

Evaluating Dental Students' Awareness and Knowledge of Malignant Melanoma

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ABSTRACT

Globally, epidemiological studies have shown a higher risk of malignant melanoma. To properly counsel their patients, dental students must be well-versed in the latest facts on malignant melanoma. This study aimed to assess the understanding and awareness of third, fourth, and fifth-grade students about malignant melanoma. A questionnaire with 11 questions was administered to 229 students (93 in the third grade, 64 in the fourth grade, and 72 in the fifth grade) who were enrolled in Marmara University's Faculty of Dentistry for our study. This survey examined the level of awareness and knowledge of the students. There were 154 (67.25%) female students and 75 (32.75%) male students in the research. There was a statistically significant difference between the scores regarding the percentage of students who responded to the statement "Oral melanomas are more aggressive than skin involvement" ($P = 0.000$). The participation rate of third-grade students (30.11%) was much lower than that of fourth and fifth-grade students (45.31% and 48.61%; $P_1 = 0.004$ and $P_2 = 0.000$). There was a statistically significant difference in the percentage of students who responded to the statement "Oral melanoma lesions are usually asymptomatic" across grades ($P = 0.000$). The participation rate of third-grade students (15.05%) was much lower than that of fourth and fifth-grade students (39.06% and 58.33%, respectively; $P_1 = 0.002$ and $P_2 = 0.000$). The participation rate of fourth-grade students was much lower than that of fifth-grade students ($P = 0.033$). Providing dental students with the necessary education about malignant melanoma increases their understanding and awareness of this disease.

Keywords: Awareness, Malignant melanoma, Oral cancer, Dental students

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Introduction

Derived from pluripotent neural crest-based melanocyte cells, malignant melanoma is a very invasive tumor that generates melanin [1]. It is the third most frequent kind of skin cancer, making up just 3% of all skin cancer diagnoses each year, yet it is responsible for around 75% of all skin cancer fatalities. From a biological perspective, it is one of the most lethal and unpredictable neoplasms [2, 3].

The stratum basale of the skin's epidermis layer serves as the primary source of melanocytes. On a similar note, skin is where malignant melanoma is most commonly observed. Furthermore, melanocytes are derived from the stratum basale of the epithelial layer, which is the mucosal counterpart of the epidermis. Although they are less frequent than skin malignancies, malignant melanomas can develop on any mucosal site where melanocytes are present.

In the mouth cavity, nasopharynx, nasal mucosa, and paranasal sinuses, mucosal melanomas are most common [4]. According to the National Cancer Database Report on Cutaneous and Noncutaneous Melanoma, 91.2% of all melanomas occur in the skin, whereas ocular (5.2%), mucosal (1.3%), and unidentified primary melanomas (2.2%) are less frequent. The head and neck region accounts for around 25% of cutaneous melanomas, followed by the limbs at 40% and other body parts at the rest of the number. Over 50% of mucosal melanomas are found in the head and neck area, with the remainder mostly consisting of anorectal and urogenital mucosa [5]. Head and

neck melanomas account for approximately 25% of all melanomas. Currently, mucosal melanomas account for around 10% of all head and neck melanomas [4]. Mucosal melanoma is more dangerous than cutaneous melanoma because it spreads quicker and produces more metastases. Primary oral malignant melanoma affects four out of every ten million people each year [6]. Despite making up 0.2% to 8% of all malignant melanomas [3, 7-10], this tumor is necessary to distinguish from all other oral pigmentations and accounts for 0.5% of all malignancies of the oral cavity [7-11]. Jackson and Simpson [12] reported that oral malignant melanomas comprise fewer than 2% of total melanomas, however, Reddy *et al.* [13] reported an incidence of 0.3%-1.3%.

UV exposure, pale skin, freckles, red hair, and sun sensitivity are common etiologic variables for cutaneous melanomas; however, no etiologic component other than ethnic variations has been identified for mucosal melanoma [14]. Sun exposure is not associated with oral malignant melanoma. Although there is currently no proof of a causal link, smoking, alcohol consumption, chronic denture irritation, and breathed environmental carcinogens all play significant roles [8, 15-17]. Additionally, recent research has shown that oral malignant melanoma cases have BAP1 expression (BRCA1-related protein, breast cancer gene) [18].

The World Health Organization (WHO) reports that while malignant melanoma is the cancer with the fastest global growth rate, annual incidence rates vary by population. Melanoma incidence is predicted to grow every ten to twenty years [19]. Geographically speaking, the rising incidence rate differs among “high incidence regions” like Australia, “medium incidence regions” like Canada and the USA, and “low incidence regions” like Scotland and India [2, 20]. In 2020, there were 16.171 new instances of cutaneous melanoma, making it the third most prevalent disease after breast and prostate cancer, according to the WHO's GLOBOCAN 2020 database, which is maintained by the International Agency for Research on Cancer (IARC). India, Uganda, and Japan have the highest rates of mucosal melanomas, although cutaneous melanomas are less prevalent in these nations. The GLOBOCAN 2020 database indicates that there are 324.635 new cases of cutaneous melanoma worldwide. About 173.844 of them are males, while 150.791 are women, and the overall number of deaths is 57.043. In 2018, there were 287.723 new cases and a total of 60.712 deaths. In Turkey, the number of new cases is 1.756, with 888 deaths recorded in 2020. Some researchers have claimed that the true prevalence is not greater in nations such as Uganda and Japan, but appears to be owing to the comparatively low cutaneous melanoma incidence in these racial groupings [5].

Oral malignant melanoma is a rare adult malignancy that affects persons under the age of 20 [6, 17]. Some studies cite decades 4-6. Incidence is highest [7, 14, 17], however, some refer to decades 4-7 [20-22] and 5-7 [23, 24]. The average age of people affected ranges from 55 to 56 years [6, 8, 22, 25]. Men were also shown to be more influential than women, according to research [2, 3, 6, 7, 14, 21-24, 26-28]. They make up 11% to 12.4% of all melanomas in Japan [14, 21, 26], and 0.2% to 8% in Europe and the United States [14, 21]. D'Silva *et al.* state that primary oral melanomas are infrequent, accounting for fewer than 2% of all melanomas in the United States [29].

The most frequent locations for oral malignant melanomas are the hard palate and maxillary gingiva [3, 4, 6-8, 14, 17, 21-23, 25, 26, 28, 30]. Other locations include the base of the mouth, buccal mucosa, tongue, and lips [3, 6-8, 17, 22, 23]. The lip is the area with the lowest prevalence of oral malignant melanoma [23].

Oral malignant melanoma has a worse prognosis than cutaneous melanoma, with a ten-year survival rate of less than 30% [17]. Other studies report varying 5-year survival rates, including 0%-20% [26], 13%-22% [5], 7% [22], 15%-38% [8], 5%-20% [21], 15%-30% [7], and 6.6%-40% [23].

The survival rate of metastatic lesions is quite low [6]. For metastatic melanoma, the mandible, tongue, and buccal mucosa are the most often affected areas [4-23]. The anatomic area of oral malignant melanoma is another prognostic factor that has a strong correlation with the overall survival rate [17, 23]. Wang *et al.* report that the survival rates for patients with oral malignant melanoma with varying tumor areas are, respectively, 51, 40, and 43 months for the gingiva, hard palate, and other regions. Comparing gingiva-affected oral malignant melanoma patients to those in other locations, the greater survival rate may be due to the ease of lesion inspection, diagnosis, and surgical access [31].

In general, the poor prognosis of oral melanoma is associated with limited access to extensive resection and a proclivity for early hematogenous spread. Younger patients have a better chance of surviving than older individuals [5]. The poor five-year survival rate highlights the necessity for urgent therapy and continuous follow-up [4].

Research on dental students' awareness and understanding of malignant melanoma in other countries has been published, but none on dental students in our nation. Assessing the knowledge and awareness of third-, fourth-, and fifth-grade pupils on malignant melanoma is the aim of the present investigation.

Materials and Methods

On 05.03.2021, the Marmara University Faculty of Medicine Non-Interventional Clinical Research Ethics Committee accepted the examination procedure, which was assigned the protocol number 09.2020.1378. In all, 229 students from Marmara University Faculty of Dentistry—93 in the third grade, 64 in the fourth, and 72 in the fifth—were involved in this study. A questionnaire consisting of eleven questions was presented to the participants whose awareness and knowledge were evaluated. Multiple-choice questions that just requested class information—not names—were asked. Participation was voluntary and open to all children starting in third grade and continuing through fifth grade.

Statistical analysis

Statistical analysis is done with Minitab 17 Statistical Software. Both qualitative data and descriptive statistics (mean, standard deviation, and frequency) were compared using the chi-square test. The $P = 0.05$ threshold was used to determine significance.

Results and Discussion

75 (32.75%) of the 229 students who participated in the study were male, while 154 (67.25%) were female. About 64 pupils (27.95%) were in the fourth grade, 72 children (31.44%) were in the fifth grade, and 93 students (40.61%) were in the third grade. The percentage of men (37.3%) and women (44.16%) who participated in the statement “Malignant melanoma ranks third among skin cancers with a rate of 3%” did not vary statistically significantly ($P = 0.142$). Additionally, there was no statistically significant difference in the percentage of respondents who said, “Surgery is the primary treatment for malignant melanoma,” by gender ($P = 0.545$). Men (70.67%) were far less likely than women (85.71%) to answer the question, “Do you think malignant melanoma is an important disease?” ($P = 0.022$). Women answered the question, “Do you think that sunscreen should be used to prevent malignant melanoma?” at a much greater proportion than males (33.33%) ($P = 0.000$). Women (65.58%) were substantially more likely than males (52.0%) to correctly answer the question, “State the clinical features of primary oral melanoma lesion,” with the correct answers being nodular/smooth-surfaced, slow-growing, irregularly shaped, and bronze/brown/black lesions ($P = 0.048$) (**Table 1**).

Regarding the participation rate to the statement, “Malignant melanoma ranks third among skin cancers with a rate of 3%,” there was a statistically significant difference across grades ($P = 0.000$). Third-grade students' response rate to the question (24.73%) was substantially lower than that of fourth-grade students (42.19%) ($P = 0.035$). Since the sample size for the Chi-square test was less than five, there were no findings on the degree of significance between the third and fifth grades. Fourth-grade students' participation percentage was much lower than that of fifth-grade students (63.89%) ($P = 0.014$) (**Table 2**).

Our study found that there was a statistically significant difference between grades in the participation rate to the statement, “Oral melanomas are more aggressive than skin involvement” ($P = 0.000$). The third-grade participation rate (30.11%) was much lower than the fourth- and fifth-grade participation rates (45.31% and 48.61%; $P_1 = 0.004$ and $P_2 = 0.000$) (**Table 2**).

Third-grade students' participation rate (15.05%) was significantly lower than that of fourth-grade students (39.06%) and fifth-grade students (58.33%) ($P_1 = 0.002$ and $P_2 = 0.000$), and fourth-grade students' participation rate was significantly lower than that of fifth-grade students ($P = 0.033$). This difference in participation rate to the statement “Oral melanoma lesions are usually asymptomatic” was statistically significant ($P = 0.000$) (**Table 2**).

The statement “Primary treatment for malignant melanoma is surgery” was statistically significantly different among grades in terms of participation rate ($P = 0.000$). Compared to the fourth and fifth classes (32.81% and 59.72%), the third-grade participation rate (13.98%) was considerably lower ($P_1 = 0.008$ and $P_2 = 0.000$). Fourth-grade students' participation rates were much lower than those of fifth-grade students ($P = 0.003$) (**Table 2**).

The percentage of students who answered the question, “Do you think malignant melanoma is an important disease?” varied statistically significantly by grade ($P = 0.000$). Fourth-grade students' participation percentage was substantially lower than that of fifth-grade students (94.44%) ($P = 0.007$) (**Table 2**).

Additionally, the percentage of students who answered the question, “Do you think that sunscreen should be used to prevent malignant melanoma?” varied statistically significantly by grade ($P = 0.001$). Third graders' participation percentage (37.63%) was much lower than that of fourth and fifth graders (59.38% and 69.44%, respectively; $P_1 = 0.027$ and $P_2 = 0.000$). Between the fourth and fifth grades, there was no statistically significant change (**Table 2**).

Identifying the most prevalent locations of oral melanoma was a question in our survey that showed a statistically significant difference between grades in terms of accurate response rate (hard palate and maxillary gingiva) ($P = 0.000$). Third graders' correct response rate (6.82%) was substantially lower than that of fourth and fifth graders (22.03% and 37.50%, respectively; $P_1 = 0.007$ and $P_2 = 0.000$). Between the fourth and fifth grades, there was no statistically significant change (**Table 2**).

For the question “Identify the most common type of malignant melanoma,” there was a statistically significant difference between grades in the rate of right answers (superficial spreading melanoma) ($P = 0.018$). Compared to the third and fifth grades (31.18% and 36.11%), the fourth grade's correct answer rate (53.13%) was substantially higher ($P_1 = 0.006$ and $P_2 = 0.046$). Between the third and fifth grades, there was no statistically significant change (**Table 2**).

For the question “State the clinical features of primary oral melanoma lesion,” there was a statistically significant difference between classes in the rate of right answers (nodular/smooth-surfaced, slow-growing, irregularly shaped, and bronze/brown/black lesions) ($P = 0.003$). Compared to the third and fifth grades (62.37% and 73.61%, respectively), the fourth grade's correct response rate (45.31%) was much lower ($P_1 = 0.003$ and $P_2 = 0.001$) (**Table 2**).

Table 1. Evaluation of knowledge level and awareness about malignant melanoma by gender

Statement	Answer	Male (%)	Female (%)	Total (%)	P
Malignant melanoma ranks third among skin cancers with a rate of 3%	Agree	28 (37.3%)	68 (44.16%)	96 (41.92%)	0.142
	Disagree	0 (0%)	5 (3.2%)	5 (2.18%)	
	No idea	47 (62.67%)	81 (52.6%)	128 (55.90%)	
Oral melanomas are more aggressive than skin involvement	Agree	30 (40%)	62 (40.26%)	92 (40.17%)	0.543
	Disagree	5 (6.67%)	17 (11.04%)	22 (9.61%)	
	No idea	40 (53.33%)	75 (48.70%)	115 (50.22%)	
Oral melanoma lesions are usually asymptomatic	Agree	25 (33.33%)	56 (36.36%)	81 (35.37%)	0.760
	Disagree	13 (17.33%)	30 (19.48%)	43 (18.78%)	
	No idea	37 (49.33%)	68 (44.16%)	105 (45.85%)	
The primary treatment for malignant melanoma is surgery	Agree	28 (37.33%)	49 (31.82%)	77 (33.62%)	0.545
	Disagree	12 (16%)	33 (21.43%)	45 (19.65%)	
	No idea	35 (46.67%)	72 (46.75%)	107 (46.72%)	
Do you think malignant melanoma is an important disease?	Agree	53 (70.67%)	132 (85.71%)	185 (80.79%)	0.022*
	Disagree	3 (4%)	2 (1.3%)	5 (2.18%)	
	No idea	19 (25.33%)	20 (12.99%)	39 (17.03%)	
Do you think that sunscreen should be used to prevent malignant melanoma?	Agree	25 (33.33%)	98 (63.64%)	123 (53.71%)	0.000*
	Disagree	11 (14.67%)	4 (2.60%)	15 (6.55)	
	No idea	39 (52.00%)	52 (33.77%)	91 (39.74%)	
Have a patient referred to the upper center with a skin lesion suspected of cancer?	Agree	0	1	1	N/A
	Disagree	51	128	179	
	No idea	24	25	49	
Identify the most common regions of oral melanoma. (Please select only one option)	Correct answer	14 (18.67%)	32 (20.78%)	46 (20.09%)	0.708
	Wrong answer	61 (81.33%)	122 (79.22%)	183 (79.91%)	
Equally frequent in all regions					

Floor of mouth and sublingual					
Hard palate and maxillary gingiva					
Tongue back and cheek/lip mucous membrane					
Sublingual and soft palate					
No idea					
Identify the most common type of malignant melanoma. (Please select only one option)	Correct answer	26 (34.67%)	63 (40.91%)	89 (38.86%)	0.363
	Wrong answer	49 (65.33%)	91 (59.09%)	140 (61.14%)	
Nodular melanoma					
Superficial spreading melanoma					
Acral lentiginous melanoma					
Lentigo malignant melanoma					
State the clinical features of the primary oral melanoma lesion (please select only one option)	Correct answer	39 (52%)	101 (65.58%)	140 (61.14%)	0.048*
	Wrong answer	36 (48%)	53 (34.42%)	89 (38.86%)	
Nodular/smooth-surfaced, slow-growing, irregularly shaped, bronze/brown/black lesions					
Erosive/smooth-surfaced, fast-growing regularly shaped, yellow/ white/brown lesions					
Completely smooth-surfaced, irregularly shaped, red/white lesions					

* $P < 0.05$, Chi-square test. N/A: Not applicable**Table 2.** Evaluation of knowledge level and awareness about malignant melanoma according to grades

Statement	Answer	3 rd Grade	4 th Grade	5 th Grade	Total	P
Malignant melanoma ranks third among skin cancers with a rate of 3%	Agree	23 (24.73%)	27 (42.19%)	46 (63.89%)	96 (41.92%)	0.000*
	Disagree	2 (2.15%)	3 (4.69%)	0 (0.00%)	5 (2.18%)	
	No idea	68 (73.12%)	34 (53.13%)	26 (36.11%)	128 (55.9%)	
Oral melanomas are more aggressive than skin involvement	Agree	28 (30.11%)	29 (45.31%)	35 (48.61%)	92 (40.17%)	0.000*
	Disagree	2 (2.15%)	7 (10.94%)	13 (18.06%)	22 (9.61%)	
	No idea	63 (67.74%)	28 (43.75%)	24 (33.33%)	115 (50.22%)	
Oral melanoma lesions are usually asymptomatic	Agree	14 (15.05%)	25 (39.06%)	42 (58.33%)	81 (35.37%)	0.000*
	Disagree	17 (18.28%)	12 (18.75%)	14 (19.44%)	43 (18.78%)	
	No idea	62 (66.67%)	27 (42.19%)	16 (22.22%)	105 (45.85%)	
The primary treatment for malignant melanoma is surgery	Agree	13 (13.98%)	21 (32.81%)	43 (59.72%)	77 (33.62%)	0.000*
	Disagree	26 (27.96%)	9 (14.06%)	10 (13.89%)	45 (19.65%)	
	No idea	54 (58.06%)	34 (53.13%)	19 (26.39%)	107 (46.72%)	
Do you think malignant melanoma is an important disease?	Agree	68 (73.12%)	49 (76.56%)	68 (94.44%)	185 (80.79%)	0.000*
	Disagree	0 (0.00%)	3 (4.69%)	2 (2.78%)	5 (2.18%)	
	No idea	25 (26.88%)	12 (18.75%)	2 (2.78%)	39 (17.03%)	
Do you think that sunscreen should be used to prevent malignant melanoma?	Agree	35 (37.63%)	38 (59.38%)	50 (69.44%)	123 (53.71%)	0.001*
	Disagree	7 (7.53%)	3 (4.69%)	5 (6.94%)	15 (6.55%)	
	No idea	51 (56.04%)	23 (25.27%)	17 (18.68%)	91 (100%)	
Have a patient referred to the upper center with a skin lesion suspected of cancer?	Agree	0	0	1	1	N/A
	Disagree	57	52	70	179	
	No idea	36	12	1	49	
Identify the most common regions of oral melanoma (please select only one option)	Correct answer	6 (6.82%)	13 (22.03%)	27 (37.50%)	46 (21%)	0.000*
	Wrong answer	82 (93.18%)	46 (77.97%)	45 (62.50%)	183 (79%)	
	Wrong answer	86 (92.47%)	61 (95.31%)	63 (87.50%)	210 (91.70%)	

Equally frequent in all regions							
Floor of mouth and sublingual							
Hard palate and maxillary gingiva							
Tongue back and cheek/lip mucous membrane							
Sublingual and soft palate							
No idea							
Identify the most common type of malignant melanoma. (Please select only one option)	Correct answer	29 (31.18%)	34 (53.13%)	26 (36.11%)	89 (38.86%)		0.018*
	Wrong answer	64 (62.82%)	30 (46.88%)	46 (63.89%)	140 (61.14%)		
Nodular melanoma							
Superficial spreading melanoma							
Acral lentiginous melanoma							
Lentigo malignant melanoma							
State the clinical features of primary oral melanoma lesion. (Please select only one option)	Correct answer	58 (62.37%)	29 (45.31%)	53 (73.61%)	140 (61.14%)		0.003*
	Wrong answer	35 (37.63%)	35 (54.69%)	19 (26.39%)	89 (38.86%)		
Nodular/smooth-surfaced, slow-growing, irregularly shaped, bronze/brown/black lesions							
Erosive/smooth-surfaced, fast-growing regularly shaped, yellow/white/brown lesions							
Completely smooth-surfaced, irregularly shaped, red/white lesions							

* $P < 0.05$, Chi-square test. N/A: Not applicable

Rarely, oral mucosal melanoma is more likely than other mouth malignancies to invade tissues locally and spread to other parts of the body. On the upper jaw's oral mucosa, it is four times more prevalent, usually on the palate or alveolar gingiva. According to research by Ivanov *et al.* [32] on medical students' attitudes and knowledge about sun protection practices and skin cancer. Two-thirds (67.8%) of participants correctly recognized basal cell carcinoma as the most frequent kind of skin cancer, reflecting the students' broad knowledge of the disease. In our study, the statement "Malignant melanoma ranks third among skin cancers with a rate of 3%" was statistically significantly different for each grade in terms of participation rate ($P = 0.000$). The third-grade participation rate (24.73%) was substantially lower than the fourth-grade participation rate (42.19%) to the question ($P = 0.035$), and the fourth-grade participation rate was significantly lower than the fifth-grade participation rate (63.89%) ($P = 0.014$).

According to a different study on skin cancer among medical students by Patel *et al.* [33], women were much more likely than men to participate (85.8%) in the statement that "sun exposure is the most important risk factor causing skin cancer," and they also used sunscreen more frequently than men. According to survey research by Ivanov *et al.* [32], one-third of medical students (33.1%) said they usually or always wore sunscreen when they were outside. According to this study, there was a difference in sunscreen use between male and female students, with female students using sunscreen at a higher rate (43.8%) than male students (21.1%) ($P = 0.022$). In line with these findings, women in our survey answered the question, "Do you think that sunscreen should be used to prevent malignant melanoma?" at a considerably greater rate (63.64%) than males (33.33%) ($P = 0.000$). Numerous survey studies that assessed medical students' sun protection practices also supported the findings [34-36]. These findings could be connected to the fact that men are more likely than women to develop malignant melanoma [2, 3, 6, 7, 14, 21-24, 26-28]

According to a survey research on melanoma awareness among medical students by Kalil *et al.* [37], senior students were more likely than first-year students to correctly identify the areas where malignant melanoma is more prevalent. However, when asked where melanoma is most commonly seen, it was found that 24.59% of final-year students and 79.66% of first-year students were unable to identify the right response. Third-grade students' accurate response rate (6.82%) was substantially lower in our study than that of fourth and fifth grades

(22.03% and 37.50%, respectively; $P_1 = 0.007$ and $P_2 = 0.000$). 30.51% of first-year students and 97.54% of senior students in the Kalil *et al.* [37] survey research had accurate knowledge. According to our research, when asked to “State the clinical features of primary oral melanoma lesion,” fourth graders' correct response rate (45.31%) was substantially lower than that of fifth graders (73.61%) ($P_1 = 0.03$ and $P_2 = 0.001$). Additionally, according to the authors, 97.54% of senior students and 30.51% of first-year students obtained the right answers. Similarly, when asked to “State the clinical features of primary oral melanoma lesion,” fourth graders' accurate response rate (45.31%) was substantially lower than that of fifth graders (73.61%) in our research ($P_1 = 0.03$ and $P_2 = 0.001$).

Conclusion

Despite their low occurrence, oral malignant melanomas have a terrible prognosis, and early detection is essential to lowering their fatality rates. Therefore, in addition to the skin examination, the oral examination must be part of the whole-body assessment. As far as we are aware, this was the first study in Turkey to evaluate dentistry students' awareness and understanding of malignant melanoma. As future dentists, dental students are essential to the prevention of oral malignant melanoma. We anticipate that the information generated will help expand the body of research in these fields, finding knowledge gaps, and designing and implementing future treatments aimed at reducing and preventing oral malignant melanoma lesions in dentistry students.

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