KNOWLEDGE, ATTITUDE AND PERCEPTION REGARDING THE FUTURE OF ARTIFICIAL INTELLIGENCE IN PEDIATRIC DENTISTRY IN A GROUP OF EGYPTIAN DENTAL STUDENTS. A CROSS SECTIONAL STUDY

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ABSTRACT

Background: nowadays there is a paradigm change in the medical and dental areas due to the exhibition of artificial intelligence (AI) concept. As AI has a prospective influence on the present and upcoming practitioners, understanding its basic conception, the working principle, and its applications as a diagnostic tool in pediatric dentistry is mandatory for its' usage.

Objective: the current study aimed to assess knowledge, attitude, and perception regarding the future of AI in Pediatric Dentistry in a group of Egyptian dental students.

Subjects and methods: the present study is a descriptive cross-sectional based questionnaire, including 15 questions distributed through Google Forms® to 312 dental students that was carried out among fifth-year dental students in Future University in Egypt (FUE). The questionnaire collected demographic data of participants and assessed their knowledge, attitude, and perception regarding the future of AI in Pediatric Dentistry.

Results: responses obtained were statistically analyzed. Results obtained showed a noteworthy knowledge of AI among students. In the current study 272 (87.2%) students were already aware of AI concept however 8 (2.6%) students were completely unfamiliar with the concept. Moreover, 250 students (80.1%) were aware that AI can be used in pediatric dentistry. 206 (66%) students agreed that AI can be a reliable diagnostic tool in pediatric dentistry. Most students 271 (86.9%) agreed that technologies as 4D animations can be an effective behavior modification aid, however only 174 (55.8%) students agreed that painless injection can be done with AI devices. 247 (79.2%) students agreed that AI can be covered in dental curriculum in the future. Only 145 (46.5%) students thought that Al has a future in pediatric dentistry in Egypt. Also 112 (35.9%) students thought that AI can be an alternative to pediatric dentists in the future. 283 (90.7%) student thought that AI will result in significant improvements in the field of pediatric dentistry in the future.

Conclusions: based on the outcomes of the study, it is recommended that additional investigations and insights into AI should be conveyed through curricular courses, lectures and webinars to discover and expand the awareness about this interesting concept.

KEY WORDS: Awareness, AI, Dental students, Curriculum

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INTRODUCTION

Artificial intelligence (AI) is imitating human thoughts, feelings and actions using technology by imparting these machines how individuals think, act and then react in dissimilar circumstances. [1]

The human brain is the most fascinating, the most advanced and intellectual of all species on earth, making it dominant. The attempt to use technology to imitate human intelligence dates to the 1950s. One of the newest areas of science and technology is AI, which is dubbed as "The Stethoscope of the 21st Century", that denotes it is an essential tool for the medical and dental society. [2]

Many people, including medical and dental professionals and researchers, are still unfamiliar with the ideas behind AI, as well as its potential effects on our private and proficient life. [3]

Recently the use of AI has gained popularity in dentistry which is helpful to new dental graduates. The usage of AI concept has popularity in dentistry, especially in diagnosis which is helpful to new dental graduates. In pediatric dentistry, it can be helpful for detection and assessment of dental caries, preclinical tasks like teeth arrangement and teeth preparation, for behavior management of anxious and fearful children as well as direct treatment by surgical robots. [4]

Education includes a lifelong learning scale ranging from undergraduate to postgraduate and specialization training and beyond. As AI applications become more widespread nowadays in the medical and dental fields, it is crucial to understand how students perceive and then interact with these new technologies. Despite the increasing use of AI in medicine and dentistry, research on the knowledge and attitudes of students towards AI remains limited. [5]

Accordingly, more research is needed to fully understand the knowledge and attitudes of students towards AI and its applications in dental education and practice.

AIM OF THE STUDY

To gain further insight, we performed an online survey to assess knowledge, attitude, and perception regarding the future of AI in Pediatric Dentistry in a group of Egyptian dental students.

PARTICIPANTS AND METHODS

Study design, participants and study sampling

The current study was conducted using a descriptive cross-sectional based questionnaire which was specially designed for this study comprising of 15 questions dispersed through Google Forms® to 312 dental students that was conveyed among fifth-year dental students in FUE. (Participants pursuing under graduation of fifth-year were only included, undergraduates pursuing first, second, third and fourth years were not included). The questionnaire gathered demographic data of students and evaluated their knowledge, attitude, and perception concerning the future of AI in Pediatric Dentistry based on their level of education towards AI. Validity of the questionnaire was tested by panel of expert professors experienced in developing questionnaires before proceeding in survey. Prior to disseminating the questionnaire to a broader sample, the questionnaire was piloted on a small group of students to detect any potential concerns and make any necessary changes.

The finalized questionnaire was circulated through Google Forms® with clear instructions and guidelines to guarantee that participants comprehended the nature of the survey.

Bearing in mind the total number of fifth-year dental students at FUE is 334 and by using the sample size for the population mean formula at a confidence level of 95% and a margin of error of 5%, a total sample size of 179 respondents was compulsory for the current study. Our sample included 312 respondents and they were randomly sampled.

Ethics considerations

To guarantee that the research is carried out in compliance with ethical standards, approval was attained from the ethics committee at the faculty of Oral and Dental Medicine FUE, with approval number (FUE.REC (43)/12-2023). A consent was attained from all contributors, and it was embedded in the heading of the questionnaire informing participants that agreeing to participate in the survey is not mandatory and it counts as a consent to use the data for research purposes. The participants' privacy was maintained throughout the whole research process.

Data collection and measures

The questionnaire comprised 15 closed-ended questions concerning AI and its possible applications regarding Pediatric Dentistry, which were divided into 3 sections.

15 Closed-ended questions were structured and organized by adjusting questions acquired from preceding studies [3,6,7] and familiarizing the questions to be more appropriate for students in Egypt. Questionnaire was in English and entered on Google Forms and a link was created and dispersed among fifth-year dental students. Participants were informed about the purposes of the survey and were given a concise explanation of AI before the survey. Participants submitted basic details about themselves and then completed the survey. Replies were made on one webpage with a single "submit" button that only permitted one submission through the link.

Questionnaire was divided into three main sections (knowledge, attitudes, and future). The first part of the questionnaire included 5 questions about respondents' knowledge of AI. The second part of the survey included 5 questions questioning about students' attitudes towards AI. The third part enquired 5 questions about the promising future of AI in pediatric dentistry amongst the students.

Analysis of data

Descriptive statistical analysis was accomplished to report items that were integrated in the current study; means were used to account the continuous variables and numbers and % were used to report all the categorical data.

RESULTS

312 students accomplished the survey. Regarding questions assessing knowledge: There was an outstanding knowledge of AI among students. 272 (87.2%) were already aware of the AI concept, however, 8 (2.6%) students were completely unfamiliar with the concept. 217 (69.6%) students recognized that AI has beneficial medical applications, and 271 (86.9%) students were aware that AI can be used in dental practice. Moreover, 250 (80.1%) students were aware that AI can be used in pediatric dentistry. 206 (66%) students agreed that AI can be a reliable diagnostic tool in pediatric dentistry as shown in figure 1.

Regarding questions assessing attitude: Most students 271 (86.9%) agreed that technologies as 4D animations can be an effective behavior modification aid, however only 174 (55.8%) students agreed that painless injection can be done with AI devices. 241(77.2%) students agreed that chronological age assessment in kids and adolescents can be done using artificial intelligence. Moreover 260 (83.3%) students accepted that AI can be used in diagnosis of early ectopic eruption. And 239 (76.6%) students stated that AI can identify plaque-affected primary teeth as shown in figure 2.

Regarding questions assessing future: 247 (79.2%) students agreed that artificial intelligence can be covered in dental school curriculum in the future. 155 (49.7%) students approved that AI will be beneficial in diagnosis, while 77 (24.7%) students agreed that AI will be useful in treatment plan, 58 (18.6%) students agreed that AI will be useful as a prognosticative mean to expect the development of a disease and 22 (7%) students approved that

AI is beneficial in direct treatment by robots. Only 145 (46.5%) students thought that Al has a future in pediatric dentistry in Egypt. Also 112 (35.9%) students thought that AI can be an alternative to dentists and pediatric dentists in the future. 283 (90.7%) students thought that AI will result in significant improvements in the field of pediatric dentistry in the future as shown in figures 3 & 4.
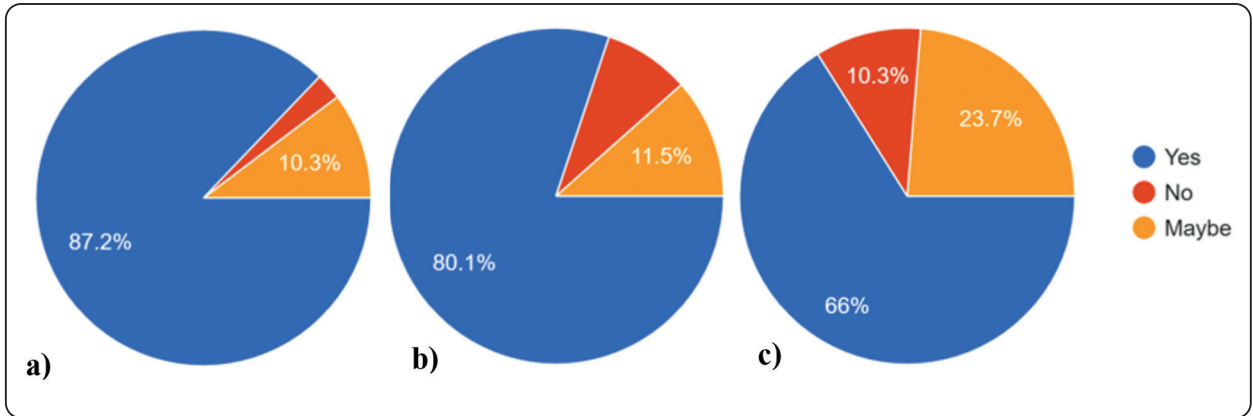

Fig. (1) a) Do you know the concept of AI? b) Do you know that AI can be used in pediatric dentistry? c) Do you know that AI can be a reliable diagnostic tool in pediatric dentistry?
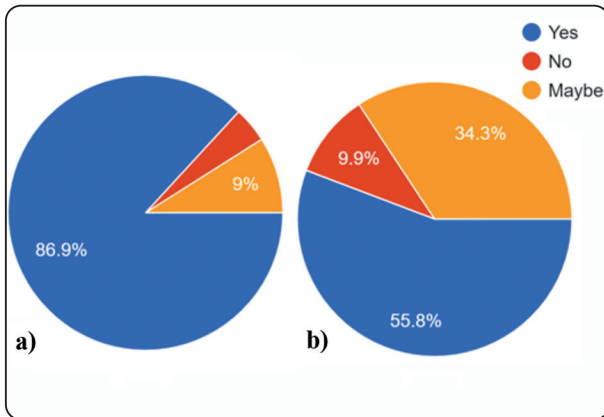

Fig. (2) a) Can technologies as 4D animations be an effective behavior modification aid? b) Can painless injection be done with AI devices?
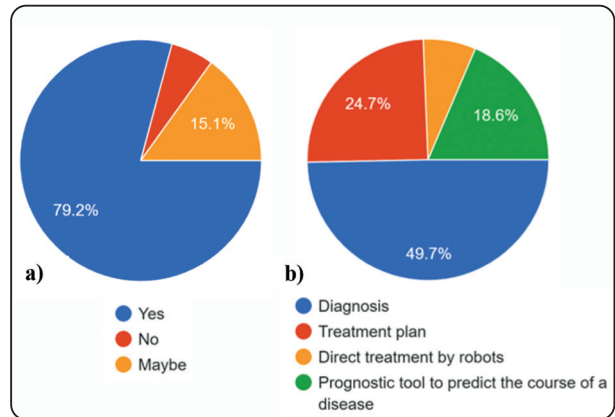

Fig. (3) a) Can artificial intelligence be covered in dental school curriculum in the future? b) Which field of dentistry do you believe AI will be most useful in?
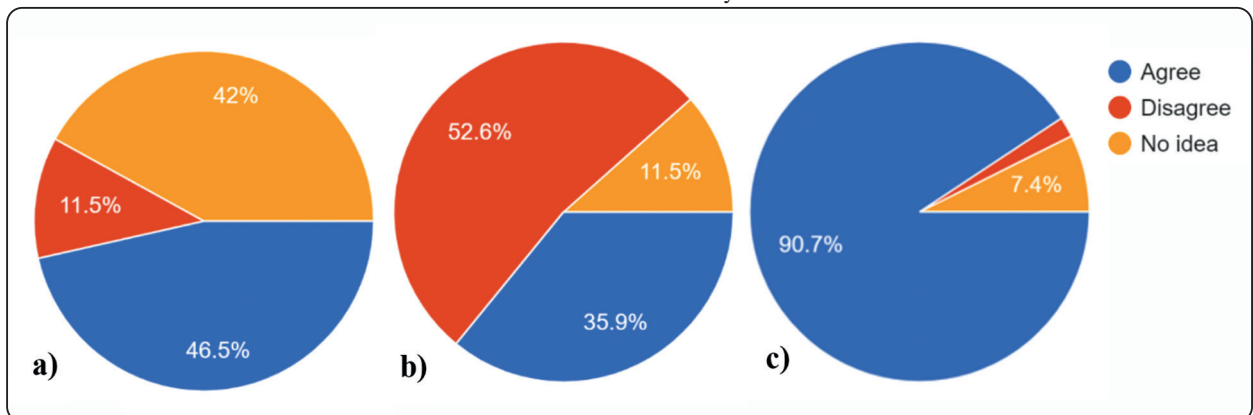

Fig. (4) a) Does Al have a future in pediatric dentistry in Egypt? b) Can AI be an alternative to dentist & pediatric dentist in the future? c) Will AI result in significant improvements in the field of pediatric dentistry in the future?

DISCUSSION

To the knowledge of the main researcher of this study, this was the foremost questionnaire-based study to assess knowledge, attitude, and perceptions of the future of AI among a group of dental students in Egypt.

With the use of AI, the fields of medicine and dentistry have entered an era of rapid technological improvements. AI has proven to be an efficient tool in various aspects of healthcare with the potential to develop patient care, enhance the efficiency of healthcare systems, and improve overall health outcomes. Consequently, the integration of AI in medical and dental education is becoming essential to prepare future physicians and dentists for the evolving landscape of healthcare. [8]

The influence of AI has extended to the field of education, where it has the potential to develop learning experiences, optimize teaching methods, and enhance the overall educational environment.[9] However, it remains unclear whether current curricula are adequately preparing students for the integration of AI in their future practice or not. [10]

Accordingly, the current research expected to assess the knowledge and attitude of students towards AI, identifying areas where education may need to familiarize to meet the shifting needs of health and oral healthcare systems.

The current study was conducted among university undergraduate fifth-year dental students in the faculty of Oral and Dental Medicine, FUE to assess their knowledge and attitudes towards AI and its applications in education and practice through a Google questionnaire-based survey.

In the current study the acknowledgement of AI amongst dental students was great and most of students were acquainted with it. Most of them approved that AI will be advantageous in pediatric dentistry.

AI allows the construction of intellectual machines, therefore it has started to have an influence on preventive and treatment modalities in health care segment.[11] AI has created great development in dentistry branch, especially in pediatric dentistry diagnosis, prevention, treatment and risk assessment. [12]

A survey which was done by **Oh et al.** [13] among Korean medical practitioners to establish awareness and attitudes towards AI. In that study; out of 669 participants, only 6% were aware of AI concept, 83.4% approved that AI is useful in medical area, and 43.9% granted that the diagnostic ability of AI is higher to that of human beings. While in the current study, 87.2 % of students were acquainted with AI concept, 49.7% students approved that AI will be helpful in diagnosis, while 24.7% students corresponded that AI will be beneficial in treatment plan.

A question which was addressed about AI future in Egypt, among current study participants; a total of 46.5% students answered affirmatively. These results were less compared to study performed by **Sur J et al** [3] in which 63% dental students affirmed the future of AI in India.

In the current study, few students approved that AI might substitute the role of dentists in the future. This is parallel to the study shown by **Yüzbaşolu** [14] and **Swed et al.** [15] who stated that AI could not replace dentists.

In the present study, 79.2% students agreed that artificial intelligence can be covered in dental school curriculum in the future which is parallel to a study conducted by **Yüzbaşıoğlu** [14] who concluded that more than 75% approved that AI should be incorporated in the undergraduate and the postgraduate dental curriculum and education.

The drawback of the current study comprises the years of practice among students, which have diverted the results in numerous scales of awareness of AI. The study must be piloted on a enormous population to distinguish the knowledge, attitude, and practice of AI among dentists in Egypt.

CONCLUSIONS

1. This questionnaire which was concerned about dental students' knowledge and perceptions of AI in pediatric dentistry discovered an overall hopefulness on AI's role and interest.

2. As AI empowered technologies are progressively incorporated into oral healthcare, dental education must change to resume generating experienced dentists who can convey excellent patient care.

3. It is crucial to have courses for students concerning AI.

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Conflict of interest

Authors of the current study declare that there is no conflict of interest.

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