Awareness and Knowledge of Artificial Intelligence in Pediatric Dentistry: A Cross Sectional Survey among Indian Pediatric Dentists

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ABSTRACT

Context: Artificial Intelligence (AI) is revolutionizing dental care, including pediatric dentistry, through advancements in diagnosis, treatment planning, and patient management. Despite its potential, successful AI implementation depends on dental professionals' awareness, knowledge, and acceptance.

Aims: To evaluate the awareness, knowledge, and perception of AI in pediatric dentistry among Indian pediatric dentists.

Settings and Design: A descriptive cross-sectional study has been conducted among members of the India Society of Pediatric & Preventive Dentist. (ISPPD)

Methods and Material: The study was conducted from March to July 2025. The sample size was calculated as 210 pediatric dentists. The questionnaire captures demographic data, awareness and familiarity with AI, knowledge of AI applications in pediatric dentistry, perceived benefits and limitations, and willingness to integrate AI into practice. The questionnaire was distributed online as google form links.

Statistical analysis used: Data has been analysed using SPSS version 23, employing descriptive statistics to determine associations

Results: A majority saw value in AI for decision-making, though many felt it should complement—not replace—clinical judgment. Awareness of AI tools varied, with 48.4% recognizing multiple tools, and 19.8% aware of AI-assisted caries detection software. Nearly half (47.4%) believed AI could significantly aid in early caries detection, though cost (51%) and lack of training (41.1%) were key barriers to adoption.

Conclusions: AI is an emerging tool in pediatric dentistry with significant potential. Awareness, knowledge, and willingness to adopt AI among practitioners are vital for its effective implementation.

Keywords: Artificial Intelligence Pediatric Dentists Diagnosis & Treatment planning

INTRODUCTION

In dentistry, the integration of automated solutions with Artificial Intelligence (AI) is transforming patient care by enhancing efficiency, accuracy, and decision-making. AI leverages advanced algorithms, including machine learning, deep learning, and neural networks, to rapidly analyse vast amounts of data. By streamlining diagnostics, treatment planning, and patient management, AI-driven solutions are reshaping the healthcare industry, leading to improved patient outcomes and more personalized dental care[1].

AI-based diagnostic tools can help detect dental anomalies, assess caries risk, and aid in early orthodontic management plan. AI operating undertakings including behaviour analysis and virtual assistants are assisting dentists with managing the dental anxiety of children and making treatments more effective and patient friendly[2,3].

Despite these developments, the successful adoption of AI in pediatric dentistry relies heavily on the understanding, knowledge, and acceptance of the dental professionals[4]. The occurrence of AI

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discussions has been widespread in medical and dental research but, there is a wide research gap regarding AI application and treatment planning. Studies based on AI have rarely been conducted on the level of understanding and readiness of pediatric dentists in adopting AI-based technologies in clinical practice[5]. Hence this study was conducted to understand the current awareness, perceptions, knowledge and willingness to adapt to AI among pediatric dentists practising in India. The relevance of this study is that it will be crucial for strategizing future educational and clinical applications in the field of pediatric dentistry and thus will have a vital role in patient management and treatment planning.

Subjects and Methods:

A descriptive cross-sectional study with convenience sampling has been conducted among members of the ISPPD. A structured, pre-validated questionnaire has been distributed via online platforms (Google Forms). The questionnaire contained 14 questions that highlight the significance, relevance and usage of AI in paediatric dental practise. The study was conducted from March to July 2025. Ethical committee approval has been obtained on 24/04/2025 and the protocol number is YEC2/2025/103. Using the ISPPD directory, it was found that 2,940 registered paediatric dentist are there in India. The sample size is calculated as 210. The questionnaires were validated by 2 lecturers from the department of public health dentistry and department of preventive and paediatric dentistry, Yenepoya dental college.

Inclusion Criteria:

- Paediatric dentists actively practicing or teaching in India.

Exclusion Criteria:

- General dentists or other specialists.

- Dentists practicing outside India

RESULTS

The results of the survey indicated that over half of the participants (53.6%) were in private practice (Table 1), and the majority (58.3%) had less than 5 years of experience (Table 2). Only 39.6% had attended AI-related training (Table 3), though 20.8% expressed interest in future programs. While 21.9% were very familiar with AI applications, most respondents had only limited familiarity (Table 4).

Awareness of AI tools varied, with 48.4% recognizing multiple tools, and 19.8% aware of AI-assisted caries detection software (Table 5). Nearly half (47.4%) believed AI could significantly aid in early caries detection (Table 6), though cost (51%) and lack of training (41.1%) were key barriers to adoption (Table 7). Concerns included data security, software integration, and trust issues, especially with parents.

Despite these challenges, the overall perception of AI was positive. A majority (58.9%) saw value in AI for decision-making, though many felt it should complement—not replace—clinical judgment (Table 8).

Table 1 Frequency and Percentage of Primary area of practice of participants

What is your primary area of practice?		
	Frequency	**Percentage**
Private Practice	103	53.6
Academic / Teaching	63	32.8
Government Hospital / Dental Clinic	26	13.5

Table 2 Frequency and percentage of Years of experience in pediatric dentistry of the participants.

How many years of experience do you have in pediatric dentistry?		
	Frequency	**Percentage**
Less than 5 years	112	58.3
5 - 10 years	36	18.8
10 - 15 years	21	10.9
More than 15 years	23	12.0

Table 3 Frequency of participants who have attended courses on Artificial Intelligence.

Have you attended any training, workshop, or webinar on Artificial Intelligence (AI) in dentistry?		
	Frequency	**Percentage**
Yes	76	39.6
No	76	39.6
Interested in Attending	40	20.8

Table 4 Frequency and Percentage of participants who are familiar with AI application in dentistry

How familiar are you with AI applications in pediatric dentistry?		
	Frequency	**Percentage**
Very Familiar	42	21.9
Somewhat Familiar	85	44.3
Heard about it but not sure	55	28.6
Not familiar at all	10	5.2

Table 5 Frequency and Percentage of participants who have used / heard about AI Based tools.

Which of the following AI-based tools have you heard of or used in pediatric dentistry?		
	Frequency	**Percentage**
Multiple Opinions	93	48.4
AI-assisted caries detection software	38	19.8
AI-driven treatment planning systems	15	7.8
AI-based teledentistry applications	11	5.7
AI-powered smart toothbrushes for monitoring oral hygiene	7	3.6
AI chatbots for patient communication and education	6	3.1
None of the above	22	11.5

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Table 6 Frequency and Percentage of participants who believe AI can improve Early caries detection.

Do you think AI can improve early detection of dental caries in pediatric patients?		
	Frequency	**Percentage**
Yes, significantly	91	47.4
Maybe, but needs more validation	93	48.4
No, traditional methods are sufficient	8	4.2

Table 7 Frequency and Percentage of participants who will incorporate AI based tool for caries detection

Would you be willing to incorporate AI-based caries detection tools into your practice if they were proven to be accurate and reliable?		
	Frequency	**Percentage**
High cost of AI software	98	51.0
Lack of training and knowledge	79	41.1
Resistance from parents/patients	15	7.8

Table 8 Frequency and Percentage of participants who believe AI can assist in behaviour management and Anxiety reduction of pediatric patients.

Do you believe AI can assist in behavior management and anxiety reduction in pediatric patients?		
	Frequency	**Percentage**
AI can significantly improve decision-making	113	58.9
AI can assist but cannot not replace clinical judgment	65	33.9
AI has limited application in pediatric treatment planning	14	7.3

DISCUSSION

The integration of AI in pediatric dentistry promises improved diagnostic precision, efficient treatment planning, and enhanced patient experience. However, knowledge gaps, training deficiencies, and concerns over ethical issues and data privacy may hinder adoption. This study emphasizes the need for structured educational interventions and training modules to prepare dental professionals for an AI-driven future. Findings may serve as a foundation for policy development and integration of AI tools into dental curricula and continuous professional development programs.

Recent literature comprehensively outlines the numerous applications of artificial intelligence in dentistry, ranging from diagnostic support to restorative and esthetic procedures, thereby underscoring the transformative potential of AI in clinical practice. For instance, Carrillo-Perez et al. (2022) conducted an extensive review detailing the scope of AI implementations in dental specialties, emphasizing both current achievements and future directions[2]

An innovative use of AI in dentistry is the AI Caries. With the use of AI Caries, parents can seek treatment for their kids at an acute and reversible phase by using their smartphones to take pictures of their children's teeth and identify ECC. Additionally, parents can learn vital information on lowering their kids' risk of dental caries[6].

Vishwanathaiah et al. (2023) present a comprehensive review of artificial intelligence in pediatric dentistry, highlighting its role in enhancing diagnostic accuracy through improved analysis of dental radiographs and support for treatment decisions. The review emphasizes AI's contributions to efficient data management, automation of administrative tasks, patient engagement via virtual assistants, and the delivery of personalized preventive care based on individual risk profiles[3]

In pediatric dentistry, AI addresses several traditional challenges, such as improving diagnostic accuracy and enhancing treatment planning for young patients. Pediatric dentistry often involves managing the behaviour of anxious or uncooperative children during dental visits. AI-driven virtual reality (VR) and augmented reality (AR) technologies are now being explored to create more engaging and less intimidating dental experiences for children, helping to manage their behaviour and reduce dental anxiety[7].

Limitations

The main limitation of this study is the restricted sample size. A bigger sample size would help in obtaining a more data and information regarding the awareness and efficiency of AI in pediatric practise.

The data obtained is limited to a particular age group and clinical setting. Larger datasets and prospective studies are needed to confirm the utility and accuracy of the AI in pediatric dentistry.

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