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Knowledge and Attitudes of Intern Dental Students Regarding the Role of Artificial Intelligence in Oral and Maxillofacial Surgery: A Cross-Sectional Survey Study

Yapay Zekânın Oral ve Maksillofasiyal Cerrahideki Rolüne İlişkin Stajyer Diş Hekimliği Öğrencilerinin Bilgi ve Tutumları: Kesitsel Bir Anket Çalışması

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ABSTRACT Objective: Research on the application of artificial intelligence (AI) in maxillofacial surgery and dentistry has exploded in the last few years. The purpose of this study was to assess dental intern students' attitudes and level of knowledge on the use of AI in oral and maxillofacial surgery. **Material and Methods:** A 37-question survey was designed by the researchers to measure the participants' knowledge, opinions, and attitudes about the use of AI in oral and maxillofacial surgery. The surveys were administered face to face to intern students at a university's faculty of dentistry. **Results:** A total of 144 students (88 female, 56 male; mean age 23.02±0.89 years) responded to the survey, yielding a response rate of 97.29%. 29.6% of the students said they had basic knowledge of AI Technologies while 58.5% were aware of the use of AI in oral and maxillofacial surgery. The respondents indicated that they primarily source information about AI through social media, media, and web browsing, respectively. The students displayed a favorable disposition, indicating that they believed AI would enhance oral and maxillofacial surgery. However, only 38.2% of the students expressed concern that AI would supplant maxillofacial surgeons in the future. **Conclusion:** Although students do not have sufficient knowledge about AI applications, they seem eager to learn and use AI in their applications. Undergraduate and graduate education opportunities should be provided so that future dentists are knowledgeable and equipped in AI.

Keywords: Artificial intelligence; deep learning; dentistry; oral and maxillofacial surgery; dental student

ÖZET Amaç: Yapay zekânın (YZ) maksillofasiyal cerrahi ve diş hekimliğinde uygulanmasına ilişkin araştırmalar son birkaç yılda patlama yapmıştır. Bu çalışmanın amacı, diş hekimliği stajyer öğrencilerinin maksillofasiyal cerrahide YZ kullanımına ilişkin tutumlarını ve bilgi düzeylerini değerlendirmektir. **Gereç ve Yöntemler:** Araştırmacılar tarafından katılımcıların oral ve maksillofasiyal cerrahide YZ kullanımına ilişkin bilgi, görüş ve tutumlarını ölçmek için 37 soruluk bir anket tasarlanmıştır. Anketler bir üniversitenin diş hekimliği fakültesindeki stajyer öğrencilere yüz yüze uygulanmıştır. **Bulgular:** Toplam 144 (88 kadın, 56 erkek; ortalama yaş 23,02±0,89 yıl) öğrenci ankete yanıt verdi ve %97,29'luk bir yanıt oranı elde edildi. Öğrencilerin %29,6'sı YZ teknolojileri hakkında temel bilgiye sahip olduğunu söylerken %58,5'i YZ'nin maksillofasiyal cerrahide kullanımından haberdardı. Katılımcılar, YZ hakkında bilgiyi öncelikle sosyal medya, medya ve web taraması yoluyla edindiklerini belirttiler. Öğrenciler, YZ'nin ağız ve çene cerrahisini iyileştireceğine inandıklarını belirterek olumlu bir eğilim gösterdiler. Ancak, öğrencilerin yalnızca %38,2'si YZ'nin gelecekte maksillofasiyal cerrahların yerini alacağından endişe duyduklarını ifade etti. **Sonuç:** Öğrenciler YZ uygulamaları hakkında yeterli bilgiye sahip olmasalar da YZ'yi öğrenmeye ve uygulamalarında kullanmaya istekli görünüyorlardı. Geleceğin diş hekimlerinin YZ konusunda bilgili ve donanımlı olmaları için lisans ve lisansüstü eğitim fırsatları sağlanmalıdır.

Anahtar Kelimeler: Yapay zekâ; derin öğrenme; diş hekimliği; oral ve maksillofasiyal cerrahi; diş hekimliği öğrencisi

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Artificial intelligence (AI) is a field of study that encompasses a range of technologies capable of performing tasks that are unique to humans, including learning, perception, reasoning, and recognition. In recent years, numerous applications have become available in our daily lives, and new uses are attracting significant interest in the business world. Advances in computer and information technologies have enabled the use of AI technologies such as machine learning and deep learning in health information systems.[1,2] Over the past decade, AI has been extensively incorporated into dental and medical decision support systems, particularly in fields like radiography and pathology.[3,4]

In recent years, there has been a notable increase in AI research in oral and maxillofacial surgery. Algorithms are employed in many areas, including diagnostic support, treatment decision support, prediction or evaluation of outcomes, preoperative planning, and postoperative follow-up. AI has a multitude of applications in the field of oral and maxillofacial surgery. These range from orthognathic surgery to the treatment of oral cancers, from implantology to the training of oral and maxillofacial surgeons, and from the management of impacted teeth to the diagnosis and treatment of intra-bone cysts and tumors.[5-12] However, the full potential of AI in maxillofacial surgery remains to be fully elucidated.

In recent years, many studies have been conducted to measure the knowledge and attitudes of dental students about to the utilization of AI in the fields of dentistry and oral radiology.[13-15] Dentistry intern students must possess the requisite knowledge and preparedness to utilize AI effectively in their future practice. To the best of the author's knowledge, no research has been conducted on dental students' perspectives or attitudes regarding the use of AI in oral and maxillofacial surgery. This study aimed to assess dental intern students' knowledge and attitudes regarding the use of AI in oral and maxillofacial surgery.

MATERIAL AND METHODS

STUDY DESIGN AND ETHICS

To achieve the research purpose, a descriptive, observational survey study was designed. The study was approved by the Clinical Research Ethics Committee of Afyonkarahisar Health Sciences University (Afyonkarahisar, Türkiye) (date: January 06, 2023 no: 2023/9) and was conducted by the principles outlined in the Declaration of Helsinki. Participation was entirely voluntary, and the data were collected anonymously.

DATA COLLECTION

A survey was constructed following a comprehensive review of the literature on the applications of AI in the field of oral and maxillofacial surgery. The survey instrument included items about to demographic information, familiarity with AI, and basic information about the working principles of AI. It also included items assessing knowledge about the areas of use of AI in oral and maxillofacial surgery, as well as items measuring opinions and attitudes regarding the impact of AI on oral and maxillofacial surgery.

In addition to demographic data (age, gender), the survey consisted of three subsections:

1. In this section, the following questions were posed: The participants were asked to indicate their awareness of the use of AI in daily life, dentistry, and oral and maxillofacial surgery; their knowledge of the working principles of AI; their sources of information about AI; their concerns about AI in the future; and their desire to use intelligence applications and receive training on AI.

2. Knowledge scale: This section included specific areas of use of AI in oral and maxillofacial surgery including orthognathic surgery (questions 1-4), oral cancers (questions 5-7), hard and soft tissue pathologies (questions 8 and 9), impacted teeth (questions 10 and 11), dental implantology (questions 12 and 13), and oral and maxillofacial surgery training (question 14).

3. Opinions ve attitudes scale: This section comprises 15 items designed to assess opinions and attitudes regarding the potential impact of AI on oral and maxillofacial surgery. The scale comprised 11 items measuring positive attitudes and 4 items measuring negative attitudes.

While the answers to the questions in the first section are formulated with two or more options, the answers to the questions in the 2nd and 3rd sections are

structured in a 5-point Likert-type format (1=completely disagree; 5=completely agree).

The survey was pretested and developed on a sample of 20 dental participants. 4th grade (n=77) and 5th grade (n=71) students studying at the Faculty of Dentistry, Afyonkarahisar Health Sciences University were included in the research. The surveys were administered face-to-face and 10 minutes were given to answer the surveys.

DATA ANALYSIS

All data were analyzed using IBM SPSS 27.0 software (SPSS Inc., Chicago, IL, USA). Cronbach's alpha was calculated to assess the internal consistency of the questionnaire on both the knowledge and opinion-attitude scales, with alpha coefficients of 0.85 and 0.73, respectively. The quantitative data were subjected to a comparison using the independent samples t-test. The chi-square test was employed for the assessment of categorical data. A p-value of less than 0.05 was considered to indicate statistical significance.

RESULTS

In total, 144 out of 148 participants completed the survey (response rate 97.29%). One student did not participate in the survey, and the responses of three students were excluded from the analysis as they did not answer more than half of the survey questions. The participants were aged between 21 and 25 years (mean age 23.02±0.89 years), with 88 female and 56 male participants. Of the participants, 74 were in the fourth grade and 70 were in the fifth grade.

A total of 95.8% of the students demonstrated awareness of the use of AI in daily life, 75.9% in dentistry, and 58.5% in oral and maxillofacial surgery. Only 29.6 of the students reported that they had a basic knowledge of the working principles of AI. A total of 94.6% of the students indicated a desire to receive training on AI applications, while 99.3% expressed an interest in utilizing AI in oral surgery practices. No statistically significant differences were observed between the general knowledge and attitudes of fourth and fifth-grade students regarding AI applications (Table 1). The primary sources of information about AI for students were social media (26.72%), media (22.26%), and web browsing (21.05%) (Figure 1).

The students demonstrated a high level of agreement with the statements pertaining to the utilisation of AI in oral and maxillofacial surgery, with rates ranging between 61.1% and 93.8% (Table 2). When the questions about the areas of use were grouped, the mean scores of each area of use were as follows: oral and maxillofacial surgery training (mean 4.30±0.70), dental implantology (mean 4.24±0.54), orthognathic surgery (mean 4.18±0.54), oral pathology

TABLE 1: Comparison of general knowledge and opinions about AI according to grades.

	4th grade		5th grade		Total		p value
	Yes n (%)	No n (%)	Yes n (%)	No n (%)	Yes n (%)	No n (%)	
1. Are you aware that the applications we use in daily life (e.g. spam filters, recommendation algorithms) use AI?	69 (95.8)	3 (4.2)	67 (95.7)	3 (4.3)	136 (95.8)	6 (4.2)	0.646
2. Are you aware of the use of AI in dentistry?	50 (70.4)	21 (29.6)	57 (81.4)	13 (18.6)	107 (75.9)	34 (24.1)	0.091
3. Are you aware of the use of AI in oral and maxillofacial surgery?	41 (56.9)	31 (43.1)	42 (60)	28 (40)	83 (58.59	59 (41.5)	0.421
4. Do you think you have basic knowledge about the working principle of AI?	24 (33.3)	48 (66.7)	18 (25.7)	52 (74.3)	42 (29.6)	100 (70.4)	0.209
5. Do you think that AI has more potential for use in oral and maxillofacial surgery than the current situation?	60 (83.3)	12 (16.7)	63 (90)	7 (10)	123 (86.6)	19 (13.4)	0.179
6. Would you like to receive training on AI applications?	64 (91.4)	6 (8.6)	66 (98.5)	1 (1.5)	130 (94.9)	7 (5.1)	0.065
7. Would you like to use AI in your oral and maxillofacial surgery practices?	69 (98.6)	1 (1.49)	67 (100)	0 (0)	136 (99.39)	1 (0.7)	0.511

AI: Artificial intelligence.

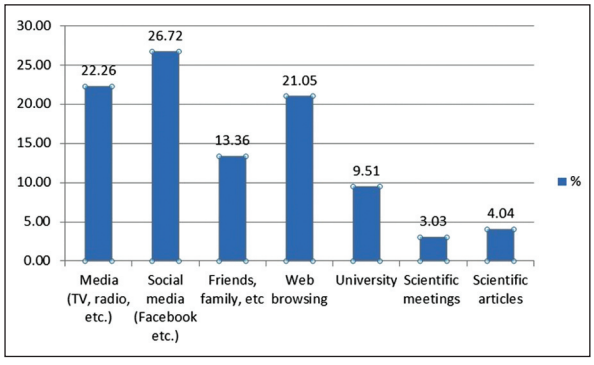

FIGURE 1: Distribution of students artificial intelligence information sources.

(mean 4.11±0.56), oral cancers (mean 3.96±0.63) and impacted teeth (mean 3.84±0.67).

It was observed that the proportion of students with positive attitudes towards the application of AI in oral and maxillofacial surgery was greater than the proportion with negative attitudes. The level of agreement with the positive statements in this section ranged from 56.9% to 91.7%, while the agreement with the negative statements ranged from 37.9% to 60.4% (Table 3). There was no statistically significant difference between students' knowledge scale scores according to grade and gender. Upon examination of the opinion/attitude scale scores, no significant difference was observed between students in terms of gender. However, it was noted that the negative opinion/attitude scores of fourth-grade students were significantly higher than those of fifth-grade students ($p<0.05$) (Table 4).

DISCUSSION

AI has made significant advancements in the fields of dentistry and oral and maxillofacial surgery in recent years. The utilization of AI-enabled methodologies has the potential to optimize the work of surgeons at each stage of patient care, encompassing screening, diagnosis, treatment planning, surgical procedures, and post-operative care. In this study, which evaluated the knowledge and attitudes of dental intern students regarding the role of AI in maxillofacial surgery for the first time in the literature, students had a positive opinion and attitude toward the application of AI in oral and maxillofacial surgery.

TABLE 2: Participants' knowledge levels regarding the use of AI in oral and maxillofacial surgery.

	I strongly disagree n (%)	I do not agree n (%)	I have no idea n (%)	I agree n (%)	I totally agree n (%)	X̄±SD
1. AI can be used in orthognathic surgery, especially to determine the development and growth rate of children.	1 (0.7)	4 (2.8)	9 (6.3)	90 (62.5)	40 (27.8)	4.13±0.70
2. AI can enable rapid and reproducible identification of the multitude of bone and skin landmarks required for 3D analysis in orthognathic surgery.	1 (0.7)	2 (1.4)	8 (5.6)	88 (61.1)	45 (31.5)	4.2±0.66
3. By making a number of measurements and calculations, AI can allow for determining the need for surgery and treatment planning for orthognathic surgery.	0 (0)	4 (2.89)	15 (10.4)	73 (50.7)	52 (36.1)	4.2±0.73
4. AI can facilitate communication with the patient by providing simulations of pre- and post-operative hard and soft tissue changes in orthognathic surgery.	1 (0.7)	3 (2.1)	12 (8.3)	79 (54.9)	49 (34)	4.19±0.73
5. AI can help early diagnosis of oral cancers using autofluorescence measurements, cytology images and photographs.	0 (0)	4 (2.8)	29 (20.1)	69 (47.9)	42 (29.2)	4.03±0.77
6. AI can help detect metastatic lymph nodes by performing radiomic analysis.	1 (0.7)	6 (4.2)	25 (17.5)	78 (54.5)	33 (23.1)	3.95±0.79
7. AI can help calculate survival, risk of recurrence, or risk of postoperative complications in oral cancers.	1 (0.7)	5 (3.5)	28 (19.4)	84 (58.3)	26 (18.1)	3.89±0.75
8. AI can be used to diagnose bone lesions in the jaws using dental radiographs.	0 (0)	3 (2.1)	11 (7.6)	86 (59.7)	44 (30.6)	4.18±0.65
9. AI can be used to diagnose soft tissue lesions in the mouth.	0 (0)	4 (2.8)	20 (13.99	87 (60.49	33 (22.9)	4.03±0.69
10. AI can make predictions about the eruption potential of impacted teeth.	1 (0.7)	4 (2.8)	18 (12.5)	73 (50.7)	48 (33.3)	4.13±0.78
11. AI can be used to calculate possible complications (edema, etc.) that may occur after impacted tooth surgery.	1 (0.7)	22 (15.3)	33 (22.9)	73 (50.7)	15 (10.4)	3.54±0.89
12. AI can improve the design of dental implants by calculating osteointegration and survival in dental implants.	0 (0)	2 (1.4)	15 (10.4)	88 (61.1)	39 (27.1)	4.13±0.64
13. AI can be used in implant planning and 3D implant positioning during surgery.	0 (0)	1 (0.7)	7 (4.9)	76 (52.8)	59 (41)	4.34±0.60
14. AI can be used in oral and maxillofacial surgery training.	1 (0.7)	1 (0.7)	11 (7.6)	70 (48.69)	59 (41.09)	4.30±0.70

AI: Artificial intelligence; SD: Standard deviation.

TABLE 3: : Participants' opinion and attitudes towards the use of AI in oral and maxillofacial surgery.

	I strongly disagree n (%)	I do not agree n (%)	I have no idea n (%)	I agree n (%)	I totally agree n (%)	X̄±SD
Positive opinion/attitudes						
1. I find the use of AI in oral and maxillofacial surgery exciting.	0 (0)	5 (3.5)	17 (11.9)	66 (46.2)	55 (38.5)	4.19±0.78
2. I think AI will lead to great advances in oral and maxillofacial surgery.	0 (0)	4 (2.8)	8 (5.6)	72 (50)	60 (41.7)	4.30±0.70
3. I think maxillofacial surgeons will have to use AI tools in the future.	5 (3.5)	20 (13.9)	37 (25.7)	51 (35.4)	31 (21.5)	3.57±1.08
4. AI applications should be a part of oral and maxillofacial surgery course undergraduate education.	2 (1.4)	11 (7.6)	33 (22.9)	59 (41)	39 (27.1)	3.84±0.95
5. AI applications should be a part of oral and maxillofacial surgery specialty training.	3 (2.1)	6 (4.3)	26 (18.6)	59 (42.1)	46 (32.9)	3.99±0.94
6. I find AI positive because it leads to situations such as the collection, storage and common use of data.	1 (0.7)	5 (3.5)	26 (18.2)	78 (54.5)	33 (23.1)	3.95±0.78
7. AI is beneficial to the patient because of its potential to improve patient care.	0 (0)	2 (1.4)	23 (16.2)	85 (59.9)	33 (22.5)	4.03±0.66
8. AI can be used as a "treatment planning tool" in diagnosis and treatment planning in oral and maxillofacial surgery.	1 (0.7)	5 (3.5)	7 (4.9)	104 (72.2)	27 (18.8)	4.04±0.66
9. AI can be used as a “prognostic tool” to evaluate the course of the disease and the success of treatments.	2 (1.4)	2 (1.4)	19 (13.2)	95 (66.4)	25 (17.5)	3.97±0.70
10. Tools provided by AI for diagnosis, treatment planning or patient monitoring empower the oral surgeon in his daily practice.	3 (2.1)	13 (9)	18 (12.7)	80 (56.39)	28 (19.7)	3.82±0.92
11. Tools provided by AI can save the oral surgeon time and facilitate his daily practice.	0 (0)	4 (2.8)	8 (5.6)	89 (61.8)	43 (29.9)	4.18±0.65
Negative opinion/attitudes						
1. I am concerned that AI may replace maxillofacial surgeons in the future.	22 (15.3)	42 (29.2)	25 (17.4)	45 (31.3)	10 (6.9)	2.85±1.21
2. I find the use of patient data for AI ethically objectionable as it violates the principle of "data confidentiality".	8 (5.6)	32 (22.2)	41 (28.5)	52 (36.1)	11 (7.6)	3.18±1.04
3. Excessive use of AI applications may lead physicians to not use certain skills learned and acquired through clinical experience, such as clinical judgment.	4 (2.8)	20 (13.9)	33 (22.9)	66 (45.8)	21 (14.6)	3.55±0.99
4. Excessive use of AI programs may damage patient-physician communication by causing physicians to not use human emotional skills such as empathy.	7 (4.9)	25 (17.4)	30 (20.8)	68 (47.2)	14 (9.7)	3.39±1.03

AI: Artificial intelligence; SD: Standard deviation.

TABLE 4: Comparison of participants' knowledge and opinion/attitude level total scores by grade and gender.

			Knowledge level		Positive opinion/attitude		Negative opinion/attitude		Total Opinion/attitude	
	n	%	X̄±SD	p value	X̄±SD	p value	X̄±SD	p value	X̄±SD	p value
Class										
4th-grade	74	51.4	56.8±5.9	0.124	43.6±4.6	0.941	13.6±2.9	0.017*	57.2±5.4	0.217
5th-grade	70	48.6	58.7±8.7		43.7±5.5		12.3±3.2		56.0±6.0	
Gender										
Male	56	38.9	57.5±7.7	0.778	42.8±5.2	0.115	13.0±2.4	0.839	55.8±6.6	0.203
Female	88	61.1	57.9±7.2		44.2±4.8		12.9±3.0		57.1±6.0	

*p<0.05; SD: Standard deviation.

This study revealed that the majority of students were aware of the use of AI in both daily life and dentistry, a finding that aligns with the results of a previous similar study in the literature.[16] However, only 58% of the participants were aware of the use of AI in oral and maxillofacial surgery. Furthermore, approximately one-third of the students (29.6%) indicated that they possessed a fundamental understanding of the operational principles of AI. It was observed that over half of the students obtained information about AI from social media, the media, and web browsing. Similarly, in the study conducted by Yüzbaşıoğlu, it was reported that the majority of dentistry students obtained information about AI through social media.[14] The information provided about AI on social media may sometimes be biased or exaggerated. It is therefore imperative that dental students obtain information about AI from accurate and unbiased sources based on scientific evidence.

In the study, 84.7% of the students also stated that they found the application of AI in oral and maxillofacial surgery exciting, and 91.7% stated that they thought it would lead to great advances in oral and maxillofacial surgery. This result is similar to the result conducted in Peru in 2023, where 86% of dental students agreed that AI will lead to major advances in dentistry in the future.[17] In addition, 94.9% of the students stated that they wanted to receive an education on AI while 99.3% stated that they wanted to use AI in dentistry practices. This illustrates the considerable enthusiasm among students for AI-related learning and applications. Furthermore, the students indicated that AI applications should be incorporated into the curricula of both undergraduate oral and maxillofacial surgery courses and specialty training programs, with 68.1% and 75% of respondents, respectively, expressing this view. A comparable study conducted in Türkiye revealed that over 75% of dental students concurred that AI should be incorporated into the curriculum at both the undergraduate and graduate levels.[14] The students are in favor of the integration of AI into the university curriculum and intend to utilize AI in their applications.

AI has a multitude of applications in the field of maxillofacial surgery, particularly in the context of orthognathic surgery and the treatment of oral cancers.

The majority of participants (80%+) indicated that AI can be utilized in orthognathic surgery for a range of applications, including cephalometric and 3D analyses, determination of surgical necessity, surgical planning, and presentation of preoperative and postoperative simulation outcomes to patients. Over 70% of participants indicated that AI could be utilized in the early diagnosis of oral cancers, the detection of metastatic lymph nodes, the calculation of postoperative survival, and the estimation of the risk of recurrence or the risk of complications. A total of 90.3% of the participants indicated that AI could be utilized in the diagnosis of bone lesions in the jaws, while 83.3% reported that it could be employed in the diagnosis of soft tissue lesions. A total of 93.8% of the participants indicated that AI could be utilized in implant planning and three-dimensional implant positioning during surgical procedures. Additionally, 88.2% of the participants reported that AI could be employed in the enhancement of dental implant design through the calculation of osteointegration and survival rates of dental implants. It was reported that AI can be employed to predict the eruption potential of impacted teeth (84%) and to calculate potential complications (e.g., edema) that may arise following impacted tooth surgery (61.1%). Additionally, 89.6% of the participants indicated that AI could be employed in the training of oral and maxillofacial surgeons. These findings indicate that the majority of participants concurred that AI has the potential to be extensively utilized in the field of oral and maxillofacial surgery.

The participants stated that AI can be used in oral and maxillofacial surgery both as a diagnosis and "treatment planning tool" (91%) and as a "prognostic tool" (83.9%) to evaluate the course of the disease and the success of treatments. Furthermore, the participants believe that the tools provided by AI, including diagnosis, treatment and patient monitoring, will enhance the capabilities of surgeons in their daily practices (76%) and facilitate their work by saving time (91.7%). Accordingly, 56.9% of the participants anticipate that oral surgeons will be required to utilize AI tools in the future. These findings are consistent

with those of Sur et al., which indicated that AI may facilitate clinical management.[18] The application of AI may yield positive outcomes not only for maxillofacial surgeons but also for patients. A significant majority (82.42%) think that AI can be beneficial to patients due to its potential to improve patient care. Furthermore, 77.6% of the participants indicated that they viewed AI as a beneficial technology due to its capacity to facilitate the collection, storage, and sharing of data. A study conducted in the United Kingdom reported that 88% of medical students agreed that AI will play an important and positive role in healthcare.[19]

In this study, 38.2% of the participants stated they were concerned that AI could replace oral surgeons. Similar to the results of this study, 35.4% of participants in a study conducted in Korea believed that AI would replace medical doctors.[20] Additionally, 43.7% of participants expressed ethical concerns regarding the use of patient data for AI, citing violations of the "data privacy" principle. A negative attitude was demonstrated by 60.4% of the participants, who stated that the excessive use of AI applications may result in physicians failing to utilize skills acquired through clinical experience, such as clinical reasoning. Similarly, 56.9% stated that excessive use of AI programs may harm patient-physician communication by causing physicians not to use human emotional skills such as empathy. There are several difficulties inherent to the use of AI in healthcare. For instance, AI is unable to engage in high-level activities such as gaining patients' trust, reassuring them, and expressing empathy.[21] While sensors collect valuable information to aid diagnosis, doctors still need to include medical history, perform physical examinations, and urge further discussion in ambiguous situations.[22]

This study has some limitations. The survey was conducted on a sample of fourth and fifth-grade intern students enrolled at a university in Türkiye. It would be erroneous to generalize the results to the whole country, despite the similarity of the educational curricula. The answers given to the questions are limited to survey questions due to methodology; background questions about AI were not asked. Nevertheless, this study represents the inaugural survey investigation into the utilization of AI in the domain of oral and maxillofacial surgery.

CONCLUSION

This study revealed that students agreed that AI has several applications in maxillofacial surgery, such as orthognathic surgery, oral cancers, dental implantology, oral pathology, dento-alveolar surgery, and oral and maxillofacial surgery training. It was revealed that they think that AI-supported applications will be useful for patients and physicians at every stage of diagnosis, treatment planning, surgical procedures, prognosis prediction, and post-operative follow-up processes in oral and maxillofacial surgery. The students expressed enthusiasm for the potential applications of AI in oral and maxillofacial surgery, indicating a keen interest in learning and applying AI-based techniques. Since the young professionals of the future must be prepared and knowledgeable to face this technological change, training and seminars should be organized for students on the basic principles of AI and its uses in maxillofacial and oral surgery, and AI courses should be added to the curriculum of dentistry and maxillofacial surgery specialty training.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

This study is entirely author's own work and no other author contribution.

REFERENCES

1. Miotto R, Wang F, Wang S, Jiang X, Dudley JT. Deep learning for healthcare: review, opportunities and challenges. Brief Bioinform. 2018;19(6):1236-46. [Crossref] [PubMed] [PMC]
2. Xiao C, Choi E, Sun J. Opportunities and challenges in developing deep learning models using electronic health records data: a systematic review. J Am Med Inform Assoc. 2018;25(10):1419-28. [Crossref] [PubMed] [PMC]
3. Yu KH, Kohane IS. Framing the challenges of artificial intelligence in medicine. BMJ Qual Saf. 2019;28(3):238-41. [Crossref] [PubMed]
4. Chen YW, Stanley K, Att W. Artificial intelligence in dentistry: current applications and future perspectives. Quintessence Int. 2020;51(3):248-57. Erratum in: Quintessence Int. 2020;51(5):430. [PubMed]
5. Bouletreau P, Makaremi M, Ibrahim B, Louvrier A, Sigaux N. Artificial intelligence: applications in orthognathic surgery. J Stomatol Oral Maxillofac Surg. 2019;120(4):347-54. [Crossref] [PubMed]
6. Alhazmi A, Alhazmi Y, Makrami A, Masmali A, Salawi N, Masmali K, et al. Application of artificial intelligence and machine learning for prediction of oral cancer risk. J Oral Pathol Med. 2021;50(5):444-50. [Crossref] [PubMed]
7. Mahmood H, Shaban M, Rajpoot N, Khurram SA. Artificial Intelligence-based methods in head and neck cancer diagnosis: an overview. Br J Cancer. 2021;124(12):1934-40. [Crossref] [PubMed] [PMC]
8. Warin K, Limprasert W, Suebnukarn S, Jinaporntham S, Jantana P. Automatic classification and detection of oral cancer in photographic images using deep learning algorithms. J Oral Pathol Med. 2021;50(9):911-8. [Crossref] [PubMed]
9. Krishnan DG. Artificial intelligence in oral and maxillofacial surgery education. Oral Maxillofac Surg Clin North Am. 2022;34(4):585-91. [Crossref] [PubMed]
10. Choi E, Lee S, Jeong E, Shin S, Park H, Youm S, Son Y, et al. Artificial intelligence in positioning between mandibular third molar and inferior alveolar nerve on panoramic radiography. Sci Rep. 2022;12(1):2456. [Crossref] [PubMed] [PMC]
11. Rasteau S, Ernenwein D, Savoldelli C, Bouletreau P. Artificial intelligence for oral and maxillo-facial surgery: a narrative review. J Stomatol Oral Maxillofac Surg. 2022;123(3):276-82. [Crossref] [PubMed]
12. Khanagar SB, Al-Ehaideb A, Maganur PC, Vishwanathaiah S, Patil S, Baeshen HA, et al. Developments, application, and performance of artificial intelligence in dentistry - A systematic review. J Dent Sci. 2021;16(1):508-22. [Crossref] [PubMed] [PMC]
13. Pauwels R, Del Rey YC. Attitude of Brazilian dentists and dental students regarding the future role of artificial intelligence in oral radiology: a multicenter survey. Dentomaxillofac Radiol. 2021;50(5):20200461. [Crossref] [PubMed] [PMC]
14. Yüzbaşıoğlu E. Attitudes and perceptions of dental students towards artificial intelligence. J Dent Educ. 2021;85(1):60-8. [Crossref] [PubMed]
15. Bisdas S, Topriceanu CC, Zakrzewska Z, Irimia AV, Shakallis L, Subhash J, et al. Artificial intelligence in medicine: a multinational multi-center survey on the medical and dental students' perception. Front Public Health. 2021;9:795284. [Crossref] [PubMed] [PMC]
16. Swed S, Alibrahim H, Elkalagi NKH, Nasif MN, Rais MA, Nashwan AJ, et al. Knowledge, attitude, and practice of artificial intelligence among doctors and medical students in Syria: a cross-sectional online survey. Front Artif Intell. 2022;5:1011524. [Crossref] [PubMed] [PMC]
17. Karan-Romero M, Salazar-Gamarra RE, Leon-Rios XA. Evaluation of attitudes and perceptions in students about the use of artificial intelligence in dentistry. Dent J (Basel). 2023;11(5):125. [Crossref] [PubMed] [PMC]
18. Sur J, Bose S, Khan F, Dewangan D, Sawriya E, Roul A. Knowledge, attitudes, and perceptions regarding the future of artificial intelligence in oral radiology in India: A survey. Imaging Sci Dent. 2020;50(3):193-8. [Crossref] [PubMed] [PMC]
19. Sit C, Srinivasan R, Amlani A, Muthuswamy K, Azam A, Monzon L, et al. Attitudes and perceptions of UK medical students towards artificial intelligence and radiology: a multicentre survey. Insights Imaging. 2020;11(1):14. [Crossref] [PubMed] [PMC]
20. Oh S, Kim JH, Choi SW, Lee HJ, Hong J, Kwon SH. Physician confidence in artificial intelligence: an online mobile survey. J Med Internet Res. 2019;21(3):e12422. [Crossref] [PubMed] [PMC]
21. Inkster B, Sarda S, Subramanian V. An empathy-driven, conversational artificial intelligence agent (Wysa) for digital mental well-being: real-world data evaluation mixed-methods study. JMIR Mhealth Uhealth. 2018;6(11):e12106. [Crossref] [PubMed] [PMC]
22. Krittanawong C. The rise of artificial intelligence and the uncertain future for physicians. Eur J Intern Med. 2018;48:e13-e14. [Crossref] [PubMed]