EVALUATING KNOWLEDGE, ATTITUDES, AND PERCEPTIONS OF ARTIFICIAL INTELLIGENCE (AI) AMONG PERIODONTISTS IN SAUDI ARABIA

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ABSTRACT

Aim of the study This study assessed the awareness, self-reported understanding, knowledge of potential applications, attitudes, perceptions, and self-reported use of AI among periodontists in Saudi Arabia. **Materials and methods** A descriptive cross-sectional survey was conducted in January 2025. A structured, self-administered online questionnaire—previously validated for content validity (Aiken's V = 0.85), internal consistency (Cronbach's alpha = 0.88), and test–retest reliability (kappa = 0.96)—was distributed by email over one month, with reminders, using a non-probability, email-based recruitment approach. A total of 164 licensed periodontists completed the survey. Questionnaire items covering demographic, knowledge, attitude, and perception domains were analysed individually and summarized descriptively as frequencies and percentages; no composite scores were calculated and no inferential statistical analyses were performed. **Results** Most respondents (134/164; 81.7%) reported being aware of AI, although fewer reported full awareness of its working principles. Most agreed that AI could be applied to the clinical diagnosis of periodontal bone loss, the assessment of prognosis of periodontally compromised teeth, and the prediction of treatment outcomes and clinical attachment levels. Support for incorporating AI into postgraduate periodontal training was strong. In contrast, self-reported use of AI was limited: 35 respondents (21.3%) had used AI for research purposes, 26 (15.9%) had used AI in diagnosing periodontal conditions, and only 21 (12.8%) considered their practices adequately equipped for AI application. Responses to the perception items generally reflected favourable views of AI's potential usefulness—including cost-efficiency, improvement of the patient experience, and application during pandemic conditions—alongside common concern regarding privacy and data security; most respondents did not view AI as a future replacement for periodontists. **Conclusions** Periodontists surveyed in Saudi Arabia reported broad awareness of AI and generally favourable attitudes toward its integration into education and practice, whereas self-reported practical use and perceived practice readiness remained limited. These descriptive findings indicate a gap between interest and implementation. Strengthening AI-related education, infrastructure, and institutional support may represent reasonable areas for future development, although the present study cannot establish these factors as causal determinants of adoption. Future research using representative sampling and inferential analyses is needed to identify factors associated with AI adoption among periodontists.

Key words: : Artificial Intelligence, Knowledge, Attitude, Periodontist, Perception, Diagnostic tools

INTRODUCTION

The term 'artificial intelligence' (AI) was introduced in the 1950s to describe computer systems designed to perform tasks that ordinarily require human intelligence 1,6. Contemporary AI encompasses a family of related approaches, including machine learning (ML), deep learning (DL), artificial neural networks (ANNs), and convolutional neural networks (CNNs)1, which use large datasets to perform cognitive tasks 2. ML aims to derive predictive models from data and observation rather than explicit manual programming, and ML models have been applied to the interpretation of medical images 3. DL organizes many layers of artificial neurons into networks-most notably CNNs—that are well suited to processing large and complex images, because successive filter layers can extract numerous

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discriminative features 4,12. Because DL algorithms can learn such features directly from labeled examples, with less reliance on handcrafted input from domain experts, they have become increasingly prominent in biomedical image processing 1,5.

Periodontitis, the sixth most prevalent disease worldwide 7, illustrates the diagnostic challenges that have motivated interest in AI-based clinical support. Current best practice combines periodontal probing to assess the soft tissues 8 with radiographic imaging to evaluate the hard tissues 9. Both approaches, however, show appreciable inter-operator variability: probing measurements are affected by inconsistencies in pressure and angulation 6, and the interpretation of dental radiographs—including bitewing, periapical, and panoramic views—varies considerably between raters 13. Because host-mediated, microbially driven inflammation degrades the alveolar bone and periodontal attachment and may ultimately result in tooth loss 10, reliable detection and staging of periodontal disease are clinically important.

Against this background, AI methods have been investigated—largely in research settings—as adjuncts to periodontal assessment. ANNs have been used to identify and categorize periodontitis according to patients' radiographic bone-loss patterns, and ANN-based evaluation of periodontal disease severity has achieved a reported accuracy of 84.2%1. Yauney et al. described an automated machine-learning pipeline that segmented oral disease and correlated adverse periodontal conditions with systemic health 11. CNN-based image analysis has likewise been proposed as a means of reducing the interpretive variability observed in the radiographic detection of dental caries and periodontal bone loss 13, and research suggests that such tools may eventually assist clinicians—particularly less experienced practitioners—in analyzing radiographic and tomographic images and in detecting plaque, gingivitis, and different implant systems. More broadly, DL networks are being evaluated in medicine for computer-aided diagnosis, individualized treatment planning, genomic analysis, and assessment of treatment response, drawing on data sources such as electronic health records, imaging, wearable-device sensors, and DNA sequencing 12. It should be emphasized, however, that most of these applications remain investigational and are not yet validated components of routine periodontal care.

Despite this expanding evidence base, the uptake of AI in periodontal practice appears limited. Factors discussed in the literature include clinicians' incomplete familiarity with the fundamental principles of AI, uncertainty regarding its appropriate scope of application, and public hesitancy toward AI-supported procedures such as robot-assisted surgery. Successful clinical translation of AI will therefore depend not only on the technical performance of the underlying models but also on the readiness of the clinicians who are expected to use them. Although several studies and reviews have examined AI applications in periodontics, and surveys in general dentistry have assessed practitioners' knowledge of and attitudes toward AI, specialty-specific evidence remains limited, and to our knowledge no previous study has characterized the awareness, attitudes, and perceptions of AI among periodontists practicing in Saudi Arabia. Such information is needed to guide postgraduate education, professional development, and implementation planning within the specialty. Accordingly, this cross-sectional survey assessed periodontists' awareness of

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AI, their self-reported understanding of its working principles, their knowledge of its potential periodontal applications, their attitudes toward its integration into training and practice, their self-reported use of AI tools, and their perceptions of its capabilities, benefits, and risks.

MATHERIALS AND METHODS

Study design and setting:

This descriptive cross-sectional survey of periodontists practicing in Saudi Arabia was conducted in January 2025 to evaluate their awareness, knowledge, attitudes, and perceptions regarding the application of AI in periodontology. The study was approved by the Biomedical Research Ethics Committee at Umm Al-Qura University (HAPO-02-K-012-2024-10-2253), and all procedures were conducted in accordance with the Declaration of Helsinki. Participation was voluntary, and all respondents provided written informed consent before completing the questionnaire. Data confidentiality and anonymity were maintained throughout the study in accordance with ethical research guidelines.

Participants and sample size:

Eligible participants were licensed periodontists practicing in Saudi Arabia, including clinicians working in private and governmental settings and academic faculty. An estimated 700 periodontists practice in Saudi Arabia 14. Individuals who were not licensed, or who practiced outside Saudi Arabia, were excluded. An a priori power analysis indicated a minimum required sample of 120 participants; a total of 164 respondents completed the survey, exceeding this minimum.

Recruitment:

Participants were recruited through email distribution of the online questionnaire over a one-month period, during which periodic reminder emails were sent to encourage participation, and participation was voluntary. The study records describe the recruitment as a non-probability approach; they do not document random selection procedures that would support classification of the sampling as simple random sampling, and the recruitment is therefore reported conservatively as non-probability, email-based sampling. The potential implications of this recruitment approach—including possible self-selection among respondents—for selection bias and generalizability are considered in the study limitations.

Survey instrument:

Data were collected using a structured, self-administered online questionnaire developed from previously published studies 15; no modifications were made to the original questionnaire. The instrument comprised four sections—demographic characteristics, knowledge, attitudes, and perceptions—combining dichotomous (yes/no), multiple-choice, five-point Likert-scale (ranging from “strongly agree” to “strongly disagree”), and open-ended items. The content and structure of the questionnaire are summarized in Table 1.

Demographic data available for analysis included age group, gender, nationality, academic rank, work category, and geographical region of practice. The knowledge section assessed participants’ awareness of the concept of AI and of its working principles, along with their level of agreement regarding its potential applications in diagnosing periodontal bone loss, assessing the prognosis of periodontally compromised teeth, predicting treatment outcomes, and predicting clinical attachment levels. The attitude section examined respondents’ views on integrating AI into postgraduate education and on the use of AI-based software for radiographic analysis in clinical practice, together with their personal

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Table 1. Content and structure of the questionnaire on artificial intelligence (AI) in periodontology. The questionnaire items and response categories are provided in Supplementary File S1. Gender was recorded in the study dataset and is reported in Table 2; the exact wording of the gender item was not preserved in the questionnaire documentation available for this revision. AI: artificial intelligence; PCT: periodontally compromised teeth.

Section	Question	Response type	Response options
Demographics	Age	Multiple choice	25–30; 31–40; 41–50; 51–60; 61–70
	Nationality	Multiple choice	Saudi; Non-Saudi
	Academic rank	Multiple choice	Professor; Associate Professor; Assistant Professor; Lecturer; Not academic
	Work category	Multiple choice	Private practice; Governmental hospital/university; Both
	Working region	Multiple choice	West; East; North; South; Central
Knowledge	Are you aware of Artificial Intelligence (AI)?	Dichotomous	Yes; No
	If yes, what is your source of information about AI?	Open-ended	Free text
	Are you aware of the working principle of AI?	Multiple choice	Yes; No; To some extent
	AI can be used in clinical diagnosis of periodontal bone loss	Likert scale	Strongly agree / Agree / Neutral / Disagree / Strongly disagree
	AI can assess the prognosis of periodontally compromised teeth (PCT)	Likert scale	Strongly agree / Agree / Neutral / Disagree / Strongly disagree
	AI can predict the prognosis of treatment provided in periodontal problems	Likert scale	Strongly agree / Agree / Neutral / Disagree / Strongly disagree
	AI can predict the clinical attachment levels around teeth	Likert scale	Strongly agree / Agree / Neutral / Disagree / Strongly disagree
Attitude	AI should be an integral part of postgraduate training in periodontology	Likert scale	Strongly agree / Agree / Neutral / Disagree / Strongly disagree

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Section	Question	Response type	Response options
	AI-based software should be used for radiographic analysis of periodontal diseases	Likert scale	Strongly agree / Agree / Neutral / Disagree / Strongly disagree
	Have you used AI for research purposes in periodontics?	Dichotomous	Yes; No
	If yes, what software or application have you used?	Open-ended	Free text
	Have you used AI in diagnosing periodontal problems?	Dichotomous	Yes; No
	If yes, what software or application have you used?	Open-ended	Free text
	Is your practice adequately equipped for the application of AI?	Multiple choice	Yes; No; Not sure
	If yes, what software or application do you have?	Open-ended	Free text
	What measures should be taken to prepare your profession for AI application?	Open-ended	Free text
Perception	AI has better diagnostic ability than periodontists	Likert scale	Strongly agree / Agree / Neutral / Disagree / Strongly disagree
	AI has better prediction of disease progression	Likert scale	Strongly agree / Agree / Neutral / Disagree / Strongly disagree
	AI is more cost-efficient	Likert scale	Strongly agree / Agree / Neutral / Disagree / Strongly disagree
	AI will help improve patient experience	Likert scale	Strongly agree / Agree / Neutral / Disagree / Strongly disagree
	AI poses privacy and data security concerns	Likert scale	Strongly agree / Agree / Neutral / Disagree / Strongly disagree
	AI can be a beneficial tool during pandemics such as COVID-19	Likert scale	Strongly agree / Agree / Neutral / Disagree / Strongly disagree
	AI can replace periodontists in the future	Likert scale	Strongly agree / Agree / Neutral / Disagree / Strongly disagree

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experience of using AI tools in research and diagnosis and the perceived adequacy of their practice infrastructure for AI application. The perception section explored participants' beliefs regarding AI's comparative diagnostic ability, prediction of disease progression, cost-efficiency, effect on patient experience, privacy and data-security implications, potential utility during pandemics, and the possibility of AI replacing periodontists in the future. An open-ended item at the end of the survey invited additional comments or suggestions.

Content validity was confirmed by a panel of six experts, yielding an Aiken's V of 0.85. Reliability was established through a pilot test with 40 participants, which produced a Cronbach's alpha of 0.88, and test–retest reliability showed high agreement, with a kappa coefficient of 0.96.

Operational definitions:

In this manuscript, the constructs measured by the questionnaire are used as follows: "awareness" refers to self-reported familiarity with the term artificial intelligence (dichotomous item); "understanding" refers to self-reported awareness of AI's working principles (yes / no / to some extent); "knowledge of potential applications" refers to respondents' level of agreement with statements describing possible periodontal applications of AI; "attitudes" refer to respondents' views on incorporating AI into postgraduate training and clinical practice, together with their self-reported use of AI tools; and "perceptions" refer to respondents' beliefs regarding AI's comparative capabilities, benefits, risks, and future role. Because all responses were self-reported, none of these constructs represents objectively tested knowledge or verified behaviour.

Data analysis:

All questionnaire items were analysed individually using their respective response categories; no composite knowledge, attitude, or perception scores were generated, and no numerical scoring system was applied to the Likert-scale responses. Categorical variables were summarized as frequencies and percentages, and the results were presented in tabular and graphical formats to illustrate response distributions. The analysis was exclusively descriptive: no inferential statistical tests, subgroup comparisons, confidence intervals, or p-values were computed. Accordingly, all findings reported in this study should be interpreted as descriptive of the sample surveyed rather than as evidence of differences between subgroups.

RESULTS

Participant characteristics:

In total, 164 periodontists completed the survey (Table 2). Slightly more than half of the respondents were male (97; 59.1%), and 67 (40.9%) were female. The largest age group was 31–40 years (66; 40.2%), followed by 41–50 years (45; 27.4%), 51–60 years (28; 17.1%), 25–30 years (22; 13.4%), and 61–70 years (3; 1.8%); overall, respondents' ages ranged from 25 to 70 years. Eighty-seven respondents (53.0%) were non-Saudi and 77 (47.0%) were Saudi nationals. Most respondents held no academic appointment (101; 61.6%); among the 63 (38.4%) academically affiliated respondents, 30 (18.3%) were assistant professors, 13 (7.9%) were lecturers, 11 (6.7%) were associate professors, and 9 (5.5%) were professors. Regarding work setting, 79 respondents (48.2%) worked in governmental hospitals or universities, 59 (36.0%) in private practice, and 26 (15.9%) in both. Geographically, respondents were concentrated in the western (62; 37.8%) and central (60; 36.6%) regions, followed by the eastern (19; 11.6%), southern (12; 7.3%), and northern (11; 6.7%) regions.

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Table 2. Demographic and professional characteristics of participating periodontists (N = 164). Values are numbers (percentages).

Variable	Category	n (%)
Gender	Male	97 (59.1)
	Female	67 (40.9)
Age (years)	25–30	22 (13.4)
	31–40	66 (40.2)
	41–50	45 (27.4)
	51–60	28 (17.1)
	61–70	3 (1.8)
Nationality	Non-Saudi	87 (53.0)
	Saudi	77 (47.0)
Academic rank	Not academic	101 (61.6)
	Academic	63 (38.4)
	Professor	9 (5.5)
	Associate professor	11 (6.7)
	Assistant professor	30 (18.3)
	Lecturer	13 (7.9)
Work-place	Private practice	59 (36.0)
	Government (hospital/university)	79 (48.2)
	Private and government	26 (15.9)
Work region	West	62 (37.8)
	East	19 (11.6)
	North	11 (6.7)
	South	12 (7.3)
	Central	60 (36.6)

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Awareness and self-reported understanding of AI:

Of the 164 respondents, 134 (81.7%) reported being aware of the term "artificial intelligence," whereas 30 (18.3%) were not (Fig. 1). With respect to the working principles of AI, most respondents reported at least some awareness of its operational principles, although only a minority reported full awareness and the remainder reported no familiarity with these principles (Fig. 2).

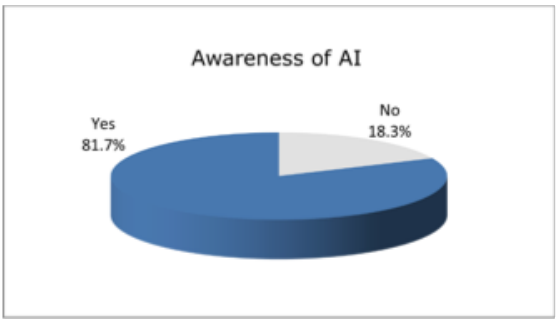


Figure 1. Awareness of artificial intelligence (AI) among surveyed periodontists (N = 164). Proportions of respondents answering "Yes" or "No" to the question "Are you aware of Artificial Intelligence (AI)?" Most respondents (134; 81.7%) reported being aware of AI, whereas 30 (18.3%) did not. AI: artificial intelligence.

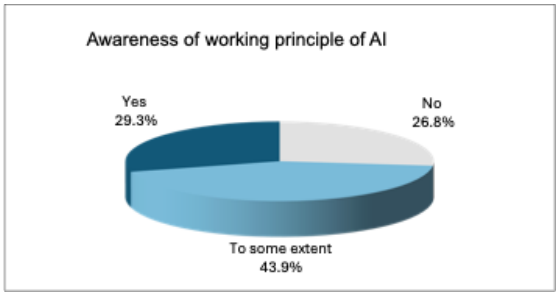


Figure 2. Participants' self-reported understanding of the operational principles of artificial intelligence (N = 164). Distribution of responses ("Yes," "No," "To some extent") to the question "Are you aware of the working principle of AI?" AI: artificial intelligence.

Knowledge of potential periodontal applications:

Respondents expressed varying levels of agreement regarding the potential clinical applications of AI. Most respondents agreed that AI can be used in the clinical diagnosis of periodontal bone loss and to assess the prognosis of periodontally compromised teeth, and most likewise agreed that AI can predict treatment outcomes for periodontal conditions and clinical attachment levels around the teeth (Fig. 3).

Attitudes toward AI in training and clinical practice:

Most respondents agreed that AI should be an integral component of postgraduate training in periodontology and that AI-based software should be employed in clinical practice to enhance the radiographic analysis of periodontal diseases (Fig. 4).

Self-reported use of AI and practice readiness

In contrast with these favourable attitudes, self-reported use of AI was limited. Thirty-five respondents (21.3%) reported having used AI for research purposes in periodontics, and 26 (15.9%) reported having used AI in diagnosing periodontal conditions. When asked whether their practice was adequately equipped for the application of AI, only 21 respondents (12.8%) answered affirmatively (Fig. 5).

Perceptions of AI in periodontics:

Responses to the perception items generally reflected favourable views of AI's potential usefulness. Approximately one-third of respondents agreed that AI possesses better diagnostic ability than periodontists and that it provides better prediction of disease progression. Most respondents agreed that AI is more cost-efficient and could improve the patient experience, although agreement that AI poses privacy and data-security concerns was also common.Most respondents agreed that AI could serve as a beneficial tool for periodontal management during pandemics such as COVID-19, but most disagree that AI could replace periodontists.

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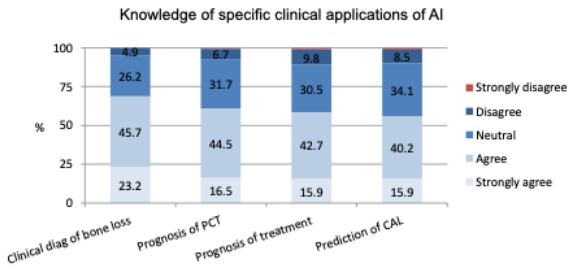


Figure 3. Respondents' agreement with potential applications of artificial intelligence in key periodontal functions (N = 164). Distributions of five-point Likert-scale responses (strongly agree to strongly disagree) to four statements: AI can be used in the clinical diagnosis of periodontal bone loss; AI can assess the prognosis of periodontally compromised teeth (PCT); AI can predict the prognosis of treatment provided in periodontal problems; and AI can predict the clinical attachment levels (CAL) around teeth. AI: artificial intelligence; PCT: periodontally compromised teeth; CAL: clinical attachment level.

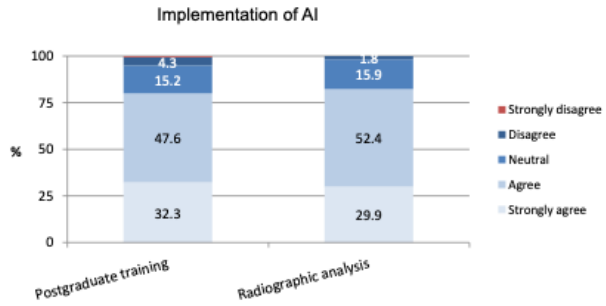


Figure 4. Attitudes toward the implementation of artificial intelligence in postgraduate training and radiographic analysis (N = 164). Distributions of five-point Likert-scale responses to two statements: AI should be an integral part of postgraduate training in periodontology; and AI-based software should be used for the radiographic analysis of periodontal diseases. AI: artificial intelligence.

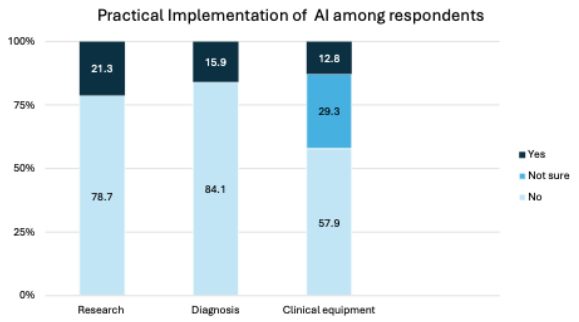


Figure 5. Self-reported utilization of artificial intelligence and practice infrastructure readiness in periodontics (N = 164). Proportions of respondents reporting having used AI for research purposes in periodontics (35; 21.3%), having used AI in diagnosing periodontal problems (26; 15.9%), and considering their practice adequately equipped for the application of AI (21; 12.8%). AI: artificial intelligence.

Discussion

This cross-sectional survey characterized the awareness, self-reported understanding, knowledge of potential applications, attitudes, perceptions, and self-reported use of AI among 164 periodontists practicing in Saudi Arabia. The central descriptive pattern was consistent: awareness of AI was broad (134/164; 81.7%) and attitudes toward its integration into postgraduate education and radiographic analysis were largely favourable, yet self-reported understanding of AI's working principles was incomplete, comparatively few respondents had used AI in research (21.3%) or diagnosis (15.9%), and only 12.8% considered their practices adequately equipped for AI application. Perceptions of AI's capabilities were broadly positive—particularly regarding cost-efficiency, patient experience, and utility during pandemics—although concerns about privacy and data security were common, and most respondents did not expect AI to replace periodontists. Because the study was descriptive, these observations characterize the sample surveyed; they do not establish differences between subgroups, nor do they identify the causes of the patterns observed.

The high proportion of respondents aware of AI is consistent with surveys of dental professionals in other settings 16-18. Awareness, however, should not be conflated with understanding. Although most respondents recognized the term, fewer reported full awareness of how AI actually works, and some reported no familiarity with its principles at all. Comparable gaps between familiarity and deeper understanding have been described previously, with the level of understanding varying by region 19, and Hamd et al. highlighted inconsistencies in knowledge levels across different populations 20. Demographic and professional variation in AI-related

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knowledge and awareness has also been reported in other samples: Chawla et al. observed differences in awareness across demographic groups among periodontal professionals in India 15, and Zope et al. reported differences between dental students and teaching faculty 21. Because the present study summarized each questionnaire item descriptively and performed no subgroup comparisons, it cannot address whether such variation exists among periodontists in Saudi Arabia; this question would require adequately powered analytical studies. What the present data do indicate is an awareness–understanding gap at the level of the whole sample, which suggests that targeted educational initiatives to improve technical literacy within the specialty may be useful.

Most respondents agreed that AI could be applied to the clinical diagnosis of periodontal bone loss, the assessment of prognosis of periodontally compromised teeth, and the prediction of treatment outcomes and clinical attachment levels. These favourable views are broadly aligned with the direction of current research: systematic reviews have summarized AI models developed for diagnosing gingivitis and periodontal disease 22, deep-learning CNN algorithms have been used to diagnose and predict periodontally compromised teeth in research settings 23, and applications of AI across dentistry continue to expand 24. Reported gains in the accuracy of AI-assisted radiographic analysis 25 further suggest potential for supporting the detection of periodontal defects. It must be emphasized, however, that the present survey measured respondents' views about these applications, not the diagnostic performance of AI systems themselves; favourable perception is not evidence of clinical validity, and many of the cited applications remain investigational rather than clinically established.

Support for incorporating AI into postgraduate periodontal training was strong, echoing findings in other dental populations 20. Taken together with the observed awareness–understanding gap, these attitudes suggest that structured AI education—covering fundamental principles, capabilities, limitations, and ethical considerations—would be well received within the specialty. The framing of this implication matters: the survey demonstrates receptiveness to education, not that education will by itself increase adoption. Evaluating whether training changes subsequent AI use would require longitudinal or interventional study designs.

The contrast between favourable attitudes and limited self-reported use was the most striking descriptive finding of this survey. Only 35 respondents (21.3%) had used AI for research and 26 (15.9%) for diagnosis, and only 21 (12.8%) considered their practices adequately equipped—a pattern of limited implementation that has also been described in other dental specialties 26. The low proportion of adequately equipped practices suggests that infrastructure readiness may be one relevant factor. Beyond this, the present study cannot determine why adoption is limited. Potential explanations such as insufficient training, limited access to AI technologies, and lack of institutional support are plausible and are discussed in the literature, but they were not directly measured or quantified in this survey, and the cross-sectional design cannot establish causal determinants of adoption. Although the questionnaire included open-ended items inviting suggestions on preparing the profession for AI application, these free-text responses were not quantitatively analysed. Future studies should investigate the barriers to, and facilitators of, AI adoption systematically.

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External evidence continues to accumulate that AI may add value in periodontal research and, eventually, in care. Recent work has applied advanced AI to the detection of patterns of periodontal bone loss on cone-beam computed tomography 27, examined AI-assisted counselling in relation to treatment outcomes and quality of life in patients with periodontitis 28, and evaluated AI-based models for diagnosing periodontal radiographic bone loss 29. Machine-learning approaches have also been proposed for stratifying patient risk profiles as a step toward more personalized, evidence-based periodontal care 29. This literature indicates the direction of the field, but it is distinct from what the present study measured: whether and how such tools are adopted by periodontists in Saudi Arabia will depend on local training, infrastructure, regulation, and clinician confidence.

Several implications follow from these findings, provided they are read as recommendations informed by descriptive data rather than as conclusions demonstrated by them. First, the receptiveness of respondents to postgraduate AI education supports the development of structured curricula and continuing-education offerings in periodontology. Second, the small proportion of adequately equipped practices points to infrastructure and institutional support as areas warranting attention if AI integration is to be pursued. Third, respondents' privacy and data-security concerns highlight the need for clear governance and data-protection frameworks to accompany any clinical deployment of AI. Establishing which of these factors actually influence adoption—and to what extent—requires analytical and longitudinal research.

Strengths and limitations

This study has several strengths, including its focus on a single specialty for which limited evidence exists, the use of a previously published instrument with documented content validity (Aiken's V = 0.85), internal consistency (Cronbach's alpha = 0.88), and test–retest reliability (kappa = 0.96), and a completed sample (164) that exceeded the calculated minimum sample size (120). Several limitations must nevertheless be acknowledged. First, the cross-sectional design captures information at a single point in time and cannot establish causal relationships, including whether training, infrastructure, or institutional support determine AI adoption. Second, all data were self-reported; responses may be affected by recall and social-desirability bias, and respondents' actual knowledge of, or use of, AI could not be independently verified. Third, recruitment was non-probability and email-based, and participation was voluntary; self-selection among respondents is therefore possible and may have attracted individuals with a greater interest in digital technologies, which could overestimate awareness of, and favourable attitudes toward, AI. Fourth, because the number of invitations successfully delivered is not known, a response rate could not be calculated, and non-response bias cannot be excluded. Fifth, respondents were concentrated in the western and central regions, and the distribution across practice settings and academic ranks was uneven; together with the modest sample of 164 relative to the estimated 700 periodontists in the country14, these features limit the generalizability of the findings to all periodontists in Saudi Arabia and to other settings. Finally, the analysis was exclusively descriptive, so no conclusions can be drawn about differences between subgroups (for example, by gender or academic affiliation)

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or about factors associated with AI use.

CONCLUSIONS

Within the limits of this descriptive cross-sectional survey, periodontists in Saudi Arabia reported broad awareness of AI and generally favourable attitudes toward its integration into postgraduate education and periodontal practice, alongside incomplete self-reported understanding of its working principles, limited self-reported use in research and diagnosis, and low perceived practice readiness. These findings characterize a specialty that appears receptive to AI but is at an early stage of practical engagement. Strengthening AI-related education, clinical infrastructure, and institutional support may be reasonable areas for future development, although the present data cannot establish that these factors determine adoption. Future research should employ representative sampling and inferential analyses to identify the factors associated with AI adoption among periodontists and to monitor how awareness, attitudes, and use evolve as these technologies mature.

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An artificial intelligence–assisted language tool was used during manuscript revision to support language editing, organization, and clarity. The study design, data collection, statistical analysis, interpretation of findings, scientific content, and final editorial decisions remained the responsibility of the author, who reviewed and approved all revisions.

Credit Contribution

The study's conceptualization and design, data collection, analysis and interpretation of the findings, and article preparation are all solely the corresponding author's responsibility.

Ethical Statement

Ethical approval for this study was obtained from the Biomedical Research Ethics Committee at Umm Al-Qura University (HAPO-02-K-012-2024-10-2253), and all procedures were conducted in accordance with the Helsinki Declaration.

Conflict of Interest

No conflicts of interest to disclose.

Supplemental Information

Supplementary File S1. Questionnaire used to evaluate knowledge, attitudes, and perceptions of artificial intelligence among periodontists in Saudi Arabia (questionnaire items and response categories available in the retained study documentation).

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