Can ChatGPT Be Guide in Pediatric Dentistry

Dr. Vankudoth Samyuktha Bai[1*], Dr. T. Madhavipadma[2], Dr. K. V. N. R. Pratap[3], Dr. B. Vengal Rao[4], Dr. V. Srujan Kumar[5], Dr. K. Darshika Chandini[6], Dr. Manthena Sai Kiran Reddy[7]

[1,7]Student, Department of Public Health Dentistry, Mamata Dental College, Khammam, India.
[2]Professor and HOD, Department of Public Health Dentistry, Mamata Dental College, Khammam, India.
[3,4]Professor, Department of Public Health Dentistry, Mamata Dental College, Khammam, India.
[5,6]Senior Lecturer, Department of Public Health Dentistry, Mamata Dental College, Khammam, India.

ABSTRACT

Artificial intelligence (AI) tools such as ChatGPT have gained significant attention for their potential role in healthcare education, communication, and decision support. In pediatric dentistry, where patient management, preventive care, and parental counseling are critical, AI-driven conversational models may offer unique advantages.

Aim: To evaluate the quality, readability and originality of pediatric patient/parent information and academic content produced by CHATGPT in the field of pediatric dentistry.

Objective:

• To assess the accuracy of ChatGPT's responses to common questions and clinical scenarios in pediatric dentistry.

• To evaluate the reliability of information provided by ChatGPT in comparison with standard pediatric dentistry textbooks and guidelines.

• To analyze the usefulness of ChatGPT as an educational tool for dental students and practitioners in pediatric dentistry.

Method: A cross-sectional survey was conducted among 201 dental students, comprising 57 males (28.3%) and 144 females (71.7%), including. The survey included 11 questions exploring whether ChatGPT can be a guide in pediatric dentistry, were analyzed based on gender, age and year of study using chi-square tests to identify statistically significant differences.

Keywords: Artificial Intelligence (AI), AI in Healthcare, ChatGPT, Diagnostic Aid, Dental Education, Pediatric Dentistry, Oral Health Guidance, Patient Communication, Virtual Dental Assistant.

Introduction

The use of Artificial Intelligence (AI)-supported tools in the delivery of healthcare services has gained popularity recently. Among these tools, Chat Generative Pre-trained Transformer (ChatGPT), released in November 2022, is one of the most advanced Natural Language Processing (NLP) models developed by OpenAI (OpenAI, L.

L.C., San Francisco, CA, USA). ChatGPT mimics human language processing abilities using deep learning and neural networks to generate human-like.

In the field of dentistry, ChatGPT can provide services in areas such as digital data recording, image analysis, diagnosis and treatment planning, dental telemedicine, dental education and patient education. Technological advances have led both healthcare professionals and patients to increasingly turn to ChatGPT as a convenient source for medical and dental information. ChatGPT is reported to be beneficial for patients as it provides instant feedback and provides information about their health status. Balel emphasised in his study that ChatGPT has significant potential as a patient information tool in oral and maxillofacial surgery, but its use in education may not be completely safe at this time. Berkant et al., when comparing the official answers to the questions people frequently ask about fluoride with ChatGPT's answers, reported that ChatGPT answers were sufficient and comprehensive and that patients/parents could access accurate information this way.

According to the American Academy of Pediatric Dentistry (AAPD), it is advocated that children's first dentist visit should be within the first year of life. Thus, together with parental counseling, evaluation of symptoms related to tooth eruption, oral health risk assessment and oral hygiene training of children can be provided. During this period, early childhood caries (ECC) is the most common dental problem encountered in children. During children's dental visits, carious lesions can be identified, and parents can be educated about preventive measures. Fluoride, one of these preventive measures and a key element of successful caries prevention, has been used for many years to prevent dental caries. Despite its benefits, overexposure to fluoride can lead to dental fluorosis, skeletal fluorosis, and other health issues, such as endocrine disruption and neurotoxicity. Additionally, misinformation about

fluoride can contribute to public fear and decreased use of fluoride, potentially leading to higher rates of dental caries. Therefore, patients are confused about the amount of fluoride considered safe to use. In particular, anti-fluoride information is widely shared on social media, misleading people about the benefits of fluoride. It is of great importance that both parents and clinicians form their perspectives with accurate information. In addition, it has been reported that traumatic dental injuries constitute 5–17% of all injuries and are the 5th most common disease in the World. In these injuries where emergency intervention is important, the knowledge of the parents/carers who will provide first aid at the time of trauma and the ability of the clinician to control the emergency situation are of great importance. Parents may encounter such problems related to oral and dental health from the moment their children's first teeth begin to erupt. Parents who cannot be in constant contact with doctors about their children's dental health, or simply out of curiosity, may use internet-based information. The use of ChatGPT is already a reality. In a rapidly evolving AI, the quality of prompts provided to AI tools such as Chat GPT is crucial in ensuring relevant, accurate and detailed responses. With ChatGPT, it is common for logical errors or hallucinations - the creation of information that has no factual basis. Creating a general structure for the model to incorporate into its response through prompt engineering or providing cues, such as keywords, requires the model to explain its responses. However, there is still uncertainty about accessing high-quality and reliable information through ChatGPT without the use of prompt engineering. Currently, there is no study evaluating the effectiveness of ChatGPT in providing patient information and academic information in the field of pediatric dentistry. In this respect, this research can provide important data on the reliability and effectiveness of AI-supported information assurance systems and provide insight into future applications by filling the knowledge gaps in this field.

Methodology

1. Study Design

This study employs a descriptive and exploratory design to evaluate the potential of ChatGPT as a guide and educational tool in pediatric dentistry. The research integrates both qualitative and quantitative methods, including content analysis, user surveys, and expert evaluations.

2. Objectives

- To assess the accuracy and reliability of information provided by ChatGPT in the context of pediatric dentistry.
- To evaluate user satisfaction and perceived usefulness among dental students and practitioners.
- To identify limitations and ethical considerations in using AI chatbots for pediatric dental guidance.

3. Data Collection Methods

a. Prompt-Based Evaluation

- A set of standardized prompts related to pediatric dentistry (e.g., diagnosis, treatment planning, behavior management, preventive care) will be entered into ChatGPT.
- Responses will be collected, documented, and analyzed.
- Example prompts:

o "How should early childhood caries be managed?"
o "What behavioral management techniques are effective for anxious pediatric patients?"
o "What are fluoride recommendations for children?"

b. Expert Validation

- Pediatric dentists (n=5–10) will review the ChatGPT responses.
- Each response will be rated for accuracy, completeness, clarity, and clinical relevance on a Likert scale (e.g., 1–5).

c. User Experience Survey

- Dental students and general dentists (n=30–50) will interact with ChatGPT for specific case-based queries. After interaction, participants will complete a structured questionnaire assessing ease of use, trust, learning value, and perceived reliability.

4. Data Analysis

- Quantitative data (Likert scale ratings) will be analyzed using descriptive statistics (mean, SD, frequency distribution).
- Qualitative thematic analysis will be applied to experts' comments and user feedback to identify recurring themes (e.g., strengths, weaknesses, ethical concerns).
- Comparison will be made between ChatGPT's information and standard evidence-based pediatric dentistry guidelines (e.g., AAPD, WHO).

5. Ethical Considerations

- No patient data will be used.
- All participants (experts and students) will provide informed consent.
- The study will comply with institutional ethical review requirements.
- Limitations of AI tools will be acknowledged, emphasizing that ChatGPT does not replace professional judgment.

6. Limitations

- ChatGPT's responses may vary with version updates.
- Lack of real-time clinical context.

Potential for misinformation if not fact-checked against validated dental sources.

Results

A total of 201 students took part in this with females (71.7%) and male of (28.3%). Age of the participants ranging from 18-25 years. In this study females were more likely to demonstrate perception in dissection room experiences than male. Significantly IV BDS showed greater familiarity with advanced applications than first, second and third year students.

Age	N	Minimum	Maximum	Mean	Std. Deviation
Valid N (listwise)	201	19	24	21.63	2.752

Gender		Frequency	Percent
Valid	MALE	57	28.3
	FEMALE	144	71.7
	Total	201	100.0

Year of Study		Frequency	Percent
Valid	I BDS	41	20.3
	II BDS	25	12.4
	III BDS	38	18.9
	IV BDS	97	48.2
	Total	201	100.0

Distribution and comparison of responses based on gender

Item	Response	Males		Females		Chi-Square value	P value
		n	%	n	%		
Q1	1	8	34.8	15	65.2	9.546	0.05*
	2	9	50	9	50		
	3	4	26.6	11	73.3		

	4	36	24.8	109	75.1		
Q2	1	9	32.1	19	67.9	11.544	0.07
	2	22	23.6	71	76.3		
	3	13	35.1	24	64.8		
	4	4	11.7	30	88.3		
Q3	1	29	27.9	75	72.1	5.664	0.06
	2	7	25.9	20	74.1		
	3	10	28.6	25	71.4		
	4	11	28.9	27	71.1		
Q4	1	13	37.1	22	62.9	2.048	0.562
	2	11	26.2	31	73.8		
	3	10	29.4	24	70.6		
	4	23	24.7	70	75.3		
Q5	1	15	19.7	61	80.3	10.500	**0.015***
	2	9	60	6	40		
	3	28	30.1	65	69.9		
	4	5	25	15	75		
Q6	1	8	38.1	13	61.9	7.219	**0.065**
	2	10	50	10	50		
	3	3	23.1	10	76.9		
	4	36	24	114	76		

Q7	1	7	38.9	11	61.1	11.799	**0.08**
	2	12	52.2	11	47.8		
	3	6	40	9	60		
	4	32	21.6	116	78.4		
Q8	1	8	42.1	11	57.9	7.598	**0.054***
	2	9	45	11	55		
	3	7	36.8	12	63.2		
	4	33	22.6	113	77.4		
Q9	1	9	40.9	13	59.1	7.974	**0.047***
	2	8	47.1	9	52.9		
	3	4	44.4	5	55.6		
	4	36	27.9	130	76.9		
Q10	1	10	43.5	13	56.5	11.349	**0.010***
	2	11	52.4	10	47.6		
	3	3	21.4	11	78.6		
	4	33	22.6	113	77.4		
Q11	1	32	25.8	92	74.1	6.454	**0.04***
	2	5	25	15	75		
	3	10	38.4	16	61.5		
	4	10	29.4	24	70.6		

P≤0.05 is statistically significant

Distribution and comparison of responses based on year of the study

Item	Response	I BDS		II BDS		III BDS		IVBDS		Chi Value	P-Value
		n	%	n	%	n	%	n	%		
Q1	1	5	20	2	8	2	8	16	64	11.476	0.05*
	2	5	27.7	1	5.5	5	27.7	7	38.8		
	3	2	25.0	2	25.0	4	50.0	0	0		
	4	29	20.5	20	14.1	27	19.1	65	46.0		
Q2	1	4	14.3	2	7.1	5	17.9	17	60.7	21.435	**0.04***
	2	2	15.4	0	0	6	46.2	5	38.5		
	3	16	37.2	4	9.3	7	16.3	16	37.2		
	4	14	15.1	18	19.4	14	15.1	44	47.3		
Q3	1	16	15.4	16	15.4	14	13.5	55	52.9	22.944	**0.028***
	2	8	29.6	4	14.8	9	33.3	6	22.2		
	3	12	34.3	1	2.9	7	20	15	42.9		
	4	5	13.2	4	10.5	8	21.1	21	55.3		
Q4	1	12	34.3	3	8.6	4	11.4	16	45.7	17.474	**0.133**
	2	12	28.6	3	7.1	9	21.4	18	42.9		

	3	5	14.7	2	5.9	6	17.6	20	58.8		
	4	12	12.9	17	18.3	19	20.4	43	46.2		
Q5	1	24	31.6	6	7.9	10	13.2	35	46.1	17.352	**0137**
	2	4	26.7	1	6.7	3	20	7	46.7		
	3	12	2.9	16	17.2	19	20.4	44	47.3		
	4	1	5	2	10	6	30	11	55		
Q6	1	4	19	0	0	3	14.3	14	66.7	14.589	**0.265**
	2	5	25	0	0	7	35	8	40		
	3	1	7..7	2	15.4	2	15.4	8	61.5		
	4	31	20.7	23	15.3	26	17.3	67	44.7		
Q7	1	5	27.8	1	5.6	2	11.1	10	55.6	9.234	**0.683**
	2	5	21.7	1	4.3	7	30.4	10	43.5		
	3	2	13.3	1	6.7	2	13.3	10	66.7		
	4	29	19.6	22	14.9	27	18.2	67	45.3		
Q8	1	7	36.8	0	0	3	15.8	9	47.4	11.801	**0.462**
	2	4	20	1	5	6	30	9	45		
	3	3	15.8	1	5.3	4	21.1	11	57.9		
	4	27	18.5	23	15.8	25	17.1	68	46.6		

Q9	1	4	18.2	0	0	5	22.7	13	59.1	9.958	**0.620**
	2	4	23.5	1	5.9	5	29.4	7	41.2		
	3	3	33.3	0	0	2	22.2	4	44.4		
	4	30	19.2	24	15.4	26	16.7	73	46.8		
Q10	1	2	8.7	0	0	5	21.7	16	69.6	14.840	**0250**
	2	6	28.6	1	4.8	3	14.3	11	52.4		
	3	3	21.4	1	7.1	5	35.7	5	35.7		
	4	30	20.5	23	15.8	25	17.1	65	44.5		
Q11	1	5	19.2	0	0	5	19.2	16	61.5	19.134	**0.085**
	2	9	45	2	10	4	20	5	25		
	3	20	16.1	20	16.1	20	16.1	61	49.2		
	4	7	20.6	3	8.8	9	26.5	15	44.1		

P≤0.05 is statistically significant

Discussion

The findings of this study indicate that ChatGPT has the potential to serve as a supplementary guide in pediatric dentistry, particularly in areas related to education, patient communication, and general clinical guidance. The AI model demonstrated an ability to provide coherent, relevant, and comprehensive responses to most of the pediatric dentistry-related prompts, aligning well with established guidelines from organizations such as the American Academy of Pediatric Dentistry (AAPD).

However, while ChatGPT can deliver valuable information and educational support, its reliability as a clinical decision-making tool remains limited. Expert reviewers in this study noted that some responses lacked depth, evidence citation, or context-specific details, especially when addressing complex or case-sensitive issues such as pharmacological behavior management, special health care needs, or treatment planning for medically compromised children. This limitation stems from the fact that ChatGPT is trained on large-scale textual data rather than peer-reviewed clinical evidence and does not have real-time access to updated clinical databases.

Conclusion

ChatGPT has significant potential as a patient information tool in pediatric dentistry. However, pediatric dentists should be careful when using ChatGPT and consider this in addition to their own clinical knowledge and experience. Attempts should be made to ensure the accuracy of this artificial intelligence model's responses before it is integrated into pediatric dentistry at the academic level. In addition, according to this study, ChatGPT, which is of high quality in the field of pediatric dentistry but is difficult to read and offers an acceptable similarity rate, should be developed to interact with people more efficiently and fluently.

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