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Original Research Article

Assessing the AI Acumen: A study on the knowledge, attitude and behaviour of dental students towards artificial intelligence

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ABSTRACT

Introduction: The influence of Artificial Intelligence (AI) can be seen in every nook and corner of life. It has become an essential part of human life. Its influence in medical field is also noticeable but in certain aspects utilization of AI in dentistry has not been up to a great extent. This questionnaire-based survey was done to assess the knowledge, attitude and behaviour of dental students about AI.

Materials and Methods: A self-administered closed ended questionnaire consisting of 36 questions was distributed among 3100 interns and post graduate students studying in different parts of Rajasthan. The questionnaire consisted of demographic details of respondents as well as fundamental KAP towards AI.

Results: Response rate was 90.32%. The results showed that about 56.75% of respondents had poor knowledge of AI and its application in dentistry. Although their attitude towards AI was fair (48.75%) but their practical experience of using AI was poor (57.89%). There was a significant difference between the KAP of postgraduates when compared to interns (p value < 0.05). Pearsons's correlation test showed that there was no correlation between knowledge and attitude or knowledge with behaviour as well as attitude and behaviour.

Conclusion: There is a lack of awareness about the use of AI in dentistry among dental students. So, there is a need for implementation of practical courses to improve the knowledge as well as practice of AI in dentistry.

1. Introduction

The influence of Artificial Intelligence (AI) has significantly increased in different sectors and dentistry is no exception to it. It has been defined as "the theory and development of computer systems that are able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision making and translation between languages."[1] AI has made an impact in nearly every aspect of human lives and in India which is a technologically developing country, AI is yet to achieve its full potential.

A lot of attention has been drawn on the use of AI in the field of medicine and dentistry in recent times because of its multiple applications. AI has the ability of decision making and problem solving.[2] Convolutional neural networks (CNNs) learn structural patterns of a given dataset (input) and perform tasks autonomously, resulting in a data-based output.[3] Functional applications of AI in dentistry include assisted treatment planning, computer aided diagnosis based on medical images and predictive data analytics. AI application technology in Dentistry is advancing remarkably. AI involves the clinical decision-

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making system, which provides professional guide with computer programs. Dentists with the help of AI can help to diagnose specific oral and dental problems, which helps in affordable, and efficient treatment for the patient. AI will guide the dentists to perform the treatment more effectively than human assistants and could avoid the communication gap. AI has been able to diagnose dental disease with nearly as much accuracy as of humans.

AI has made healthcare providers' work easier by providing solution to different clinical problems.[4] It would not be wrong to say that AI has the power to revolutionize the field of medical as well as dental practice, but it must be taken into notice that use of AI in dentistry is not in routine yet.

In India, many dental practitioners as well as dental students are still unaware about the influence and use of AI in their field. No provisions have been made by the governing bodies to include the use of AI in the educational curriculum too. Hence the present study was done with the objective of assessing knowledge, attitude and practice/behaviour of interns and post graduate students in the field of dentistry regarding the use of AI in dentistry.

2. Materials and Methods

2.1. Study design

The study was conducted in the form of a cross sectional descriptive survey. This survey aimed to assess intern and post graduate dental students' perception about the use of AI in dentistry and its future without any pre-specified hypothesis hence sample size calculation and power estimation were waived and convenience sampling method was used. Participation was voluntary and only those who responded to the questionnaire were included in the study.

2.2. Study tool

A self-administered questionnaire consisting of 36 questions divided into four parts (knowledge, attitude, practice/behavior, and limitations & future) [Annexure 1] was distributed among 3100 interns and post graduate students studying in different parts of India. The questionnaire was distributed via Google Forms and the responses were subsequently collected for the months of June and July of the year 2023. A pilot study was done to determine the internal consistency of the questionnaire using Cronbach's alpha method and a value of 0.82, 0.83, 0.74 and 0.83 was obtained for knowledge, attitude, practice and limitations & future respectively.

2.3. Statistical analysis

Collected data was compiled in a master Excel sheet (2007). Statistical analysis as done using SPSS 20 (IBM) version. Unpaired t test was done to check the association and a p value of 0.05 was considered as statistically significant. Pearson correlation test was used to determine correlation between knowledge, attitude and practice.

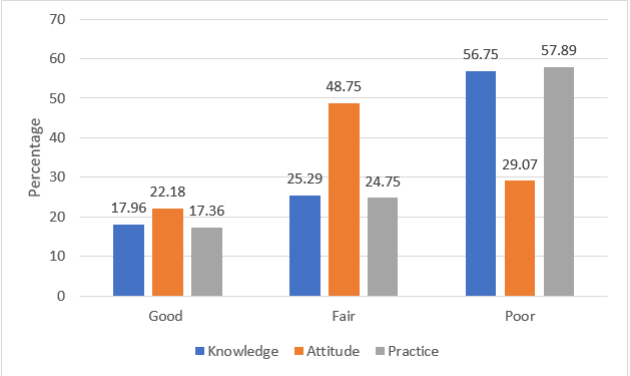

Figure 1: Percentage distribution of over all study participants in all three domains

3. Results

1. *Demographic details:* A total of 3100 questionnaires were distributed among interns and post graduate students and 2800 responses were obtained with a response rate of 90.32%. Out of which 1530 were interns and 1270 were post graduate students. Overall mean age of the participants was 24.1 years. Female participants were more than the male participants (Table 1).
2. *Distribution of scores for knowledge, attitude and practices:* The results obtained showed that most of the participants had poor knowledge about the use of AI in dentistry (56.5%). Also, the majority of the participants had poor experience of using AI in their routine work but the majority of the participants had fair attitude toward the importance of AI in the present world. (Table 2). Figure 1 gives the percentage distribution of the participants in the 3 categories of the questionnaire.
3. A significant difference was seen among the post graduate dental students and interns in all three aspects, with p value (Table 3). Post graduate students had better knowledge, attitude and practice with regard to the use of AI in dentistry as compared to the interns.
4. Pearson's correlation test revealed that there was no correlation between knowledge & attitude and knowledge & behavior as well as attitude & behavior. This means that even if the students' knowledge regarding AI is high it doesn't signify that their attitude/behavior/practice of AI based applications is also high and vice versa. Similarly, person with better attitude towards AI may not have a better practice of AI (Table 4)

Table 1: Gender and academic position distribution of participants

Academic position	Total	Gender		Mean age (in years)
		Male	Female	
Intern	1530	404 (26.4%)	1126 (73.6%)	22.4
Post-graduate	1270	438 (34.5%)	832 (65.5%)	25.8
Total	2800	842 (30.1%)	1958 (69.9%)	24.1

Table 2: Distribution of scores for knowledge, attitude and practices among participants

Parameter		Overall	Interns	Post-graduates
Knowledge	Good (>10)	503	218	285
	Fair (6-10)	708	337	371
	Poor (<5)	1589	975	614
Attitude	Good (28-40)	621	294	327
	Fair (14-27)	1365	838	527
	Poor (<13)	814	398	416
Practices	Good (28-40)	486	182	304
	Fair (14-27)	693	208	485
	Poor (<13)	1621	1140	481

Table 3: Comparison of mean scores of knowledge, attitude and practice among different academic position by usingunpaired 't' test

Academic position	Knowledge		Attitude		Practice	
	Mean	SD	Mean	SD	Mean	SD
Intern	5.85	3.82	20.25	6.36	10.78	5.89
Post-graduates	8.46	4.25	25.76	4.28	13.47	6.53
Total	7.16	4.09	23.00	5.32	12.13	6.21
p-value	0.012*		0.023*		0.04*	

Table 4: Correlation analysis of knowledge, attitude and practice among study subjects by using pearson correlation

	Knowledge		Attitude		Practice	
	R	p-value	r	p-value	R	p-value
Knowledge	-					
Attitude	0.151	0.06	-			
Behaviour	0.062	0.184	0.135	0.139	-	

4. Discussion

In this KAP study, we have tried to explore the understanding of budding dentists as well as those specializing in different fields of dentistry, specially orthodontics, in terms of application and understanding of AI through a self-administered questionnaire.

This study showed that there is a poor knowledge of AI among the participants (56.75%). Most of them were aware about the term AI but not thoroughly and lacked basic understanding about its application in their fields. Only 17.96% of the study population had good knowledge about AI. The result of this study was not in agreement to the study conducted by Dr. Shobha Fernandes et al.[5] in which 64% of the participants were aware of AI and its use. Whereas, other studies conducted by Asmatahsin M et al (2021),[6], Yuzbasioglu E et al (2021)[7] and Khanagar S et al (2021)[8] concluded that the knowledge of AI amongst orthodontists and other dental specialists was less than 50%, which is in accordance with this study.

Most of the participants (64.8%) in this study believed that diagnosis and treatment planning can be made more accurately using AI compared to traditional methods. Although the participants in this study had poor knowledge about AI and its applications in dentistry, they had positive attitude towards its use (70%). In practice, a significantly less number of orthodontists and other dental specialists was currently using AI in their practice (less than 57.89%). A question which addressed the future of AI in India, had received affirmative response towards it (more than 70% participants vouched for the same). When compared to other studies, it shows that overall Indian population lacks practical experience of AI.

There is a feeling of a lack of availability of learning sources regarding the use of AI in dentistry (based on the responses of 82.3% of the study population). The sample population of interns and postgraduates of the Department of Orthodontics and the remaining fields had an affirmative response for the question which addressed

the necessity of incorporation of chapters on AI based applications. The use of AI in cephalometric analysis, planning and implementation of orthognathic surgery, decision for extraction or non-extraction (as attempted by us in the previous study published in this journal) are potential fields of study specially in the field of orthodontics. (90.5% demand for the inclusion of the above).

AI with deep learning algorithms has developed tools which are able to diagnose[9] carious lesions, gingival disease, interpret radiographs. However, only 12.5% of the sample population has used these softwares in their practice, probably because of the lack of experience about AI and unavailability of essential guidance.

5. Conclusion

From the current study we can make the following conclusions:

1. Post graduate students of the Department of Orthodontics & Dentofacial Orthopaedics and other specialities have better knowledge of AI as compared to interns.
2. The sample population has a positive attitude towards AI.
3. Both the groups lack practical knowledge of AI.
4. The sample population suggests the incorporation of AI based applications in the educational curriculum; covering the topics of interest such as orthodontic diagnosis, treatment planning and implementation of treatment in Orthodontics as well as other specialities of dentistry.

6. Source of Funding

None.

7. Conflict of Interest

None.

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