



Knowledge Awareness And Practice Of Artificial Intelligence Among Dental Students In Melmaruvathur.

Yughanila.V(CRI),Dr.Sriram.S(MDS)-Reader, department of conservative dentistry and endodontics, adhiparasakthi dental college and hospital.

ABSTRACT

Background

Artificial Intelligence (AI) has emerged as a transformative technology in modern healthcare, including dentistry. AI systems have demonstrated potential in assisting with diagnosis, radiographic interpretation, treatment planning, and prediction of treatment outcomes. However, the level of awareness, perception, and clinical exposure to AI among dental professionals remains variable.

Aim

The present study aimed to evaluate the knowledge, attitude, and practice related to Artificial Intelligence in dentistry among dental students and practitioners.

Methods

A cross-sectional questionnaire-based study was conducted among 112 dental students and practitioners. A structured and pre-validated questionnaire consisting of four sections—demographic data, knowledge, attitude, and practice regarding AI in dentistry—was distributed. Data were analyzed using descriptive statistical methods and presented as frequencies and percentages.

Results

Among the participants, 75% were female, while 18.75% were male. Undergraduate students constituted the largest proportion (46.5%), followed by interns (40%). A majority (85%) were aware that AI could be integrated with CBCT and OPG for automated radiographic interpretation. About 70% believed AI could assist in early detection of dental problems. Positive attitudes toward AI-based treatment simulations and outcome prediction were reported by more than half of the respondents. Regarding practice, 68.8% reported using AI-based tools in dental learning or clinical work, while 80.3% used AI tools for research activities.

Conclusion

The study findings indicate that dental students and practitioners possess moderate to good knowledge and a generally positive attitude toward Artificial Intelligence in dentistry. However, structured training and formal education regarding AI applications remain limited. Incorporating AI education into dental curricula may facilitate effective adoption of AI technologies in dental practice.

Keywords

Artificial Intelligence, Dentistry, Knowledge, Attitude, Practice, Dental Education

INTRODUCTION

Artificial Intelligence (AI) has rapidly evolved as a revolutionary technology capable of performing tasks that traditionally require human intelligence. These tasks include pattern recognition, decision-making, and predictive analysis. In healthcare, AI has gained considerable attention due to its potential to improve diagnostic accuracy, enhance treatment planning, and optimize patient care.

In dentistry, AI technologies are increasingly being applied in several domains, including radiographic interpretation, caries detection, periodontal disease assessment, orthodontic treatment planning, and implant outcome prediction. Machine learning and deep learning algorithms can analyze complex datasets obtained from dental imaging techniques such as cone beam computed tomography (CBCT) and orthopantomograms (OPG), assisting clinicians in identifying pathological changes that may otherwise be overlooked.

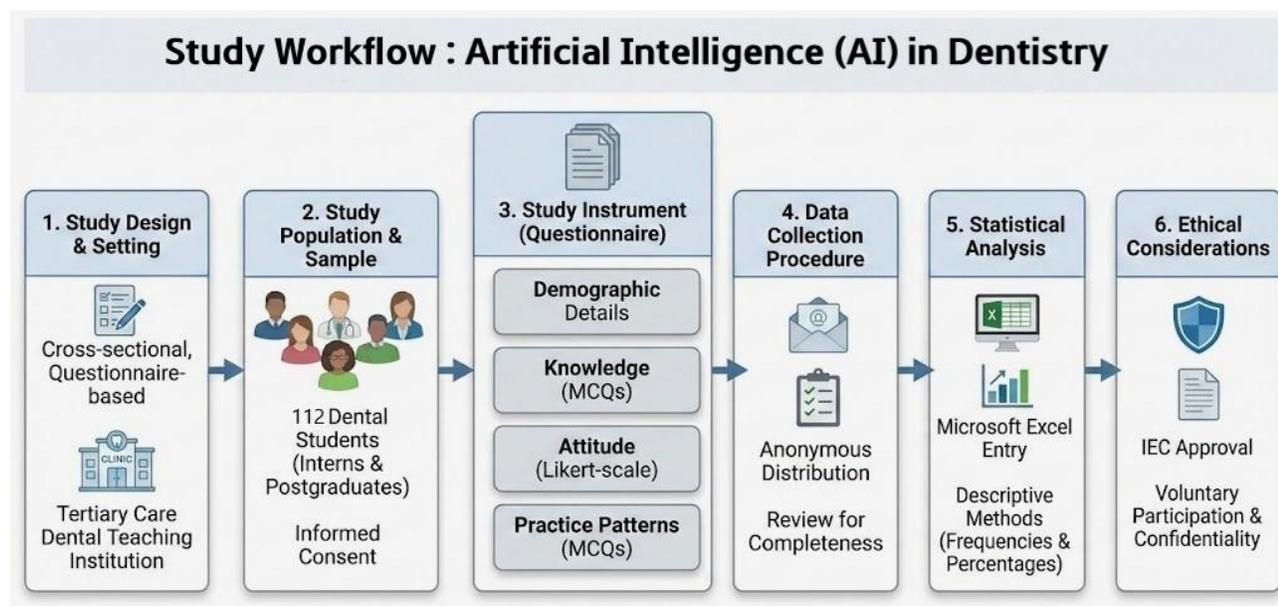
Recent advancements in AI-driven software have also enabled digital treatment simulations, automated diagnostic support systems, and predictive models that can estimate treatment outcomes. These developments highlight the growing role of AI in improving the efficiency and precision of dental practice.

Despite these technological advancements, the successful implementation of AI in dentistry largely depends on the awareness, acceptance, and competence of dental professionals. Dental students and practitioners represent the future workforce responsible for integrating AI into clinical workflows. However, many dental curricula currently provide limited exposure to AI-related education and training.

Assessing the knowledge, attitude, and practice (KAP) regarding AI among dental professionals is therefore essential in identifying educational gaps and determining the readiness of the dental community to adopt emerging technologies.

Therefore, the present study was conducted to evaluate the knowledge, attitude, and practice regarding Artificial Intelligence in dentistry among dental students and practitioners.

Materials and Methods



Study Design and Setting

This cross-sectional, questionnaire-based study was conducted among dental students at a tertiary care dental teaching institution. The study was designed to evaluate current understanding, perceptions, and clinical exposure regarding .

Study Population and Sample Size

A total of 112 dental students who provided informed consent were included in the study. The study population comprised interns and postgraduate students actively involved in clinical dental training, thereby ensuring representation of learners at different stages of professional development.

Inclusion Criteria

- Dental students and practitioners willing to participate
- Participants who provided informed consent

Exclusion Criteria

- Individuals who did not complete the questionnaire
- Participants unwilling to provide consent

Study Instrument

Data were collected using a structured, pre-validated questionnaire developed from the existing literature and expert input. The questionnaire consisted of four sections:

1. Demographic details
2. Knowledge related to Artificial Intelligence (AI) in Dentistry
3. Attitude toward the use of Artificial Intelligence (AI) in Dentistry
4. Practice patterns and clinical exposure related to Artificial Intelligence (AI) in Dentistry

The knowledge and practice sections included multiple-choice questions, while the attitude section comprised Likert-scale statements to assess perceptions, confidence, and training needs regarding.

Data Collection Procedure

Questionnaires were distributed to eligible participants and completed anonymously to ensure confidentiality and minimize response bias. All completed questionnaires were reviewed for completeness before data extraction and analysis.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using descriptive statistical methods. The results were summarized and presented as frequencies and percentages.

Ethical Considerations

Ethical clearance for the study was obtained from the Institutional Ethics Committee Participation was voluntary, and informed consent was obtained from all participants before data collection. Confidentiality of participant information was strictly maintained throughout the study.

Results:

A total of 112 completed questionnaires were included in the final analysis.

Table 1. Demographic characteristics of the study participants (N = 112)

Variable	Category	n (%)
Gender	Female	84 (75)
	Male	21 (18.75)
	Prefer not to disclose	7 (6.25)
Academic level	Postgraduate students	3 (2.75)
	Interns	45 (40)
	Undergraduate students	52 (46.50)
	Dental practioners	12 (10.75)

Knowledge regarding Artificial Intelligence (AI) in Dentistry**Table 2. Knowledge regarding Artificial Intelligence (AI) in Dentistry (Interpretive presentation, N = 112)**

Knowledge domain	Indicator of knowledge	Correct/ appropriate response n (%)	Neutral response n (%)	Incorrect/ suboptimal response n (%)
AI can be integrated with CBCT and OPG for automated interpretations	Integration of CBCT and OPG	94 (85)	6 (5)	12 (10)
Do you think AI can help in detecting dental problems earlier	Detection dental problems	78 (70)	15 (13)	19 (17)
AI requires regular updates and monitoring to work effectively	Regular updates and monitoring of AI	82 (73.25)	9 (8)	21 (18.75)
I have come across AI-related content in dental journals or scientific articles.	AI-related content in dental journals or scientific articles	74 (66)	16 (14.5)	22 (19.5)
I am aware of ethical concerns such as data privacy and patient consent while using AI tools.	Ethical concerns such as data privacy and patient consent	76 (67.25)	16 (14.5)	20 (17.75)

“Correct/appropriate response” was defined based on “Yes” of Artificial Intelligence (AI) in dentistry. “Neutral response” was defined based on “unclear” of Artificial Intelligence (AI) in dentistry Responses other than the correct option, including “NO” selections, were grouped as “incorrect/suboptimal” for interpretive clarity. Percentages were calculated using the total sample size (N = 112).

Attitude towards Artificial Intelligence (AI) in Dentistry

Table 3. Attitude towards Artificial Intelligence (AI) in Dentistry

Statement	Positive attitude n (%)	Neutral n (%)	Negative attitude n (%)
Have you used AI tools to create treatment simulation videos or 3D previews for patient counselling	58 (51.8)	12 (10.7)	42 (37.5)
.Have you used AI models for predicting treatment outcomes (e.g., implant success, caries risk, and extraction difficulty.	60 (53.6)	14 (12.5)	38 (33.9)
Have you used AI to compare “before and after” treatment outcomes (e.g., orthodontics, esthetic dentistry)?	56 (53.6)	13 (12.5)	43 (33.9)
Know the basic meaning of terms like “machine learning” and “deep learning.”	67 (59.8)	16 (14.3)	29 (25.9)

Positive attitude = Yes

Neutral attitude = Not Aware

Negative attitude = No

The chi-square goodness-of-fit test was used to assess whether the distribution of attitudes differed significantly from an equal distribution. Statistical significance was set at $p < 0.05$.

Table 4. Practice Related To Artificial Intelligence (AI) in Dentistry

Statement	Positive attitude n (%)		Neutral n (%)	Negative attitude n (%)
	Frequently	Occasionally		
.Have you ever used any AI-based tool or software in your dental learning or clinical work	45 (40.2)	32 (28.6)	21 (18.8)	14 (12.5)
	77 (68.8)			
. .Have you attended any workshop, webinar, or certification course on AI in dentistry.	34 (30.4)	35 (31.3)	32 (28.6)	11 (9.8)
	69 (61.7)			
How often do you use AI tools to verify drug interactions, prescriptions, or treatment protocols	42 (37.5)	49 (43.8)	18 (16.1)	3 (2.7)
	91 (81.3)			
Have you used AI tools during research work (data analysis, literature search, image labeling, statistics	38 (33.9)	52 (46.4)	13 (11.6)	9 (8.0)
	90 (80.3)			
Have you used AI tools (like ChatGPT, Dental AI apps) to understand clinical cases or treatment plans	41 (36.6)	45 (40.2)	23 (20.5)	3 (2.7)
	86 (76.8)			

Positive attitude = Yes (Frequently + Occasionally)

Neutral attitude = Not Aware

Negative attitude = No

The chi-square goodness-of-fit test was used to assess whether the distribution of attitudes differed significantly from an equal distribution. Statistical significance was set at $p < 0.05$.

DISCUSSION

The present study assessed the knowledge, attitude, and practice regarding Artificial Intelligence in dentistry among dental students and practitioners. The findings indicate that most participants are aware of the growing role of AI in dental practice and demonstrate a positive perception toward its integration in clinical workflows.

A large proportion of participants were aware of AI applications in radiographic interpretation, particularly in CBCT and OPG imaging. Previous studies have reported that AI-based algorithms can significantly enhance the detection of dental caries, periapical lesions, and periodontal bone loss.

Participants also demonstrated positive attitudes toward AI-assisted treatment simulations and predictive models. These technologies can improve patient communication and facilitate more accurate treatment planning.

However, despite favorable perceptions, the study revealed limited exposure to structured training programs related to AI in dentistry. This highlights the need for integrating AI education within dental curricula and continuing professional development programs.

Increasing awareness and training opportunities may enhance the ability of dental professionals to utilize AI tools effectively and ethically in clinical practice.

CONCLUSION

The present study revealed that dental students and practitioners possess moderate to good knowledge and generally positive attitudes toward Artificial Intelligence in dentistry. However, practical training and formal educational exposure remain limited.

Incorporating AI-related education into dental curricula and continuing education programs may enhance the adoption and effective implementation of AI technologies in dental practice.

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