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Original Research Article

Assessment of knowledge and awareness of artificial intelligence and its uses in dentistry among dental students in Jammu and Kashmir: A questionnaire based survey

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ABSTRACT

Introduction: Artificial intelligence (AI) is the ability of computers or other machines to secure understanding in order to carry out tasks that traditionally need human knowledge. The present study aims to assess their knowledge, attitude and practice towards artificial intelligence among dental students.

Materials and Methods: A survey based questionnaire was done to study the knowledge, attitude and practice about artificial intelligence among dental students of Jammu & Kashmir. A total questionnaire of 15 questions were collected by Google form app. SPSS statistical analysis was done. A total of 540 participants participated in this survey.

Results: The results were collected and data were analyzed. Maximum of the participants had good knowledge, positive attitude and practical nature towards the artificial intelligence. The difference of the result is statistically significant ($p < 0.05$)

Conclusion: From the study it was concluded that the majority of participants were aware of artificial intelligence and its applications.

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1. Introduction

One of the major advances in science and technology is artificial intelligence (AI). There are many ways to define AI, but Kaplan and Haenlein's definition of it as the system's ability to accurately understand external data, to learn from that data, and to use it to achieve specified goals and tasks through flexible adaptations is the best. AI is being used in a wide variety of contexts throughout our daily lives.^{1,2}

In addition, a lot of individuals are unaware that AI is a component of the majority of the items they use on a daily basis. AI, for instance, is crucial to autonomous driving

and parking of vehicles. Smart email responses and smart maps, which we use daily to get to our many destinations, are two further instances that merit addressing. Although humans are the most intelligent animals we are aware of, when it comes to pattern identification, robots are thought to be superior since they can employ more data dimensions. This process is known as machine learning (ML).³

In dentistry, the use of AI programs in clinical settings has grown in popularity, particularly in diagnostic imaging, which benefits recent dental graduates. Among other analogous tasks, AI systems enable the auto-segmentation of the inferior alveolar nerve, the investigation of facial growth, the tracing of cephalometric landmarks, the detection of caries, alveolar bone loss, and periapical

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pathosis. Studies show that AI is increasingly being employed in the diagnosis and planning of treatment for a variety of orofacial illnesses, as well as in the early detection of mouth cancer and cervical lymph node metastases.⁴

It can be used in educational dentistry for pre-clinical duties like tooth preparation and arrangement, for behavior management of worried youngsters, and for direct treatment by surgical robots.⁵ Future artificial intelligence-based technologies will lighten the load on teachers and lower the price of education.⁶

Hence the present questionnaire based study was conducted among the dental students of a dental college to assess their knowledge, attitude and practice towards artificial intelligence.

2. Materials and Methods

The present questionnaire based cross sectional descriptive study was conducted among dental students of dental colleges of Jammu & Kashmir for a period of one year. The permission for commencement of study was obtained from the institutional ethical committee.

A total of 600 subjects including dental students were sent online a pre-validated questionnaire link via social media websites (WhatsApp groups), along with a short note explaining the purpose of the study and informed consent. The questionnaire consisted of 15 close ended items, broadly divided into 3 sections. Participants were asked to select one option from the answers provided against each question. The questionnaire was sent to every student, considering low response rate in online survey. After excluding the incomplete forms the total forms left to be counted in the study was 540.

Collected data were compiled in a master Excel sheet 2007. Statistical analysis was done by using the software SPSS 23.0(IBM) version. Chi square test was done to check the association and a 'p' value was set at >0.05 as significant.

3. Results

The demographic data of participants is shown in Table 1. The numbers of dental students in third year were more in number as compared to other years (40%).

Table 1: Demographic data of participants

Study participants	Percentage	
Dental undergraduates	First year	13%
	Second year	16%
	Third year	40%
	Final year	12%
	Interns	19%
Total	100%	

4. Discussion

Over the past two decades, the field of artificial intelligence has grown and made great advancements. AI applications are expanding towards medicine and dentistry as a result of recent advancements in digitalized data acquisition, machine learning, and computing infrastructure. AI is being examined for a variety of purposes, including the identification of normal and abnormal structures, the diagnosis of diseases, and the prediction of treatment outcomes.⁷ This Google questionnaire-based study evaluated the KAP among the 540 dentistry students in Jammu & Kashmir, India, with relation to the future of AI.

There was a remarkable knowledge of artificial intelligence among the students. More than 60% of students know the use of AI in health care devices. More than 50% of dental students know the use of technology in dentistry. Comparisons with studies in various parts of India, like in Chennai about 59% of the study participants were aware which was similar to present study⁵ and in Telangana study conducted by Asmatahasin M et al^{8,9} revealed 89.63% of students were aware of the term AI which was higher. The comparison with international outlook, was in concordance to our study, in Turkey reported by Yuzbasoglu E et al³ among dental students, only 48.40% were familiar; and in Saudi Arabia author concluded that 49.9% had basic knowledge about the AI.⁸

The percentage of participants who thought AI helps in clinical decision making were 70 %. The percentage of respondents who thought AI improved doctor patient relationships were 42%. More than 70 % of the participants thought that AI can be used for radiographic diagnosis of tooth caries and rest of participants disagreed. 50% of the participants chose AI is used in interpreting complicated radiographic scans, 30% of participants chose direct treatment. Around 70 % of the participants thought AI has a future in dentistry in India. These all results were similar to study done by Sadeep et al where students show positive attitude and practical nature towards the use of artificial intelligence.¹⁰ According to Mupparapu et al¹¹, the goal of AI may not have been to replace medical professionals, but dentists could profit from the extra luxury of a second opinion in nanoseconds thanks to AI technologies that could support the diagnosis and ultimately help patients.

The availability of online learning programmes, social media and other broadcasting media, as well as the development of communication technology, can all be attributed to the increased understanding and use of AI.^{12–15}

Our research shows that survey respondents were aware of the idea of AI and agreed that it might be applied to dentistry. Therefore, in order for dentistry students to better comprehend AI and its applications, seminars, lectures, and workshops must be organized.

Table 2: hows the response of study participants towards knowledge, attitude and perception part of questionnaire. Some of the results were statistically significant value of p less than 0.05.

Question	Options	Percentage					P value
		Ist	IInd	IIIrd	Final	Intern	
Are you familiar of AI driven health care devices?	Yes	70	73	84	60	80	0.511
	No	8	7	6	10	11	
	May be	22	20	10	30	9	
According to you what are the advantages of using AI?	AI can deliver vast amounts of clinically relevant high quality data in real time	12	25	20	23	10	0.201
	AI has no emotional exhaustion nor physical limitation	18	10	12	10	14	
	I can speed up processes in healthcare and reduce medical errors	30	15	10	11	9	
	All of the above	40	50	58	56	67	
Do you have the basic knowledge about the working principle of Artificial Intelligence?	No	52.8	52.2	50.1	55	53.2	0.002*
	Yes	47.2	47.8	49.9	45	46.8	
Are you aware of the usage of Artificial Intelligence in Dentistry?	No	40.67	41	55.8	54	52.3	0.003*
	Yes	59.33	59	44.2	46	47.7	
	Agree	20.9	34.8	39.7	43.8	42.8	
Do you consider artificial intelligence will lead to major advances in dentistry?	Disagree	3.2	2.9	3.3	4.3	3.3	0.054
	No idea	11.9	12.8	10.2	12.7	13.1	
	Strongly agree	64	49.5	46.8	39.2	40.8	
	Agree	33.2	36.2	37.6	29.9	34.2	
Artificial intelligence can be used as a definitive diagnostic tool in the diagnosis of diseases	Disagree	12.6	14.6	16.5	15.3	16.3	0.060
	No idea	24.3	25	26.7	22.1	26.3	
	Strongly agree	12.1	14.2	14.9	13.2	14.7	
	Strongly disagree	17.8	10	4.3	19.5	8.5	
	Yes	70	69	73	75	72.3	
How useful do you think AI could be for radiographic diagnosis of tooth caries?	No	19	26	24	15	13.6	0.002*
	May be	11	5	3	10	14.1	
	Agree	43.2	44.3	46.8	45	42	
Artificial intelligence can be helpful in the radiographic diagnosis of periodontal diseases.	Disagree	9	7.4	8	6.8	7.2	0.130
	No idea	20.6	22.4	23.9	21.7	23.1	
	Strongly agree	24.3	20.4	20.8	22.1	19.3	
	Strongly disagree	2.9	5.5	0.9	4.4	8.4	

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Table 2 continued

In the diagnosis of soft tissue lesions of the mouth artificial intelligence can be used?	Agree	34.7	35	37.8	32.5	34.3	0.201
	Disagree	8.9	7.8	9.9	9.2	8.6	
	No idea	32.1	34	31.2	30.2	31.4	
	Strongly agree	15.8	16.4	17.7	16.8	18.1	
	Strongly disagree	8.5	6.8	3.3	11.3	7.6	
Artificial intelligence can be used as a treatment planning tool in diagnosis and treatment planning in dentistry.	Agree	41.3	45.1	44.2	43.1	46.2	0.001*
	Disagree	7.5	9.2	8.3	7.9	8.1	
	No idea	19.3	18.7	20.6	19.4	18.7	
	Strongly agree	22	21.1	23.4	27.1	23.2	
	Strongly disagree	9.9	5.9	3.5	2.5	4	
In the radiographic diagnosis of pathologies in the jaws AI can be used?	Agree	45.2	46.5	47.3	44	45	0.128
	Disagree	7.6	6.5	6.9	7.2	8.1	
	No idea	21.9	23.2	22.2	21.3	20.5	
	Strongly agree	20.5	21.4	21.5	20.5	21.2	
	Strongly disagree	4.8	2.4	2.1	7	5.2	
Do you think Artificial intelligence applications should be part of undergraduate dental training?	Agree	43.2	44.1	40.4	41.1	40.2	0.000*
	Disagree	7.7	7.6	8.7	6.9	8.2	
	No idea	23.1	21.4	21	20.5	22	
	Strongly agree	24.6	25	26.7	23.1	25	
	Strongly disagree	1.4	1.9	3.1	8.4	4.6	
Do you think Artificial intelligence should be part of postgraduate dental training?	Agree	46.2	47.4	48.9	46.5	45	0.000*
	Disagree	2.0	2.5	3.1	2.7	3.2	
	No idea	12.5	15.7	13.7	16	14.6	
	Strongly agree	32.3	31.1	33.3	32.3	36	
	Strongly disagree	7	3.3	0.9	2.5	1.2	
Does AI help in clinical decision making?	Yes	77.5	79.4	81	70	78	0.029
	No	17.2	12.5	13	14	15	
	May be	5.3	8.1	6	16	7	
	Interpreting complicated radiographic scans	50	51	52	53.1	55.1	
AI will be most useful in which field of dentistry?	Direct treatment	30.4	33.2	32	31.1	30.2	0.189
	Making diagnosis	12.5	15.1	13	13.2	12.8	
	Making treatment decisions	7.1	0.7	3	2.6	1.9	

*statistically significant

It is vital to pique dental students' interest in learning about AI and its possible future uses as a new technology because they lack fundamental knowledge of the field. Participants emphasized the importance of including fundamental AI concepts in dentistry school curricula.

5. Conclusion

Within the constraints of this study, it is clear that the majority of dental students are familiar with artificial intelligence and its applications in dentistry. This study has significant implications for dental students' education and awareness of artificial intelligence and its applications in dentistry.

6. Source of Funding

None.

7. Conflict of Interest


None.

References

- Schwendicke F, Same W, Krois J. Artificial Intelligence in Dentistry: Chances and Challenges. *J Dent Res*. 2020;99(7):769–74.
- Kaplan A, Haenlein M. Siri, Siri, in my hand: Who's the fairest in the land? On the interpretations, illustrations, and implications of artificial intelligence. *Bus Horiz*. 2019;62:15–25.
- Yüzbaşıoğlu E. Attitudes and perceptions of dental students towards artificial intelligence. *J Dent Educ*. 2020;85(1):60–8.
- Hwang JJ, Jung YH, Cho BH, Heo MS. An overview of deep learning in the field of dentistry. *Imaging Sci Dent*. 2019;49(1):1–7.
- Ranjana V, Gayathri R, Priya VV, Kavitha S. Awareness on Application of Artificial Intelligence in Medicine among Dental Students - A Survey. *Ann Rom Soc Cell Biol*. 2021;p. 1137–53.
- Haleem A, Javaid M, Khan IH. Artificial intelligence (AI) applications in dentistry. *Curr Med Res Pract*. 2020;10(1):36–8.
- Sur J, Bose S, Khan F, Dewangan D, Sawriya E, Roul A, et al. 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.

- Khanagar S, Alkathiri M, Alhamlan R, Alyami K, Alhejazi M, Alghamdi A, et al. Knowledge, attitudes, and perceptions of dental students towards artificial intelligence in Riyadh, Saudi Arabia. *Med Sci*. 2021;25(114):1857–67.
- Asmatahasin M, Pratap K, Padma TM, Kalyan VS, Kumar VS. Attitude and Perception of Dental Students towards Artificial Intelligence. *Indian J Med Res*. 2021;10(3):305–14.
- Sadeep H. Assessment of knowledge and awareness of artificial intelligence and its uses in dentistry among dental students. *J Pharma Negat Results*. 2022;4:1304–9. doi:10.47750/pnr.2022.13.S04.155.
- Mupparapu M, Wu CW, Chen YC. Artificial intelligence, machine learning, neural networks, and deep learning: futuristic concepts for new dental diagnosis. *Quintessence Int*. 2018;49(9):687–8.
- Fernandes S, Bafna Y. Knowledge Attitude and Practice of Dental Students Towards Artificial Intelligence (AI): A Questionnaire based Survey. *J Xidian Univ*. 2022;16(8):284–91.
- Fotea S, Fotea I, undrea E. Artificial intelligence in education - Romanian students' attitudes toward artificial intelligence and its impact on their career development. In: ICERI2019. Proceedings; 2019.
- Arya G. Future of Dentistry: Artificial Intelligence. *Acta Scient Dent Sci*. 2020;.
- Bogdan CM, Popovici DM. Information system analysis of an e-learning system used for dental restorations simulation. *Comput Methods Programs Biomed*. 2012;107(3):357–66.

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