

## Study on Dentist's Awareness towards use of Artificial Intelligence and Robotics in Oral Health Dentistry

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### ABSTRACT

**Background:** This study aim of the study was to determine the knowledge and awareness among dentist's toward use of Artificial Intelligence and Robotics in Oral Health Dentistry. **Materials & Methods:** A cross-sectional study was carried out on a total number of 300 dental surgeons (Male=150; Female=150) was participated in the study with age ranges from 20- to 55-year-old to know the knowledge and awareness among dentist's toward use of Artificial Intelligence and Robotics in Oral Health Dentistry. Written informed consent was obtained from the participants after explaining to them the purpose of the study. The sampling method included in the study is a simple random sampling method. A self-administered structured questionnaire was developed, and the data was collected. Both descriptive and analytical statistical measurements were done.

**Results:** The majority of participants, 189 (63%) were said that Artificial intelligence will lead to major advances in dentistry and medicine. 48% agreed that Artificial intelligence can replace dentists/physicians in the future. When asked about the participant's whether Artificial intelligence can be used in 3-dimensional implant positioning and planning, majority of participants agreed to this information.

**Conclusions:** Dentists have sufficient and satisfactory knowledge of AI; they are willing to improve their knowledge in this field. Participants shared an optimistic view and thought that AI will have a positive impact on dental future practice. A need to incorporate AI technology in dental curriculum exists.

**Key words:** Artificial intelligence, Robotics, Knowledge, Dentistry, AI technologies, Dentists, Saudi Arabia

**HOW TO CITE THIS ARTICLE:** M Zakirulla, Rayed Ahmed M Al Shehre, Nawaf A Alhamood, Waad Salem Alarram, Asma Fayez Alshehri, Amjad Yahya Alhidan, Arwa Musa Asiri, Rahaf Mohammed Alamri, Jawaher Ali Alalyah, Yosef Abdullah M Assiri, Saeed Mohammed Alqarni, Abdulallah G Alamodi, Feras Ali Alsaeed, Yasir Saad Jaadan, Study on Dentist's Awareness towards use of Artificial Intelligence and Robotics in Oral Health Dentistry, J Res Med Dent Sci, 2022, 10 (10): 114-117.

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**Received:** 05-Oct-2022, Manuscript No. JRMDS-22-76654;

**Editor assigned:** 07-Oct-2022, PreQC No. JRMDS-22-76654(PQ);

**Reviewed:** 21-Oct-2022, QC No. JRMDS-22-76654(Q);

**Revised:** 25-Oct-2022, Manuscript No. JRMDS-22-76654(R);

**Published:** 31-Oct-2022

### INTRODUCTION

Artificial intelligence (AI) in medicine and dentistry has drawn the attention of researchers in recent years because of its multiple applications [1]. AI is a decision-making and problem-solving model [2]. Convolutional

neural networks (CNNs) learn structural patterns of a given dataset (input) and perform tasks autonomously, resulting in a databased output [3]. Functional applications of AI in dentistry include assisted treatment planning, computer aided diagnosis based on medical images and predictive data analytics. AI application technology in Dentistry is advancing remarkably. AI involves the clinical decision system, which provide professional guide with computer programs. Dentists with the help of AI can help to diagnose specific oral and dental problems, which helps in affordable, efficient treatment for the patient. AI will guide the dentists to perform the treatment more effectively than human assistants and could avoid the communication gap. Diagnosis of dental problems in the dental field with

the help of AI is reaching levels of human competence. Changing the role of computer-assisted diagnosis from a 'second-opinion' tool to a more collaborative one [4]. The development of AI applications in the field of pediatric dentistry is also remarkable [5].

Robotics is the next generation technology which has opened new pathways in various areas of dentistry. The dental training robots are realistic human-like robots called 'Phantoms' and the treatment robots are simroid, nanorobots, implant robots, Endomicro robots, robotic dental drill, orthodontic arch wire bending robots etc [6]. The robots improve the precision of different dental procedures which are used in all departments of dentistry [7]. AI-based applications will restructure patient care, relieving the dental workforce from lengthy routine tasks, improving health at lesser costs for a wider population and ultimately assist prognostic, protective, and participatory dentistry. It is well known fact that developing countries are struggling with heavy disease burden, untrained healthcare workers as well as inadequate healthcare infrastructure.

In the field of implantology and surgery, AI software has assisted plan surgeries to the minute detail before to the actual surgery. Robotic surgery is one of the greatest applications of AI in field of surgery. AI will not replace dentists, in no ways, there exists a doubt in the supremacy of integrating AI into practice, it can never replace the role of a dentist since clinical practice is not only about diagnosing but also correlating with clinical findings and providing personalized patient care. Although AI can assist in numerous ways, final call has to be made by a dentist as dentistry is a multidisciplinary approach [8]. As the field of healthcare-related AI expands, this process will certainly make an impact on young dentists in addition to those who are currently studying dentistry. It is becoming evident that there is a need for teaching AI technology to dental students. Therefore, it would be necessary to execute a survey among undergraduate students and dentists with a view to evaluate their ideas and perceptions regarding the way in which the field of dentistry might be impacted by AI. Hence study was carried to assess the knowledge and awareness among dentist's toward use of Artificial Intelligence and Robotics in Oral Health Dentistry.

## MATERIALS AND METHODS

A cross-sectional study was carried out on a total number of 300 dental surgeons (Male=150; Female=150) was participated in the study with age ranges from 20- to 55-year-old to know the knowledge and awareness among dentist's toward use of Artificial Intelligence and Robotics in Oral Health Dentistry. Written informed consent was obtained from the participants after explaining to them the purpose of the study. The sampling method included in the study is a simple random sampling method. Ethical approval for performing the survey was obtained from the Scientific Research Committee of King Khalid University, College of

Dentistry. The questions were designed and circulated through online google forms among dental surgeons practicing in the Abha region of Saudi Arabia. The questionnaire was formulated, which comprised of two parts: The first portion included the questions related to the demographic information of participants, such as age, gender, year of experience, and level of education. The other part of the questionnaire comprised of 10 questions with 'yes' and 'no' pattern, and the multiple-choice question will be prepared, and piloting will be done. Questionnaire will be tested for reliability and validity.

A self-administered structured questionnaire originated and was tested among a comfort sample of 20 dental surgeons. These were interviewed to get feedback on the entire acceptability of the study when it comes to length and language clearness; in accordance with their feedback, the queries were corrected. Encounter validity was furthermore assessed before the start of research. Both descriptive and analytical statistical dimensions were used to describe the primary variables by SPSS 18 (IBM Corporation, Armonk, NY, USA) software.

## RESULTS

A total of 300 (150 males and 150 females) dental students, general dentists, and specialists responded to the questionnaire. 85% of study subjects were of 20-30 years, 10% were of 31-40 years, 3% were of 41-50 years, and 2% were >50 years. The majority of participants, 189 (63%) were said that Artificial intelligence will lead to major advances in dentistry and medicine. 48% agreed that Artificial intelligence can replace dentists/physicians in the future. When asked about the participant's whether Artificial intelligence can be used in 3-dimensional implant positioning and planning, majority of participants agreed to this information. 69% of Participants agreed to this statement "Do you think robots are safer and communications better than dentists". However, the majority of participants (78%) agreed that they prefer dentists over robots when there is disruption of power, while performing the operation during major surgeries. Most of the participants recommended that the artificial intelligence subject should be included in the undergraduate dental training curriculum. Participants had a concern about an increase in cost price when robots were introduced in the patient's dental treatment.

## DISCUSSION

The expansion and applications of AI are presently going into in the medical expression as well (5). On the whole, the healthcare market is a natural client of AI software. The AI use to support dental diagnosis, which have been continuously expanding since past decade [9]. Yu et al., include proposed Artificial Nerve organs Network (ANN), to be able to detect the tooth weathering. By using the back-propagation (BP) neural network, typically the X-ray image of your teeth is definitely reviewed. The network obtained considerable superior functionality

in making differential diagnostic category between decayed along with healthy teeth using inter-pixel autocorrelation coefficients as its input characteristic vector. In comparison to one other method, the dental caries detection accuracy seemed to be significantly improved [10].

Mostly dental offices (73.1%) inside the survey gave typically the viewpoint that AI gets the potential to exchange dentists/physicians/assistants later on. Contrary to other professions, it happens to be obvious that AI technology will have issues in replacing medical doctors or dentists. There are many challenges, such as AI cannot take part in high-level discussions with people to attain trust, assure them, express agape [11] and through diagnosis, dentists really still required for presentation in ambiguous conditions to include health background, conduct physical examinations and even encourage further debate [12]. With the potential influence involving AI technology for the future of the healthcare industry, the necessity to include these kinds of topics in the course exists. It is interesting to note that most dental students inside clinical and preclinical years in today's analyze agreed that AI ought to be part of undergraduate dentistry training. The outcomes display a need to incorporate AI into dental curricula. Our findings help other studies representing that students acknowledge the importance of AI solutions within their field and the interest to understand fresh technologies [13,14]. Pauwels et al. documented lowered skepticism following a lecture education about AI [15]. Additional training in this area may lessen negative attitudes to AI and help to be able to an accepted tool throughout practitioners' daily regimens. Promoting AI inside dental education, the add-on of all stakeholders inside the development process together with ensuring a legal in addition to ethical basis will definitely be key elements to the success of AI in dentistry and even medicine. Participants highlighted that the essential doing work principles of AI should be taught throughout dentistry, as mentioned in other studies in the literature [16]. It must be noted, even so, that research has selected limitations. This analyze was carried out between dental students and dentists from a single institution and place. Therefore, the outcome wouldn't normally always be applicable to other dentist schools due to distinct curricula and dental training programs. Therefore, the results would not be applicable to other dental schools due to different curricula and dental training programs. To order to explore these problems further, follow-up surveys and multicenter research should be carried out.

### CONCLUSION

From current study, it was concluded that there is satisfactory awareness about AI & robotic dentistry among dentists. On the basis of these results, the lectures and seminars must be organized to ensure that dental students gain a better understanding of AI and ultimately help them play a fully conscious and active role in the development, implementation and use of AI

tools in dentistry. AI application in dentistry could help dentist's provider in advancement and best possible care to patients. Furthermore, this study serves as a basis for future quantitative studies on this topic. More specifically, prospective studies may focus on the quality and effect of the implemented educational programs and guidelines to demonstrate the impact of AI models on dentistry practice.

### CONFLICTS OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this article.

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