can be cited.[32] Thus, it can be mentioned that training and courses on this subject should be held regularly.

Several limitations of our study, such as the lack of comparison between the specialties of dentists, the limited number of participants, the lack of visual data to test diagnostic skills, the limited number of questions to assess knowledge and attitudes, and the unknown prevalence of OC in the community, should be noted. Therefore, our results cannot be generalized, and further studies are necessary.

According to the results of our study, knowledge-risk factors and knowledge-diagnostic procedures total scores were positively correlated; however, both mean total scores were negatively correlated with the total score of the negative attitudes. The 4th-grade students were observed to be insufficient in questions about the risk factors and in terms of the total score. The group who considered leukoplakia and erythroplakia most likely to become precancerous lesions were the 5th-grade students. Deficiencies were observed regarding the clinical characteristics of the prior oral lesion. Most participants expressed the need for further training on OC and screening.

In conclusion, OC is a disease that increases the global burden of cancer; therefore, it should be assessed comprehensively at regional and national levels, and deficiencies should be addressed through effective planning. These deficiencies can be eliminated by focusing on this subject in the undergraduate curriculum and providing professional development courses.

## REFERENCES

1. Gelband H, Jha P, Sankaranarayanan R, Horton S. In: *Cancer: Disease Control Priorities, Third Edition (Volume 3)* 2015;3. doi: 10.1596/978-1-4648-0349-9.2015.

2. Warnakulasuriya S. Global epidemiology of oral and oropharyngeal cancer. *Oral Oncol.* 2009;45 (4-5):309-316.

3. Shield KD, Ferlay J, Jemal A, et al. The global incidence of lip, oral cavity, and pharyngeal cancers by subsite in 2012. *CA Cancer J Clin.* 2017;67(1):51-64.

4. Shrestha AD, Vedsted P, Kallestrup P, Neupane D. Prevalence and incidence of oral cancer in low- and middle-income countries: A scoping review. *Eur J Cancer Care (Engl).* 2020;29(2):e13207.

5. Chamoli A, Gosavi AS, Shirwadkar UP, et al. Overview of oral cavity squamous cell carcinoma: Risk factors, mechanisms, and diagnostics. *Oral Oncol.* 2021;121:105451.

6. Warnakulasuriya S, Kujan O, Aguirre-Urizar JM, et al. Oral potentially malignant disorders: A consensus report from an international seminar on nomenclature and classification, convened by the WHO Collaborating Centre for Oral Cancer. *Oral Dis.* 2021;27(8):1862-1880.

7. Gomez I, Seoane J, Varela-Centelles P, Diz P, Takkouche B. Is diagnostic delay related to advanced-stage oral cancer? A meta-analysis. *Eur J Oral Sci.* 2009;117(5):541-546.

8. Hassona Y, Scully C, Shahin A, Maayta W, Sawair F. Factors Influencing Early Detection of Oral Cancer by Primary Health-Care Professionals. *J Cancer Educ.* 2016;31(2):285-291.

9. Lim K, Moles DR, Downer MC, Speight PM. Opportunistic screening for oral cancer and precancer in general dental practice: results of a demonstration study. *Br Dent J.* 2003;194(9):497-502; discussion 493.

10. Kebabcioglu O, Pekiner FN. Assessing Oral Cancer Awareness Among Dentists. *J Cancer Educ.* 2018;33(5):1020-1026.

11. Ahmed NHM, Naidoo S. Oral Cancer Knowledge, Attitudes, and Practices among Dentists in Khartoum State, Sudan. *J Cancer Educ.* 2019;34(2):291-296.

12. Coppola N, Rivieccio I, Blasi A, et al. Current knowledge, attitude and practice among dental hygienists in oral cancer awareness: Systematic review. *Int J Dent Hyg.* 2022;20(2):249-261.

13. Sallam M, Al-Fraihat E, Dababseh D, et al. Dental students' awareness and attitudes toward HPV-related oral cancer: a cross sectional study at the University of Jordan. *BMC Oral Health.* 2019;19(1):171.

14. Shadid RM, Abu Ali MA, Kujan O. Knowledge, attitudes, and practices of oral cancer prevention among dental students and interns: an online cross-sectional questionnaire in Palestine. *BMC Oral Health.* 2022;22(1):381.

15. Tarakji B. Knowledge, awareness, and attitude among dental students regarding oral cancer in Saudi Arabia. *Ann Afr Med.* 2022;21(4):444-450.

16. Leuci S, Coppola N, Viglione AP, et al. Knowledge, attitude, and practice in oral cancer: A national survey on 150 dental hygienists. *Oral Dis.* 2023;29(8):3205-3213.

17. Alaizari NA, Al-Maweri SA. Oral cancer: knowledge, practices and opinions of dentists in yemen. *Asian Pac J Cancer Prev.* 2014;15(14):5627-5631.

18. Keser G, Pekiner FN. Assessing Oral Cancer Awareness Among Dental Students. *J Cancer Educ.* 2019;34(3):512-518.

19. Kujan O, Alzoghaibi I, Azzeghaiby S, et al. Knowledge and attitudes of Saudi dental undergraduates on oral cancer. *J Cancer Educ.* 2014;29(4):735-738.

20. Joseph BK, Sundaram DB, Sharma P. Oral cancer awareness among dentists in Kuwait. *Med Princ Pract.* 2012;21(2):164-170.

21. Hertrampf K, Wiltfang J, Koller M, Klosa K, Wenz HJ. Dentists' perspectives on oral cancer: a survey in Northern Germany and a comparison with international data. *Eur J Cancer Prev.* 2010; 19(2):144-152.

22. Shadid RM, Habash G. Knowledge, Opinions, and Practices of Oral Cancer Prevention among Palestinian Practicing Dentists: An Online Cross-Sectional Questionnaire. *Healthcare (Basel).* 2023;11(7):1005.

23. Abati S, Bramati C, Bondi S, Lissoni A, Trimarchi M. Oral Cancer and Precancer: A Narrative Review on the Relevance of Early Diagnosis. *Int J Environ Res Public Health.* 2020;17(24):9160.

24. Pillai A, Adilbay D, Matsoukas K, Ganly I, Patel SG. Autoimmune disease and oral squamous cell carcinoma: A systematic review. *J Oral Pathol Med.* 2021;50(9):855-863.

25. Kumar M, Nanavati R, Modi TG, Dobariya C. Oral cancer: Etiology and risk factors: A review. *J Cancer Res Ther.* 2016;12(2):458-463.

26. Colella G, Gaeta GM, Moscariello A, Angelillo IF. Oral cancer and dentists: knowledge, attitudes, and practices in Italy. *Oral Oncol.* 2008;44(4):393-399.

27. Clovis JB, Horowitz AM, Poel DH. Oral and pharyngeal cancer: knowledge and opinions of dentists in British Columbia and Nova Scotia. *J Can Dent Assoc.* 2002;68(7):415-420.

28. Taneja P, Marya CM, Jain S, Nagpal R, Kataria S. Assessment of Knowledge, Attitude, and Practice Regarding Oral Cancer among Dental Graduates-A Web-Based Survey. *J Cancer Educ.* 2022;37(4):1194-1200.

29. Badri P, Ganatra S, Baracos V, Lai H, Amin MS. Oral Cavity and Oropharyngeal Cancer Surveillance and Control in Alberta: A Scoping Review. *J Can Dent Assoc.* 2021;87:l4.

30. Erbasar H, Neda G, Alpaslan C. Oral cancer prevention and early detection awareness of Ankara dentists. *Acta Oncologica Turcica.* 2017;50(2):139-147.

31. Tercanlı Alkıs H, Gunen Yılmaz S. Evaluating Oral Cancer Awareness Among Dental Students. *OJM.* 2020;42(5):71-75.

32. Nazar HS, Ariga J, Shyama M. Oral Cancer Knowledge, Attitudes, and Practices among Newly Graduated Dentists in Kuwait. *Asian Pac J Cancer Prev.* 2022;23(2):459-465.