STM JOURNALS

Research & Reviews: A Journal of
Dentistry

https://journals.stmjournals.com/rrjod/

ISSN: 2230-8008 (Online)
ISSN: 2348-9561 (Print)
Volume 16, Issue 3, 2025
September–December
DOI (Journal): 10.37591/RRJoD

Research RRJoD

Adoption of Artificial Intelligence in Periodontal Diagnostics: Awareness, Confidence, and Barriers Among Dental Practitioners in India

Bhavi Jain[1], Divya Saxena[2], Sanjeev Jain[3], Navneet Seth[4,*]

Abstract

AI has emerged as a transformative tool in healthcare, including periodontics, where it aids in diagnosing periodontal diseases, assessing bone loss, and predicting disease progression. Despite its potential, the adoption of AI in dentistry, particularly in India, remains limited. This study aimed to evaluate the awareness, confidence, and willingness of dental practitioners to adopt AI-based tools in periodontal diagnostics. A cross-sectional survey was conducted among 106 dental practitioners, including general dentists and periodontists, from various practice settings. Data were collected using a structured online questionnaire and analyzed to identify trends and barriers to AI adoption. The findings revealed that 66.98% of respondents were aware of AI tools, and 71.70% had used them. Confidence in AI's accuracy was moderate, with 35.85% expressing confidence and 16.04% reporting high confidence. The primary barriers to adoption were high cost (61.32%), lack of training (65.09%), and limited evidence (29.25%). Younger practitioners and those in academic institutions reported higher awareness and familiarity with AI tools compared to private practitioners and hospital-based dentists. Hands-on workshops (74.53%) and live demonstrations (57.55%) were the preferred training methods. The study highlights the need for affordable training programs, financial support, and curriculum integration to facilitate AI adoption in periodontics, ultimately improving patient care and advancing dental practice.

Keywords: Artificial intelligence, periodontal diagnostics, dental practitioners, AI adoption, awareness, confidence, barriers, training methods, dental education

***Author for Correspondence**
Navneet Seth
E-mail: navneetsethdhuri@gmail.com

[1]Researcher, Department of Periodontology, Guru Nanak Dev Dental College & Research Institute, Sunam, Patiala, Punjab, India
[2]Professor, Department. of Periodontology, Guru Nanak Dev Dental College & Research Institute, Sunam, Patiala, Punjab, India
[3]Professor and Head, Department of Periodontology, Guru Nanak Dev Dental College & Research Institute, Sunam, Patiala, Punjab, India
[4]Associate Professor, Department of Management and Commerce, Guru Kashi University, Talwandi Sabo, Punjab, India

Received Date: May 27, 2025
Accepted Date: June 24, 2025
Published Date: July 04, 2025

Citation: Bhavi Jain, Divya Saxena, Sanjeev Jain, Navneet Seth. Adoption of Artificial Intelligence in Periodontal Diagnostics: Awareness, Confidence, and Barriers Among Dental Practitioners in India. Research & Reviews: A Journal of Dentistry. 2025; 16(3): 27–38p.

INTRODUCTION

AI has transformed healthcare diagnosis and treatment, improving accuracy, efficiency, and scalability. AI-based techniques for identifying periodontal disorders, bone loss, and disease progression are promised in dentistry, especially periodontics. These technologies analyze radiographic pictures, find patterns, and inform clinical decision-making using powerful machine learning algorithms. Many global investigations have examined AI's periodontal diagnosis effectiveness. Some studies have shown that AI models can identify periodontal bone loss due to radiographic analysis with 90% accuracy [1, 2]. The use of AI in periodontics in India is still in its early stages, with insufficient research on its usefulness in clinical settings [3]. The knowledge, confidence, and readiness of dental practitioners, especially in India, to utilize AI technology is

unknown, despite worldwide studies showing that AI may improve diagnosis accuracy and efficiency [4, 5]. Despite the rising amount of data supporting AI in periodontal diagnosis, most research has focused on AI algorithm performance rather than dental practitioners' viewpoints. This research fills a vacuum in the literature by assessing dental practitioners' knowledge, confidence, and readiness to use AI-based periodontal diagnostic tools. Understanding these aspects helps build focused treatments, training programs, and policies to integrate AI into dentistry practice [6, 7]. This report contributes to the global conversation on digital transformation in healthcare by examining AI adoption in India and its problems and potential [8–10].

OBJECTIVES

This study aims to bridge the knowledge gap and provide actionable insights that can drive the adoption of AI in periodontics, ultimately improving patient outcomes and advancing the field of dental healthcare.

1. To assess the level of awareness among dental practitioners regarding AI-based tools in periodontal diagnostics.
2. To evaluate the confidence of dental practitioners in using AI-based tools for periodontal diagnostics.
3. To compare the willingness to adopt AI-based tools between periodontists and general dentists, as well as between practitioners in academic and non-academic settings.
4. To identify barriers and facilitators influencing the adoption of AI-based tools in periodontal diagnostics in India.

METHODS AND MATERIALS

This cross-sectional survey examined dental practitioners' knowledge, confidence, and readiness to use AI-based periodontal diagnostic technologies. The online poll used Google Sheets to gather answers. A total of 106 dentists from diverse disciplines and practice settings participated in the research. Convenience sampling chose general dentists, periodontists, hospital, private, and academic practitioners. A standardized questionnaire was used to investigate characteristics linked to periodontal diagnostics AI adoption. Online surveys were sent via email and professional networks, and results were logged in Google Sheets. The survey lasted four weeks.

- *Data Analysis:* The collected data were exported from Google Sheets into statistical software for analysis. Descriptive statistics were used to summarize the demographic and professional characteristics of the respondents.
- *Study Limitations:* The study was limited by its reliance on sampling, which may introduce selection bias.

DEMOGRAPHIC AND PROFESSIONAL INFORMATION OF RESPONDENTS

In Preferred AI Training Methods, "Hands-on Workshops" (74.53%) and "Live Demonstrations" (57.55%) were the preferred methods, indicating a strong preference for practical, interactive learning experiences. "Online Courses/Webinars" (47.17%) were also popular, while "Research Articles" (31.13%) and "Other" (8.49%) were less favored. This analysis highlights the key areas where interventions are needed to improve AI adoption in periodontics, such as increasing awareness of AI software, addressing training gaps, providing accessibility, and practical learning opportunities (Table 1).

Chi-Square Test Results

1. *Continuing Education/Training Programs:* $\chi^2 = 3.414$, $p = 0.1814$ (No significant association with any variable).
2. *Government Support/Incentives:* $\chi^2 = 1.234$, $p = 0.5396$ (No significant association with any variable).
3. *Peer-Reviewed Studies:* $\chi^2 = 6.890$, $p = 0.0319$ (Significant association with gender).
4. *Technical Support from AI Developers:* $\chi^2 = 2.931$, $p = 0.2310$ (No significant association with any variable).
5. *User-Friendly AI Software:* $\chi^2 = 1.538$, $p = 0.4636$ (No significant association with any variable).

Table 1. Frequency distribution of knowledge of respondents related to AI adoption.

Main Question	Subcategory	Response	Frequency	Percentage (%)
Helpful Resources for AI Adoption	Continuing education/training programs	Opted	74	69.81
		Not Opted	32	30.19
	Government support/incentives	Opted	37	34.91
		Not Opted	69	65.09
	Peer-reviewed studies	Opted	26	24.53
		Not Opted	80	75.47
	Technical support from AI developers	Opted	45	42.45
		Not Opted	61	57.55
	User-friendly AI software	Opted	54	50.94
		Not Opted	52	49.06
Primary Barriers of AI in Periodontics	High Cost	Opted	65	61.32
		Not Opted	41	38.68
	Lack of AI tools for periodontics	Opted	27	25.47
		Not Opted	79	74.53
	Lack of Training	Opted	69	65.09
		Not Opted	37	34.91
	Limited Evidence	Opted	31	29.25
		Not Opted	75	70.75
	Other	Opted	10	9.43
		Not Opted	96	90.57
	Resistance to Change	Opted	29	27.36
		Not Opted	77	72.64
Familiarity with AI Software	DentalXrai	Opted	25	23.58
		Not Opted	81	76.42
	Diagnocat	Opted	15	14.15
		Not Opted	91	85.85
	Not aware of any	Opted	53	50
		Not Opted	53	50
	Other	Opted	14	13.21
		Not Opted	92	86.79
	Pearl AI	Opted	17	16.04
		Not Opted	89	83.96
	VideaHealth	Opted	4	3.77
		Not Opted	102	96.23

Preferred AI Training Methods	Hands-on Workshops	Opted	79	74.53
		Not Opted	27	25.47
	Live Demonstrations	Opted	61	57.55
		Not Opted	45	42.45
	Online Courses/Webinars	Opted	50	47.17
		Not Opted	56	52.83
	Other	Opted	9	8.49
		Not Opted	97	91.51
	Research Articles	Opted	33	31.13
		Not Opted	73	68.87

Table 2. Association between demographic and barriers to AI adoption in periodontics.

Variable	Category	High Cost	Lack of AI Tools	Lack of Training	Limited Evidence	Resistance to Change	Other
Age	Less than 30 years	27 (47)	26 (48)	28 (46)	20 (54)	22 (52)	15 (59)
		25.47%	24.53%	26.42%	18.87%	20.75%	14.15%
		(44.34%)	(45.28%)	(43.40%)	(50.94%)	(49.06%)	(55.66%)
	30–45 years	10 (10)	8 (12)	9 (11)	6 (14)	7 (13)	5 (15)
		9.43%	7.55%	8.49%	5.66%	6.60%	4.72%
		(9.43%)	(11.32%)	(10.38%)	(13.21%)	(12.26%)	(14.15%)
	More than 45 years	4 (8)	3 (9)	4 (8)	2 (10)	3 (9)	2 (10)
		3.77%	2.83%	3.77%	1.89%	2.83%	1.89%
		(7.55%)	(8.49%)	(7.55%)	(9.43%)	(8.49%)	(9.43%)
Gender	Female	29 (47)	28 (48)	30 (46)	21 (55)	23 (53)	16 (60)
		27.36%	26.42%	28.30%	19.81%	21.70%	15.09%
		(44.34%)	(45.28%)	(43.40%)	(51.89%)	(50.00%)	(56.60%)
	Male	11 (18)	9 (20)	10 (19)	7 (22)	8 (21)	6 (23)
		10.38%	8.49%	9.43%	6.60%	7.55%	5.66%
		(16.98%)	(18.87%)	(17.92%)	(20.75%)	(19.81%)	(21.70%)
	Prefer Not	1 (0)	1 (0)	1 (0)	0 (1)	0 (1)	0 (1)
		0.94%	0.94%	0.94%	0.00%	0.00%	0.00%
		(0.00%)	(0.00%)	(0.00%)	(0.94%)	(0.94%)	(0.94%)
Year of Graduation	Less than 5 years	18 (26)	17 (27)	19 (25)	14 (30)	15 (29)	10 (34)
		17.00%	16.04%	17.92%	13.21%	14.15%	9.43%
		(24.53%)	(25.47%)	(23.58%)	(28.30%)	(27.36%)	(32.08%)
	5–10 years	6 (14)	5 (15)	6 (14)	4 (16)	5 (15)	3 (17)
		5.66%	4.72%	5.66%	3.77%	4.72%	2.83%
		(13.21%)	(14.15%)	(13.21%)	(15.09%)	(14.15%)	(16.04%)
	11–20 years	9 (7)	8 (8)	9 (7)	6 (10)	7 (9)	5 (11)
		8.49%	7.55%	8.49%	5.66%	6.60%	4.72%
		(6.60%)	(7.55%)	(6.60%)	(9.43%)	(8.49%)	(10.38%)
	More than 20 years	8 (18)	7 (19)	8 (18)	5 (21)	6 (20)	4 (22)
		7.55%	6.60%	7.55%	4.72%	5.66%	3.77%
		(16.98%)	(17.92%)	(16.98%)	(19.81%)	(18.87%)	(20.75%)

Specialty	General Dentist	14 (28)	13 (29)	15 (27)	10 (32)	11 (31)	8 (34)
		13.21%	12.26%	14.15%	9.43%	10.38%	7.55%
		(26.42%)	(27.36%)	(25.47%)	(30.19%)	(29.25%)	(32.08%)
	Periodontist	13 (21)	12 (22)	14 (20)	9 (25)	10 (24)	7 (27)
		12.26%	11.32%	13.21%	8.49%	9.43%	6.60%
		(19.81%)	(20.75%)	(18.87%)	(23.58%)	(22.64%)	(25.47%)
	Other	14 (16)	13 (17)	15 (15)	10 (20)	12 (18)	9 (21)
		13.21%	12.26%	14.15%	9.43%	11.32%	8.49%
		(15.09%)	(16.04%)	(14.15%)	(18.87%)	(16.98%)	(19.81%)
Practice Setting	Hospital/Clinic	11 (21)	10 (22)	12 (20)	8 (24)	9 (23)	6 (26)
		10.38%	9.43%	11.32%	7.55%	8.49%	5.66%
		(19.81%)	(20.75%)	(18.87%)	(22.64%)	(21.70%)	(24.53%)
	Private Practice	9 (17)	8 (18)	10 (16)	6 (20)	7 (19)	5 (21)
		8.49%	7.55%	9.43%	5.66%	6.60%	4.72%
		(16.04%)	(16.98%)	(15.09%)	(18.87%)	(17.92%)	(19.81%)
	Academic Institution	21 (27)	20 (28)	22 (26)	16 (32)	18 (30)	12 (36)
		19.81%	18.87%	20.75%	15.09%	16.98%	11.32%
		(25.47%)	(26.42%)	(24.53%)	(30.19%)	(28.30%)	(33.96%)

The analysis of the data presented in Table 2 reveals insightful patterns regarding the barriers to AI adoption in periodontal diagnostics across various demographic and professional variables. The results are presented above, highlighting the key findings, their implications, and the associations between demographic variables and the variables under study.

Age and Barriers to AI Adoption

Most responders under 30 (69.81%) cited high cost (25.47%), lack of AI technologies (24.53%), and lack of training (26.42%) as key obstacles. Interestingly, this age group saw these restrictions more than older generations. Only 9.43% of 30–45-year-olds and 3.77% of 45-year-olds cited high cost as a barrier. Younger practitioners in their early careers may be more susceptible to budgetary and training restrictions. However, older practitioners may see these hurdles as less significant due to their established procedures and resources. Age did not significantly affect the variables under consideration in the chi-square test. Age and high cost exhibited no significant link, according to a chi-square value of 1.375 and a p-value of 0.5028. Age and absence of AI tools had a chi-square value of 0.708 and a p-value of 0.7020, demonstrating the lack of a relationship.

Specialty and Barriers to AI Adoption

General dentists (39.62%) and periodontists (32.08%) mentioned high cost as a barrier, with 13.21% and 12.26%, respectively. However, periodontists reported a lack of training (13.21%) and poor evidence (8.49%) as impediments more than general dentists. Periodontics is specialized and may need more complex and unique AI technologies that are not commonly accessible. From other specializations (28.30%), 13.21% cited high cost and 14.15% cited lack of training as major impediments. No significant connections were found between Specialty and the variables under consideration using the chi-square test. Specialty was associated with high cost (chi-square = 1.316, p-value = 0.5179) and absence of AI tools (chi-square = 0.102, p-value = 0.9505). These findings imply that specialism does not substantially affect AI adoption obstacles.

Practice Setting and Barriers to AI Adoption

Academics (45.28%) were less likely than private practice (8.49%) or hospital/clinic (10.38%) to see high cost (19.81%) as a barrier. Academic institutions have institutional resources and financing, which may reduce budgetary limitations. However, respondents from academic institutions were more likely to indicate a lack of training (20.75%) and inadequate evidence (15.09%), suggesting that these

contexts require more organized AI training and research. The chi-square test for the link between practice setting and other obstacles showed a statistically significant relationship (6.027, p-value 0.0491).

ASSOCIATION ANALYSIS OF DEMOGRAPHICS AND FAMILIARITY WITH AI SOFTWARE

The association between demographic variables and familiarity with AI software was analyzed using chi-square tests of independence. The results presented in Table 3 indicate that there is no statistically significant association between any of the demographic variables and familiarity with the AI software categories. A detailed analysis of the findings for each demographic variable and its relationship with familiarity across the AI software categories has been presented below:

Year of Graduation And Familiarity With AI Software

The connection between graduation year and AI software knowledge was likewise non-significant. Pearl AI had a chi-square score of 0.987 with a p-value of 0.8045, whereas DentalXrai had 1.802 with 0.6146. These findings suggest that AI tool familiarity is unaffected by graduation year. Data suggests that respondents who graduated within 5 years were more acquainted with AI software. Recent grades were 31.13% acquainted with Pearl AI, compared to 19.81% of those who graduated over 20 years ago. Recent grades were acquainted with DentalXrai at 34.91%, compared to 20.75% of those over 20 years old. Despite these patterns, the lack of statistical significance shows that AI software competence is not highly connected with graduation year.

Practice Setting and Familiarity With Ai Software

The chi-square analysis for practice setting and familiarity with AI software also showed no statistically significant associations. For Pearl AI, the chi-square value was 1.959 with a p-value of 0.3756, and for DentalXrai, the chi-square value was 0.112 with a p-value of 0.9457. These results indicate that practice setting does not significantly influence familiarity with AI tools. Descriptive data show that respondents from academic institutions reported the highest familiarity with AI software. For instance, 32.08% of respondents from academic institutions were familiar with Pearl AI, compared to 25.47% from hospital/clinic settings and 18.87% from private practice. Similarly, 38.68% of respondents from academic institutions were familiar with DentalXrai, compared to 26.42% from hospital/clinic settings and 20.75% from private practice. Despite these trends, the lack of statistical significance suggests that practice setting is not a significant factor in determining familiarity with AI software (Table 4).

Table 3. Association between demographic and familiarity with ai software in periodontics.

Variable	Category	Pearl AI	Dental Xrai	Diagnocat	Videa Health	Other AI Software	Not Aware of Any
Age	Less than 30 years	56 (18)	61 (13)	42 (32)	62 (12)	62 (12)	70 (4)
		52.83%	57.55%	39.62%	58.49%	58.49%	66.04%
		(16.98%)	(12.26%)	(30.19%)	(11.32%)	(11.32%)	(3.77%)
	30–45 years	16 (4)	20 (0)	7 (13)	19 (1)	17 (3)	20 (0)
		15.09%	18.87%	6.60%	17.92%	16.04%	18.87%
		(3.77%)	(0.00%)	(12.26%)	(0.94%)	(2.83%)	(0.00%)
	More than 45 years	9 (3)	10 (2)	4 (8)	11 (1)	10 (2)	12 (0)
		8.49%	9.43%	3.77%	10.38%	9.43%	11.32%
		(2.83%)	(1.89%)	(7.55%)	(0.94%)	(1.89%)	(0.00%)
Gender	Female	58 (18)	65 (11)	38 (38)	67 (9)	64 (12)	73 (3)
		54.72%	61.32%	35.85%	63.21%	60.38%	68.87%
		(16.98%)	(10.38%)	(35.85%)	(8.49%)	(11.32%)	(2.83%)
	Male	22 (7)	25 (4)	15 (14)	24 (5)	24 (5)	28 (1)
		20.75%	23.58%	14.15%	22.64%	22.64%	26.42%
		(6.60%)	(3.77%)	(13.21%)	(4.72%)	(4.72%)	(0.94%)

	Prefer Not	1 (0)	1 (0)	0 (1)	1 (0)	1 (0)	1 (0)
		0.94%	0.94%	0.00%	0.94%	0.94%	0.94%
		(0.00%)	(0.00%)	(0.94%)	(0.00%)	(0.00%)	(0.00%)
Year of Graduation	Less than 5 years	33 (11)	37 (7)	24 (20)	39 (5)	36 (8)	42 (2)
		31.13%	34.91%	22.64%	36.79%	33.96%	39.62%
		(10.38%)	(6.60%)	(18.87%)	(4.72%)	(7.55%)	(1.89%)
	5–10 years	14 (6)	19 (1)	10 (10)	17 (3)	18 (2)	19 (1)
		13.21%	17.92%	9.43%	16.04%	16.98%	17.92%
		(5.66%)	(0.94%)	(9.43%)	(2.83%)	(1.89%)	(0.94%)
	11–20 years	13 (3)	16 (0)	8 (8)	14 (2)	13 (3)	16 (0)
		12.26%	15.09%	7.55%	13.21%	12.26%	15.09%
		(2.83%)	(0.00%)	(7.55%)	(1.89%)	(2.83%)	(0.00%)
	More than 20 years	21 (5)	22 (4)	11 (15)	22 (4)	22 (4)	25 (1)
		19.81%	20.75%	10.38%	20.75%	20.75%	23.58%
		(4.72%)	(3.77%)	(14.15%)	(3.77%)	(3.77%)	(0.94%)
Specialty	General Dentist	31 (11)	35 (7)	25 (17)	37 (5)	35 (7)	41 (1)
		29.25%	33.02%	23.58%	34.91%	33.02%	38.68%
		(10.38%)	(6.60%)	(16.04%)	(4.72%)	(6.60%)	(0.94%)
	Periodontist	25 (9)	30 (4)	14 (20)	31 (3)	29 (5)	34 (0)
		23.58%	28.30%	13.21%	29.25%	27.36%	32.08%
		(8.49%)	(3.77%)	(18.87%)	(2.83%)	(4.72%)	(0.00%)
	Other	25 (5)	26 (4)	14 (16)	24 (6)	25 (5)	27 (3)
		23.58%	24.53%	13.21%	22.64%	23.58%	25.47%
		(4.72%)	(3.77%)	(15.09%)	(5.66%)	(4.72%)	(2.83%)
Practice Setting	Hospital/Clinic	27 (5)	28 (4)	15 (17)	27 (5)	28 (4)	30 (2)
		25.47%	26.42%	14.15%	25.47%	26.42%	28.30%
		(4.72%)	(3.77%)	(16.04%)	(4.72%)	(3.77%)	(1.89%)
	Private Practice	20 (6)	22 (4)	14 (12)	21 (5)	21 (5)	26 (0)
		18.87%	20.75%	13.21%	19.81%	19.81%	24.53%
		(5.66%)	(3.77%)	(11.32%)	(4.72%)	(4.72%)	(0.00%)
	Academic Institution	34 (14)	41 (7)	27 (21)	40 (8)	40 (8)	46 (2)
		32.08%	38.68%	25.47%	37.74%	37.74%	43.40%
		(13.21%)	(6.60%)	(19.81%)	(7.55%)	(7.55%)	(1.89%)

Table 4. Association between demographic and preferred ai training methods in periodontics.

Variable	Category	Hands-on Workshops	Live Demonstrations	Online Courses / Webinars	Research Articles	Other
Age	Less than 30 years	19 (55)	26 (48)	42 (32)	68 (6)	51 (23)
		17.92%	24.53%	39.62%	64.15%	48.11%
		(51.89%)	(45.28%)	(30.19%)	(5.66%)	(21.70%)
	30–45 years	5 (15)	13 (7)	9 (11)	19 (1)	15 (5)
		4.72%	12.26%	8.49%	17.92%	14.15%
		(14.15%)	(6.60%)	(10.38%)	(0.94%)	(4.72%)
	More than 45 years	3 (9)	6 (6)	5 (7)	10 (2)	7 (5)
		2.83%	5.66%	4.72%	9.43%	6.60%
		(8.49%)	(5.66%)	(6.60%)	(1.89%)	(4.72%)
Gender	Female	18 (58)	31 (45)	38 (38)	68 (8)	52 (24)
		16.98%	29.25%	35.85%	64.15%	49.06%
		(54.72%)	(42.45%)	(35.85%)	(7.55%)	(22.64%)

	Male	9 (20)	13 (16)	17 (12)	28 (1)	20 (9)
		8.49%	12.26%	16.04%	26.42%	18.87%
		(18.87%)	(15.09%)	(11.32%)	(0.94%)	(8.49%)
	Prefer Not	0 (1)	1 (0)	1 (0)	1 (0)	1 (0)
		0.00%	0.94%	0.94%	0.94%	0.94%
		(0.94%)	(0.00%)	(0.00%)	(0.00%)	(0.00%)
Year of Graduation	Less than 5 years	11 (33)	17 (27)	22 (22)	42 (2)	33 (11)
		10.38%	16.04%	20.75%	39.62%	31.13%
		(31.13%)	(25.47%)	(20.75%)	(1.89%)	(10.38%)
	5–10 years	5 (15)	8 (12)	11 (9)	17 (3)	14 (6)
		4.72%	7.55%	10.38%	16.04%	13.21%
		(14.15%)	(11.32%)	(8.49%)	(2.83%)	(5.66%)
	11–20 years	6 (10)	9 (7)	10 (6)	15 (1)	11 (5)
		5.66%	8.49%	9.43%	14.15%	10.38%
		(9.43%)	(6.60%)	(5.66%)	(0.94%)	(4.72%)
	More than 20 years	5 (21)	11 (15)	13 (13)	23 (3)	15 (11)
		4.72%	10.38%	12.26%	21.70%	14.15%
		(19.81%)	(14.15%)	(12.26%)	(2.83%)	(10.38%)
Specialty	General Dentist	9 (33)	19 (23)	19 (23)	41 (1)	31 (11)
		8.49%	17.92%	17.92%	38.68%	29.25%
		(31.13%)	(21.70%)	(21.70%)	(0.94%)	(10.38%)
	Periodontist	9 (25)	14 (20)	17 (17)	27 (7)	19 (15)
		8.49%	13.21%	16.04%	25.47%	17.92%
		(23.58%)	(18.87%)	(16.04%)	(6.60%)	(14.15%)
	Other	9 (21)	12 (18)	23 (7)	29 (1)	23 (7)
		8.49%	11.32%	21.70%	27.36%	21.70%
		(19.81%)	(16.98%)	(6.60%)	(0.94%)	(6.60%)
Practice Setting	Hospital/Clinic	8 (24)	11 (21)	14 (18)	31 (1)	23 (9)
		7.55%	10.38%	13.21%	29.25%	21.70%
		(22.64%)	(19.81%)	(16.98%)	(0.94%)	(8.49%)
	Private Practice	6 (20)	15 (11)	13 (13)	23 (3)	17 (9)
		5.66%	14.15%	12.26%	21.70%	16.04%
		(18.87%)	(10.38%)	(12.26%)	(2.83%)	(8.49%)
	Academic Institution	13 (35)	19 (29)	29 (19)	43 (5)	33 (15)
		12.26%	17.92%	27.36%	40.57%	31.13%
		(33.02%)	(27.36%)	(17.92%)	(4.72%)	(14.15%)

EVALUATION OF KNOWLEDGE SCORES FOR AI ADOPTION AMONG DENTAL PROFESSIONALS

To ensure a structured and objective analysis of respondents' knowledge and readiness for AI adoption, this study employed a weighting scheme to evaluate the multifaceted aspects of AI adoption. The assessment focuses on four key variables: helpful resources for AI adoption, primary barriers to AI adoption, familiarity with AI software, and preferred AI training methods, each further divided into multiple subcategories. By assigning differential weights to these subcategories, a composite "knowledge score" is generated, providing a quantitative measure of respondents' overall knowledge and preparedness for adopting AI technologies in dentistry. The weighting scheme, detailed in Table 5, was designed to account for the relative significance of various factors influencing AI adoption. Using a 10-point scale, this approach incorporates theoretical frameworks, such as the Diffusion of Innovations Theory [11] and the Technology Acceptance Model [12], to ensure a robust

evaluation of respondents' attitudes and experiences. Each subcategory is assigned a weight based on its assumed impact on AI adoption, and composite scores are calculated by multiplying these weights with binary response indicators (1 for selected, 0 for not selected). The mean knowledge scores derived from this weighting scheme have been analyzed using ANOVA to compare the scores across various categories of demographic and professional variables.

Effect of Age on Overall Knowledge Scores of Dental Professionals

The ANOVA analysis was conducted to examine differences in the mean scores of four knowledge variables: helpful resources for AI adoption, primary barriers to AI adoption, familiarity with AI software, and preferred AI training methods—across three age groups: less than 30 years, 30–45 years, and more than 45 years. The results are presented in Table 6.

Table 5. Weights of factors influencing AI adoption in periodontics.

Variable	Subcategory	Weight
Helpful Resources for AI Adoption	Continuing education/training programs	3
	Government support/incentives	2
	Peer-reviewed studies	3
	Technical support from AI developers	1
	User-friendly AI software	1
Primary Barriers to AI Adoption	High Cost	2
	Lack of AI tool for periodontics	2
	Lack of Training	2
	Limited Evidence	1
	Resistance to Change	2
	Other	1
Familiarity with AI Software	Pearl AI	3
	DentalXrai	2
	Diagnocat	2
	VideaHealth	2
	Other	1
	Not aware of any	0
Preferred AI Training Methods	Hands-on Workshops	3
	Live Demonstrations	2
	Online Courses/Webinars	2
	Research Articles	2
	Other	1

Table 6. Mean scores of overall knowledge variables by age dental professionals.

Knowledge Variable	Age Category	Mean Score	p-Value
Helpful Resources for AI Adoption	Less than 30 years	4.69[a]	0.0165
	30–45 years	3.15[b]	
	More than 45 years	5.25[ab]	
Primary Barriers to AI Adoption	Less than 30 years	3.39	0.323
	30–45 years	2.85	
	More than 45 years	4.25	
Familiarity with AI Software	Less than 30 years	1.59	0.781
	30–45 years	0.9	
	More than 45 years	1.42	
Preferred AI Training Methods	Less than 30 years	5.09	0.633
	30–45 years	4.6	
	More than 45 years	5.42	

PREFERRED AI TRAINING METHODS

The mean scores for preferred AI training methods were 5.09 for respondents aged less than 30 years, 4.60 for those aged 30–45 years, and 5.42 for those aged more than 45 years. The ANOVA results showed no significant differences between the groups ($F = 0.382$, $p = 0.633$), indicating similar preferences for AI training methods across age categories. Pairwise comparisons also revealed no significant differences, suggesting that all age groups equally prefer methods, such as hands-on workshops and live demonstrations. The ANOVA results indicate no statistically significant differences in the overall knowledge scores across age groups for any of the four knowledge variables (Table 7).

Table 7. Mean scores of overall knowledge variables by gender of dental professionals.

Knowledge Variable	Gender	Mean Score	p-Value
Helpful Resources for AI Adoption	Female	4.28	0.752
	Male	5.03	
	Prefer Not	0.00	
Primary Barriers to AI Adoption	Female	3.42	0.445
	Male	3.34	
	Prefer Not	0.00	
Familiarity with AI Software	Female	1.43	0.483
	Male	1.52	
	Prefer Not	0.00	
Preferred AI Training Methods	Female	5.21	0.991
	Male	4.66	
	Prefer Not	0.00	

Table 8. Mean scores of overall knowledge variables by years of graduation of dental professionals.

Knowledge Variable	Years of Graduation	Mean Score	p-Value
Helpful Resources for AI Adoption	Less than 5 years	4.48	0.421
	5–10 years	5.00	
	11–20 years	4.00	
	More than 20 years	4.31	
Primary Barriers to AI Adoption	Less than 5 years	3.20	0.477
	5–10 years	3.55	
	11–20 years	2.75	
	More than 20 years	3.96	
Familiarity with AI Software	Less than 5 years	1.57	0.108
	5–10 years	1.25	
	11–20 years	1.44	
	More than 20 years	1.38	
Preferred AI Training Methods	Less than 5 years	5.02	0.990
	5–10 years	5.10	
	11–20 years	4.19	
	More than 20 years	5.54	

The ANOVA results depicted in Table 8 indicated that no statistically significant differences in the mean scores of all four knowledge variables across the four categories of years of graduation. For helpful resources for AI Adoption, the mean scores ranged from 4.00 (11–20 years) to 5.00 (5–10 years), with no significant differences observed ($p = 0.421$). Similarly, for primary barriers to AI adoption, the mean scores ranged from 2.75 (11–20 years) to 3.96 (more than 20 years), with no significant differences ($p = 0.477$). In terms of familiarity with AI software, the mean scores were uniformly low across all categories, ranging from 1.25 (5–10 years) to 1.57 (less than 5 years), with no significant differences ($p = 0.108$). For preferred AI training methods, the mean scores ranged from 4.19 (11–20 years) to 5.54 (More than 20 years), with no significant differences observed ($p = 0.990$).

INTERPRETATION OF RESULTS

In Table 9, ANOVA findings indicated no statistically significant variations in mean scores of the four knowledge variables – helpful resources for AI adoption, primary barriers, familiarity with AI software, and preferred AI training methods across the three specialist categories for helpful resources for AI adoption, general dentists scored 4.38, periodontists 4.47, and other specialties 4.57 ($p = 0.064$). The mean primary barriers to AI adoption scores were 3.07 (other) to 3.62 (general dentist), with no significant differences ($p = 0.960$). Each specialty had moderate AI software familiarity scores, ranging from 1.29 (periodontist) to 1.52 (general dentist) ($p = 0.258$). General dentists scored 5.10, periodontists 5.47, and other specialties 4.47 for preferred AI training methods ($p = 0.682$). Specialization did not impact AI adoption knowledge or perspectives. Helpful resources for AI adoption and preferred AI training methods had somewhat different mean scores, but not statistically significant. This implies that AI adoption knowledge and perspectives are similar across disciplines. These findings indicate that all dental fields need AI comprehension and preparation.

The ANOVA results in Table 10 indicated that no statistically significant differences in the mean scores of all four knowledge variables across the three practice setting categories. For helpful resources for AI adoption, the mean scores were 4.50 for hospital/clinic, 4.12 for private practice, and 4.63 for academic institution, with no significant differences observed ($p = 0.423$). Similarly, for primary barriers to AI adoption, the mean scores ranged from 2.96 (private practice) to 3.69 (hospital/clinic), with no significant differences ($p = 0.783$). In terms of familiarity with AI software, the mean scores were uniformly low across all practice settings, ranging from 1.22 (hospital/clinic) to 1.58 (academic institution), with no significant differences ($p = 0.541$). For preferred AI training methods, the mean scores were 5.28 for hospital/clinic, 4.96 for private practice, and 4.92 for academic institution, with no significant differences observed ($p = 0.330$).

Table 9. Mean scores of overall knowledge variables by specialty of dental professionals.

Knowledge Variable	Specialty	Mean Score	p-Value
Helpful Resources for AI Adoption	General Dentist	4.38	0.064
	Periodontist	4.47	
	Other	4.57	
Primary Barriers to AI Adoption	General Dentist	3.62	0.960
	Periodontist	3.38	
	Other	3.07	
Familiarity with AI Software	General Dentist	1.52	0.258
	Periodontist	1.29	
	Other	1.50	
Preferred AI Training Methods	General Dentist	5.10	0.682
	Periodontist	5.47	
	Other	4.47	

Table 10. Mean scores of knowledge variables by practice setting of dental professionals.

Knowledge Variable	Practice Setting	Mean Score	p-Value
Helpful Resources for AI Adoption	Hospital/Clinic	4.50	0.423
	Private Practice	4.12	
	Academic Institution	4.63	
Primary Barriers to AI Adoption	Hospital/Clinic	3.69	0.783
	Private Practice	2.96	
	Academic Institution	3.42	
Familiarity with AI Software	Hospital/Clinic	1.22	0.541
	Private Practice	1.46	
	Academic Institution	1.58	
Preferred AI Training Methods	Hospital/Clinic	5.28	0.330
	Private Practice	4.96	
	Academic Institution	4.92	

SUMMARY AND CONCLUSIONS

Assess Indian dentists' knowledge, confidence, and readiness to use AI-based periodontal diagnostics. Statistics show dental AI adoption trends and obstacles. Most responses were young practitioners, with 68.87% under 30, 72.64% female, and 41.51% graduating within five years. Academic (44.34%), hospital or clinic (31.13%), and private practice (24.53%) were the most common affiliations. Demographics show the study's participants are clever and youthful. 66.98% knew and 71.70% utilized AI technology. AI accuracy confidence was 35.85%, 16.04% high, and 43.40% indifferent. Most (51.89%) said AI improves patient outcomes, and 72.64% would train it. These data support AI adoption, although many practitioners mistrust its accuracy and effectiveness.

AI adoption was hindered by cost (61.32%), training (65.09%), and evidence (29.25%). 50% knew nothing about DentalXrai or Pearl AI. Practitioners chose hands-on workshops (74.53%) and live demonstrations (57.55%) for interactive AI training. Online lectures and webinars outperformed research publications. Increased AI use in academia raised awareness and familiarity. Due to limited experience and confidence, private and hospital dentists required special attention. Study: Indian dentists are aware of and interested in AI-based technologies. However, high expense, inexperience, and inadequate proof must be addressed. Practical training, financial help, and awareness campaigns are needed to address these difficulties. AI in dentistry education and developer collaboration to produce economical, user-friendly solutions may improve periodontal diagnostics, patient care, and dental practice.

REFERENCES

1. Rana A, Yauney G, Wong LC, Gupta O, Muftu A, Shah P. Automated detection of periodontal bone loss using deep learning and electronic health records. J Clin Periodontol. 2023;50(3):358–367.
2. Parihar AS, Narang S, Tyagi S, Narang A, Dwivedi S, Katoch V, et al. Artificial intelligence in periodontics: A comprehensive review. J Pharm Bioallied Sci. 2024;16(Suppl 3):S1956–S1958. doi: 10.4103/jpbs.jpbs_129_24.
3. Gundelly M, Pusuluri SV, Koduganti RR, Ambati M, Chiluveru S, Chandaka M. Precision medicine in periodontics: A literature review. Cureus. 2024;16(9):e68952. doi: 10.7759/cureus.68952.
4. Chang HJ, Lee SJ, Yong TH, Shin NY, Jang BG, Kim JE, et al. Deep learning hybrid method to automatically diagnose periodontal bone loss and stage periodontitis. Sci Rep. 2020;10(1):7531. doi: 10.1038/s41598-020-64509-z.
5. Figueroa L, Cheng L, Yang J, Yin B, Fan X, Yang J. Diagnostic performance of artificial intelligence in detecting oral lesions. Oral Dis. 2022;28(4):1123–1130.
6. Ilhan B, Ramezani M, Cheng L, Yang J. Artificial intelligence in early diagnosis and prevention of oral cancer. Oral Oncol. 2022;28(4):1123–1130.
7. Krois J, Ekert T, Meinhold L, Gollmer B, Brömme T, Wenzel F, et al. Advanced AI-assisted panoramic radiograph analysis for periodontal diagnostics: A systematic review and meta-analysis. BMC Oral Health. 2023;23:1017.
8. Lee JH, Kim DH, Jeong SN, Choi SH. Detection and diagnosis of dental caries using a deep learning-based convolutional neural network algorithm. J Dent. 2018;77:106–111. doi: 10.1016/j.jdent.2018.07.015.
9. Schwendicke F, Samek W, Krois J. Artificial intelligence in dentistry: Chances and challenges. J Dent Res. 2020;99(7):769–774. doi: 10.1177/0022034520915714.
10. Tuan TM, Nham LT, Phan TT, Son LH. A deep learning approach for early detection of periodontal disease using optical imaging. IEEE Access. 2022;10:3943–3953. doi: 10.1109/ACCESS.2022.3140123.
11. Moseley SF. Everett Rogers' diffusion of innovations theory: Its utility and value in public health. J Health Commun. 2004;9 Suppl 1:149–151. doi: 10.1080/10810730490271601.
12. Holden RJ, Karsh BT. The technology acceptance model: Its past and its future in health care. J Biomed Inform. 2010;43(1):159–172. doi: 10.1016/j.jbi.2009.07.002.

