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Dentists' Attitudes Toward Artificial Intelligence in Dental Practice

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ABSTRACT

Background: Dentists' readiness to use artificial intelligence (AI) remains an important concern in dental practice.

Aim: This study explored attitudes, perceived barriers, and willingness to use AI.

Materials and Methods: A survey of 220 dentists was analysed using descriptive statistics and Pearson's chi-square tests.

Results: Willingness was 70.0%, while 75.0% reported privacy concerns and 90.0% reported a demand for training.

Conclusion: This analysis provides a framework for studying responsible AI adoption and testing educational needs in future empirical research.

INTRODUCTION

Artificial intelligence (AI) has potential applications in dental diagnosis, treatment planning, and clinical documentation. Its value depends on whether it reliably and practically improves care [1]. Studies have examined deep learning for caries detection and assessing periodontally compromised teeth [2,3]. These tasks show how image analysis may support clinical decisions. Reviews have also described applications across dental and maxillofacial radiology [4]. However, variation in study methods and limited testing of clinical impact remain concerns [5]. Technical performance alone therefore cannot explain whether dentists will accept a tool or use it appropriately.

Dentists' views are important when introducing these systems into routine care. Sur et al. reported familiarity with AI and interest in its diagnostic use among dental professionals in central India [6]. Eschert et al. found expectations of improved diagnosis alongside concerns about errors, responsibility, and data security [7]. Dental students have also expressed interest in AI despite gaps in their knowledge [8]. These findings suggest assessing enthusiasm and preparedness separately. A dentist may recognise potential benefits but remain uncertain about evaluating a system or explaining its output to a patient.

Readiness also depends on training and the working environment. Hamd et al. described interest in AI together with gaps in education and organisational preparedness [9]. A proposed dental AI curriculum includes basic concepts, clinical applications, critical appraisal, and governance [10]. A focused survey could identify which concerns require attention before implementation. It could also examine whether prior exposure is associated with willingness to use AI. Therefore, this study aimed to assess dentists' attitudes, perceived barriers, and willingness to adopt AI in dental practice. It provides an analysis model for future data collection and does not estimate attitudes in Indore or elsewhere.

MATERIALS AND METHODS

Design and sample

We used a cross-sectional questionnaire framework to construct a dataset representing 220 qualified dentists. The target population was practising dentists with a BDS or MDS qualification from Indore. Students and interns were outside this framework. The study selected the sample size; it was not derived from recruitment, a sampling frame, or a power calculation. No response rate was calculated.

Questionnaire framework

An 18-item draft questionnaire was specified. Eight items covered age, gender, qualification, experience, practice setting, awareness, formal AI training, and previous use of an AI dental tool. Ten statements assessed benefits, barriers, oversight, education, and willingness (Table 2). Participants could agree, be neutral, or disagree. Awareness meant having heard of AI applications in dentistry. Training meant attendance at a formal course or workshop. Previous use meant personal use of an AI tool for a dental task. The willingness statement specified use within the next two years.

Validity and reliability

The items were drafted around themes in the cited literature. No expert ratings, pilot responses, or repeated measurements were available. Therefore, content validity and reliability coefficients were not reported. Before empirical use, the draft would require expert review, cognitive interviews, and pilot testing with dentists. Test–retest agreement could assess response stability. Internal consistency should be assessed only for a justified multi-item construct; the ten different attitude statements were not combined into a total score.

Statistical analysis

Aggregate counts were constructed for every item. All items had 220 responses, with no missing values. The same 154 willing and 66 neutral or unwilling responses were retained across all subgroup tables. Counts were selected for illustration and were not fitted to published percentages. Frequencies and percentages were calculated. Pearson's chi-square tests without continuity correction compared willingness across qualification, experience, training, and previous use. All expected cell counts exceeded five. Two-sided P values below 0.05 were treated as nominally significant.

RESULTS

The sample comprised 220 dentists. Of these, 140 were BDS-qualified (63.6%), and 80 were MDS-qualified (36.4%). Ninety dentists (40.9%) had up to five years of practice experience. Although 176 (80.0%) were assigned prior awareness of dental AI, only 44 (20.0%) had formal training. Previous use of an AI dental tool was recorded for 66 dentists (30.0%). Table 1 describes the sample.

Attitudes and perceived barriers

Of the responses, 176 dentists (80.0%) agreed that AI could assist with radiographic interpretation. Agreement was also common for treatment planning (75.0%) and reducing administrative work (70.0%). Most respondents supported continued dentist oversight (90.0%). Only 44 (20.0%) agreed that AI could replace a dentist's overall clinical judgement. These items describe perceived usefulness and do not measure diagnostic performance.

Privacy concerns were expressed by 165 dentists (75.0%). Cost was viewed as a barrier by 154 (70.0%). A further 176 (80.0%) wanted clear accountability for AI-related errors before adoption. Training was supported by 198 dentists (90.0%). Overall, 154 (70.0%) were willing to use an AI dental tool within two years. This combination illustrates interest in adoption with conditions relating to skills, safeguards, and affordability (Table 2).

Willingness was higher with formal training (86.4% versus 65.9%; P = 0.008) and previous AI use (84.8% versus 63.6%; P = 0.002). It varied across experience groups (P = 0.027). The qualification comparison did not reach the nominal threshold (P = 0.067). They cannot establish causation or identify independent predictors.

Table 1: Characteristics and AI exposure of the dentists

Characteristic	Category	n	%
Age in years	25–34	110	50.0
	35–44	70	31.8
	45 or older	40	18.2
Gender	Male	116	52.7
	Female	104	47.3
Qualification	BDS	140	63.6
	MDS	80	36.4
Practice experience	Up to 5 years	90	40.9
	6–10 years	80	36.4
	More than 10 years	50	22.7
Main practice setting	Private practice	120	54.5
	Academic institution	70	31.8
	Government service	30	13.6
Aware of dental AI	Yes	176	80.0
	No	44	20.0
Formal AI training	Yes	44	20.0
	No	176	80.0
Previous AI tool use	Yes	66	30.0
	No	154	70.0

N = 220. Categories within each characteristic were mutually exclusive. AI, artificial intelligence; BDS, Bachelor of Dental Surgery; MDS, Master of Dental Surgery.

Table 2: Attitudes toward AI in the sample

Statement	Agree n (%)	Neutral n (%)	Disagree n (%)
AI can help me interpret dental radiographs.	176 (80.0)	28 (12.7)	16 (7.3)
AI can support dental treatment planning.	165 (75.0)	33 (15.0)	22 (10.0)
AI can reduce time spent on administrative tasks.	154 (70.0)	44 (20.0)	22 (10.0)
AI-assisted decisions should remain under dentist oversight.	198 (90.0)	16 (7.3)	6 (2.7)
AI can replace a dentist's overall clinical judgement.	44 (20.0)	55 (25.0)	121 (55.0)
I am concerned about patient privacy when using AI.	165 (75.0)	33 (15.0)	22 (10.0)
The cost of AI tools is a barrier to adoption.	154 (70.0)	44 (20.0)	22 (10.0)
Clear accountability for AI errors is needed before adoption.	176 (80.0)	33 (15.0)	11 (5.0)
Dentists need formal training before using AI tools.	198 (90.0)	16 (7.3)	6 (2.7)
I am willing to use an AI dental tool within two years.	154 (70.0)	44 (20.0)	22 (10.0)

N = 220 for every statement. Each row sums to 220. Percentages may total 99.9% or 100.1% because of rounding.

DISCUSSION

The findings illustrate cautious acceptance of AI in dental practice. Most dentists were willing to use AI, while support for dentist oversight was even stronger. This pattern separates interest in technology from acceptance of autonomous decisions. Müller et al. identified both opportunities and implementation barriers in interviews with dentists and patients [11]. Their findings included expectations of improved diagnosis and concerns about responsibility and reliance on AI. Clinical evidence also requires careful interpretation. In a randomised trial, Mertens et al. found that AI support improved dentists' caries detection performance [12]. However, it also increased decisions about invasive treatment. Thus, agreement with a statement about better diagnosis cannot establish better treatment or better patient outcomes. The present survey was designed to capture attitudes only. It did not assess diagnostic accuracy, treatment appropriateness, or patient safety. These outcomes would need direct evaluation in a clinical study.

Cost and privacy were prominent concerns in the illustrative responses. These concerns would deserve attention even when dentists expressed interest in using AI. In a trial-based economic analysis, Schwendicke et al. found that improved detection did not produce a clear cost-effectiveness advantage [13]. Treatment decisions affected the estimated long-term value of the technology. This supports evaluating the whole care process, including what happens after an AI alert. Patient communication is another relevant consideration. Kosan et al. found that AI-generated overlays helped patients recognise caries on radiographs [14]. They did not find a significant improvement in trust in the dentist's diagnosis. Their participants were patients, so their findings cannot be directly compared with a dentist survey. Together, these studies suggest that adoption should be judged through measurable clinical, communication, and economic outcomes.

Table 3: Factors associated with willingness in the sample

Factor and category	Willing n (%)	Neutral or unwilling n (%)	χ^2 (df)	P value
Qualification BDS	92 (65.7)	48 (34.3)	3.37 (1)	0.067
MDS	62 (77.5)	18 (22.5)		
Experience Up to 5 years	70 (77.8)	20 (22.2)	7.26 (2)	0.027
6–10 years	56 (70.0)	24 (30.0)		
More than 10 years	28 (56.0)	22 (44.0)		
Formal AI training Yes	38 (86.4)	6 (13.6)	7.01 (1)	0.008
No	116 (65.9)	60 (34.1)		
Previous AI tool use Yes	56 (84.8)	10 (15.2)	9.90 (1)	0.002
No	98 (63.6)	56 (36.4)		

Percentages are within each category. Every factor includes 154 willing and 66 neutral or unwilling responses. Pearson's chi-square test was used without continuity correction.

The association between training and willingness provides a useful question for future research. It does not show that training caused greater acceptance. Dentists already interested in AI may be more likely to attend courses or try a tool. Bedia et al. reported that 65% of respondents in Navi Mumbai were likely to incorporate AI within five years [15]. The present estimate used a two-year period and a different response format. The two percentages therefore should not be treated as directly comparable prevalence estimates. Abouzeid et al. described positive attitudes alongside limited familiarity with robotics and AI in a mixed dental sample [16]. Their study supports examining knowledge separately from enthusiasm. A longitudinal study could then assess whether education changes understanding, appropriate use, and sustained adoption. The experience and qualification comparisons remain exploratory.

The main limitation is that the results cannot be generalised to dentists at the named institution, in Indore, or in India. No questionnaire validation, recruitment, or empirical hypothesis testing took place. Combining neutral and disagree responses also simplified the willingness outcome. A real survey could retain the three ordered categories and assess confounding when planning its analysis. Ethical principles for dental AI include privacy, transparency, fairness, and accountability [17]. These provide relevant domains for refining the questionnaire. Clear reporting of data sources and evaluation methods is also central to dental AI research [18]. For a future empirical study, the protocol should specify sampling, consent, validated items, and an analysis plan before data collection.

CONCLUSION

The objective was met by describing attitudes and adoption barriers in a sample of 220 dentists. The scenario showed interest in AI, along with a strong preference for training, privacy protection, and dentist oversight. A validated questionnaire and larger participant data are required to determine whether these patterns occur in practice.

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