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A study of the knowledge and awareness of dental students in Syrian public universities about the using artificial intelligence in pediatric dentistry

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Abstract:

Background : The advent of artificial intelligence (AI) has caused a paradigm change in the medical and dental disciplines in recent years. It is crucial for practitioners to comprehend the basic ideas, underlying principles, and applications of AI as it continues to influence clinical practices in the present and the future. AI is a potent diagnostic tool in pediatric dentistry that improves precision, effectiveness, and judgment. To maximize AI's potential in clinical practice, a thorough grasp of its function in this field is essential.

Object: The purpose of the current study was to evaluate a group of Syrian dental students' knowledge ,perceptions and attitudes about the future of artificial intelligence in pediatric dentistry.

Materials and Methods: This study used a descriptive cross-sectional questionnaire with 11 items that were emailed to 780 dentistry students in their fourth and fifth years at Hama, Homs, and Lattakia Government Universities in Syria via Google Forms®. Participants' demographic information was gathered, and their knowledge, attitudes, and perceptions on the future of AI in pediatric dentistry were evaluated.

Result : The findings of this study demonstrated that students had a notable level of knowledge about artificial intelligence (AI). Of the students in the current study, 680 (87.17%) were already aware of the concept. Additionally, 626 students (80.2%) were aware that AI can be used in pediatric dentistry, and 516 (66.1%) agreed that AI can be a reliable diagnostic tool in pediatric dentistry. The majority of students 677 (86.7%) agreed that AI can be used as a behavior modification tool, but only 435 (55.8%) agreed that painless injections could be performed using AI devices. 617 (79.1%) agreed that AI could be covered in dental curricula in the future, and only 362 (46.4%) believed that Al had a future in pediatric dentistry in Syria . Additionally, 280 students (35.8%) believed that AI could eventually replace pediatric dentists. 707 students (90.6%) said that artificial intelligence would lead to major advancements in pediatric dentistry in the future.

Conclusions: In light of the study's findings, it is advised that further research and insights regarding AI be shared via lectures, webinars, and course curriculum in order to learn more about this fascinating idea.

Key words : Pediatric Dentistry - Dental Students - Artificial Intelligence.

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دراسة حول مدى معرفة ووعي طلاب طب الأسنان في الجامعات السورية الحكومية حول استخدام الذكاء الاصطناعي في طب أسنان الأطفال .

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الملخص:

الخلفية: تسبب ظهور الذكاء الاصطناعي في تغيير جذري في التخصصات الطبية وطب الأسنان في السنوات الأخيرة. ومن الأهمية بمكان أن يفهم الممارسون الأفكار الأساسية والمبادئ والتطبيقات الأساسية للذكاء الاصطناعي لأنه يستمر في التأثير على الممارسات السريرية في الحاضر والمستقبل. يعد الذكاء الاصطناعي أداة تشخيصية قوية في طب أسنان الأطفال تعمل على تحسين الدقة والفعالية والحكم. ولتعظيم إمكانات الذكاء الاصطناعي في الممارسة السريرية، فإن الفهم الشامل لوظيفته في هذا المجال أمر ضروري.

الهدف: كان الغرض من الدراسة الحالية تقييم معرفة وتصورات ومواقف مجموعة من طلاب طب الأسنان السوريين حول مستقبل الذكاء الاصطناعي في طب أسنان الأطفال.

المواد والطرق: استخدمت هذه الدراسة استبيانًا وصفيًا مقطعيًا يحتوي على 11 عنصرًا تم إرساله عبر البريد الإلكتروني إلى 780 طالب طب أسنان في سنواتهم الرابعة والخامسة في جامعات حماة وحمص واللاذقية الحكومية في سوريا عبر Google Forms®. تم جمع المعلومات الديموغرافية للمشاركين، وتم تقييم معرفتهم ومواقفهم وتصوراتهم حول مستقبل الذكاء الاصطناعي في طب أسنان الأطفال.

النتيجة: أظهرت نتائج هذه الدراسة أن الطلاب لديهم مستوى ملحوظ من المعرفة حول الذكاء الاصطناعي. من بين الطلاب في الدراسة الحالية، كان 680 (87.17٪) على دراية بالفعل الاصطناعي في طب أسنان الأطفال، ووافق 516 (66.1٪) على أن الذكاء الاصطناعي يمكن أن يكون أداة تشخيصية موثوقة في طب أسنان الأطفال. وافقت غالبية الطلاب 677 (86.7٪) على أنه يمكن استخدام الذكاء الاصطناعي كأداة لتعديل السلوك، لكن 435 (55.8٪) فقط وافقوا على أنه يمكن إجراء حقن غير مؤلمة باستخدام أجهزة الذكاء الاصطناعي. وافق 617 (79.1٪) على أنه يمكن تغطية الذكاء الاصطناعي في المناهج الدراسية لطب الذكاء الاصطناعي سيؤدي إلى تقدم كبير في طب أسنان الأطفال في المستقبل.الأسنان في المستقبل، و362 (46.4٪) فقط يعتقدون أن آل لديه مستقبل في طب أسنان الأطفال في سوريا. بالإضافة

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إلى ذلك، يعتقد 280 طالبًا (35.8%) أن الذكاء الاصطناعي يمكن أن يحل في النهاية محل أطباء أسنان الأطفال. وقال 707 طالبًا (90.6%) أن

الاستنتاجات: في ضوء نتائج الدراسة، يُنصح بمشاركة المزيد من الأبحاث والرؤى المتعلقة بالذكاء الاصطناعي من خلال المحاضرات والندوات عبر الإنترنت ومنهج الدورة من أجل معرفة المزيد عن هذه الفكرة الرائعة.

الكلمات المفتاحية: طب أسنان الأطفال – طلاب طب الأسنان – الذكاء الاصطناعي.

Introduction:

Artificial intelligence is a software system that uses data sources to either make decisions on its own or help humans make decisions (Hashimoto et al., 2020) One area of computer science that is capable of analyzing vast volumes of data is artificial intelligence. Nevertheless, it is not limited to computer science; it encompasses a wide range of disciplines, including statistics, linguistics, philosophy, psychology, and medicine.(He et al., 2019)
In the medical field, it has helped treat a number of ailments and reduced several errors in diagnosis and follow-up. It has grown recently, moving from research to use across a range of industries.(Alami et al., 2020)
Significant financial support for AI research, particularly in the medical arena, has come from high-income nations. There are no significant intentions to apply AI in low-income nations like Syria, and there is also a dearth of research on the topic

This study was carried out using a descriptive cross-sectional questionnaire that was specifically created for it. It consisted of 11 questions distributed via Google Forms® to 900 dental students in their fourth and fifth years at the government universities of HAMA, HOMS, and LATTAKIA. First-, second-, and third-year undergraduates were excluded.
Based on their degree of education on AI, the questionnaire assessed students' knowledge, attitudes, and perceptions regarding its application in pediatric dentistry in addition to collecting demographic information.
To ensure that participants understood the purpose of the survey, the completed questionnaire was distributed via Google Forms® along with comprehensive instructions and recommendations.
Using the population mean formula sample size at a 95% confidence level and a 5% margin of error, a total sample size of 447 respondents was required for the current study, taking into account the 1100 four and fifth-year dental students at HAMA, HOMS, and Lattakia universities. 780 responders made up our sample, which was selected at random.

The application of artificial intelligence (AI) in dentistry has grown in popularity recently, which benefits recent dental graduates, particularly in the area of diagnostics. It can be used in pediatric dentistry for preclinical procedures such tooth numbering and arrangement, for the identification and evaluation of dental caries, for controlling the behavior of children who are afraid or worried, and for direct surgical robot treatment. (Ranjana et al., 2021)
Research on students' views and knowledge of AI is still limited , despite the growing application of AI in dentistry and medical.(Chan and Zary, 2019)
The purpose of this study is to assess dental students' knowledge of various AI methods in pediatric dentistry and determine how well-informed they are about AI and its consequences in Syria.
Materials and methods:
The study's objective is to learn more, so we conducted an online survey among Syrian dental students at government universities to gauge their knowledge, attitudes, and perceptions of the use of AI in pediatric dentistry.
All contributors gave their consent, which was included in the questionnaire's header to let participants know that answering the survey is completely voluntary and that doing so constitutes consent for the use of the data for study. Throughout the whole research process, the privacy of the participants was protected.
The survey included three sections with eleven closed-ended questions about artificial intelligence (AI) and its potential uses in pediatric dentistry.
11 closed-ended questions were developed and structured by modifying questions from earlier research (Sur et al., 2020, Khater et al., 2023) and getting acquainted with them to make them more suitable for Syrian students. A link to the Arabic-language survey was made and distributed to four and fifth-year dentistry students using Google Forms.
Before the poll, participants received a brief explanation of artificial intelligence and were made aware of its objectives.
After providing some basic information about themselves, participants finished the survey. One "submit" button allowed for only one contribution via

the link, and responses were made on a single webpage

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Survey was separated into three fundamental areas (information, perspectives, and future). The initial segment of the survey included inquiries concerning respondents' information on simulated intelligence. The second piece of the overview included inquiries addressing about understudies' mentalities towards simulated intelligence. The third part enquired inquiries concerning the promising fate of artificial intelligence in pediatric dentistry among the understudies.

Data analysis : Items that were incorporated into the current study were reported using descriptive statistical analysis; continuous variables were accounted for using means, and all categorical data were reported using numbers and percentages. distributed 900 questionnaires to 900 students. The questionnaire was completed by 780 students , 28% were female and 72% were male as shown in Figure 1. This percentage had no statistical significance on the research results.

RESULTS:

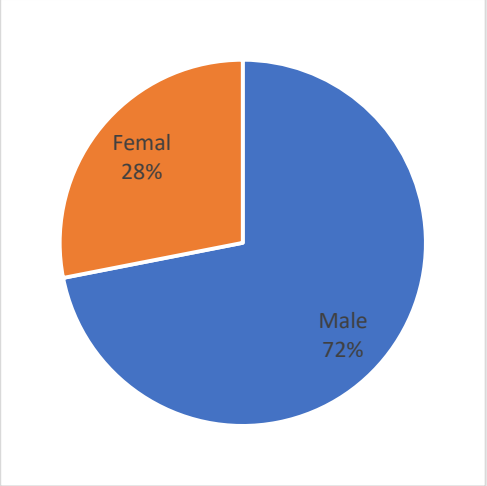

Fig (1) : percentages of gender among all participants

Table(1): represents the results of the questionnaire distributed to the students.

	yes	no		maybe	P. value
Do you know the concept of AI	680 (87.17)	80 (10.4%)		20 (2.5%)	<0.0001*
Do you know that AI can be used in pediatric dentistry	626 (80.2%)	64 (8.2%)		90 (11.6%)	
Do you know that AI can be a reliable diagnostic tool in pediatric dentistry?	516 (66.1%)	80 (10.4%)		184 (32.5%)	
Can technologies as 4D animations be an effective behavior modification aid	678 (87%)	33 (4.2%)		69 (8.8%)	
are you aware that AI can be used in dental practice.	677 (86.7%)	32 (4.1%)		71 (91%)	
Can painless injection be done with AI devices?	435 (55.7%)	77 (9.8%)		268 (34.5%)	
Can artificial intelligence be covered in dental school curriculum in the future	617 (79.1%)	45 (5.7%)		118 (15.1%)	
Which field of dentistry do you believe AI will be most useful in?	diagnosis	Treatment plan	Direct Treatment by robot	Prognostic tool to predict the course of a disease	
	387 (49.6%)	192 (24.6%)	56 (7.3%)	145 (18.5%)	
Does Al have a future in pediatric dentistry in Syria	agree	disagree		No idea	
	362 (46.4%)	90 (11.4%)		328 (42.2%)	
Can AI be an alternative to dentist & pediatric dentist in the future?	280 (35.8%)	410 (52.5%)		90 (11.7%)	
Will AI result in significant improvements in the field of pediatric dentistry in the future?	707 (90.6%)	15 (1.9%)		58 (7.5%)	

Discussion:

this was the first questionnaire-based study in Syria to evaluate dental students' attitudes, knowledge, and perceptions of the future of artificial intelligence in dentistry and pediatric dentistry .

AI has proven to be an effective tool in various aspects of healthcare, with the potential to improve patient care, increase the efficiency of healthcare systems, and improve overall health outcomes. As a result, the integration of AI in medical and dental education is becoming essential to prepare future physicians and dentists for the changing healthcare landscape. AI has propelled the fields of medicine and dentistry into an era of rapid technological advancements.(Lee et al., 2021)

It is yet unknown, nevertheless, if the existing curricula are sufficiently educating students for the incorporation of AI into their future work. (Ejaz et al., 2022)

AI's impact has spread to the educational sector, where it can improve teaching strategies, create new learning opportunities, and improve the atmosphere in the classroom as a whole. (Luckin and Holmes, 2016)

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These findings paled in comparison to a research by (Sur et al., 2020) that found 63% of dental students believed AI would play a significant role in India in the future.

In order to determine awareness and attitudes toward AI, (Oh et al., 2019)conducted a survey among Korean medical professionals. Only 6% of the 669 participants in that survey were aware of the idea of artificial intelligence (AI), 83.4% agreed that AI has applications in the medical field, and 43.9% agreed that AI is more capable of diagnosing problems than humans. Although 87.17% of students in the current survey were familiar with the concept of artificial intelligence, 49.6% of them agreed that AI would be useful for diagnosis, and 24.6% agreed that AI would be useful for therapy.

A few students in the current survey agreed that artificial intelligence (AI) may eventually replace dentists. This is similar to the findings of the study (Swed et al., 2022) showing AI could not take the role of dentists.

Using a Google questionnaire-based survey, the current study evaluated the knowledge and attitudes of undergraduate dental students in their fourth and fifth years at the Oral and Dental Medicine faculty in Hama, Homs, and Lattakia regarding artificial intelligence (AI) and its applications in practice and education.

AI has greatly advanced the field of dentistry, particularly in the diagnosis, treatment, prevention, and risk assessment of pediatric dentistry. (Fatima et al., 2022)

The majority of dental students in the current survey were aware of artificial intelligence (AI), and there was a high level of recognition among them. The majority of them agreed that AI will benefit pediatric dentistry.

Since AI makes it possible to build intelligent machines, it has begun to impact treatment and prevention strategies in the medical field.(Alaa and Ahmed, 2024)

When asked about the future of artificial intelligence in Syria, 46.4% of the present research participants gave an affirmative response

Similar to a study (Yüzbaşıoğlu, 2021) that found that over 75% of students agreed that AI should be included in undergraduate and graduate dental curriculum and education, 79.1% of students in the current study agreed that artificial intelligence can be covered in dental school curricula in the future.

The current study's flaw is the years of student practice, which has influenced the findings on a variety of AI awareness scales, so to determine the knowledge, attitude, and use of AI among Syrian dentists, the study needs to be piloted on a sizable population of dental student .

Conclusions:

This survey, which asked dental students about their knowledge and opinions about AI in pediatric dentistry, found that most of them were optimistic about the field's potential and interest and Dental education must adapt to restart producing skilled dentists who can provide exceptional patient care as AI-powered technologies are gradually integrated into oral healthcare.

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