OPEN ACCESS

Saudi Journal of Oral and Dental Research

Abbreviated Key Title: Saudi J Oral Dent Res
ISSN 2518-1300 (Print) | ISSN 2518-1297 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage: https://saudijournals.com

Original Research Article **Surgery**

Digital Literacy and Awareness of Artificial Intelligence Technologies in Oral Healthcare: A Cross-Sectional Community Survey

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DOI: https://doi.org/10.36348/sjodr.2026.v11i06.002 | **Received:** 12.04.2026 | **Accepted:** 03.06.2026 | **Published:** 06.06.2026

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Abstract

Background: Artificial intelligence (AI) is increasingly being integrated into healthcare systems, including dentistry, where it has applications in diagnosis, treatment planning, digital imaging, and patient communication. Public understanding of AI technologies may influence future adoption of digital healthcare systems; however, awareness of AI applications in oral healthcare among community populations remains inadequately explored. ***Aim:*** To assess digital literacy and awareness regarding artificial intelligence technologies in oral healthcare among participants attending a community oral health screening setting. ***Materials and Methods:*** A cross-sectional questionnaire-based survey was conducted among 250 participants attending a community oral health screening setting. A structured and validated questionnaire assessed awareness of artificial intelligence, familiarity with AI applications in healthcare and dentistry, and sources of digital health information. Associations between demographic variables and AI awareness were analyzed using Chi-square tests. Statistical significance was set at $p < 0.05$. ***Results:*** Awareness regarding artificial intelligence technologies varied among participants. Educational status demonstrated a significant association with AI awareness ($p = 0.021$), with participants having higher educational attainment exhibiting greater familiarity with AI applications in healthcare. Participants with greater exposure to digital technologies showed improved awareness regarding AI-based healthcare systems. No statistically significant association was observed between age group and AI awareness ($p = 0.084$). ***Conclusion:*** Educational status and digital literacy appear to influence community awareness regarding artificial intelligence technologies in oral healthcare. Improving public familiarity with digital healthcare systems may support future integration of AI-assisted technologies into oral healthcare delivery and patient communication.

Keywords: Artificial Intelligence, Digital Literacy, Oral Healthcare, Community Dentistry, Healthcare Technology, Public Awareness.

INTRODUCTION

Artificial intelligence (AI) has emerged as one of the most rapidly advancing technologies in modern healthcare. AI systems are increasingly being utilized in medical diagnostics, healthcare communication, data analysis, and clinical decision-making to improve efficiency and accessibility of healthcare services [1]. In dentistry, AI applications have expanded considerably in recent years, with growing use in radiographic interpretation, orthodontic assessment, caries detection, treatment planning, and digital patient management systems [2,3]. The integration of AI into oral healthcare reflects the broader transition toward digital healthcare delivery and technology-assisted clinical practice.

Digital technologies are becoming increasingly important in oral healthcare communication and public health promotion. AI-assisted platforms, including virtual assistants, educational applications, and chatbot-based systems, have demonstrated potential to improve

dissemination of oral health information and support preventive healthcare initiatives [4]. Such technologies may enhance accessibility to healthcare information, particularly among populations with limited access to oral healthcare professionals. The use of AI in oral healthcare may therefore contribute to improved public awareness, early disease recognition, and preventive oral hygiene practices.

Despite rapid technological advancements, public familiarity with artificial intelligence in healthcare remains variable. Several studies have reported that awareness and understanding of digital healthcare technologies are strongly influenced by factors such as educational status, technological exposure, and digital literacy [5,6]. Individuals with greater familiarity with digital technologies are more likely to understand and engage with AI-assisted healthcare systems. Conversely, limited technological awareness may contribute to misconceptions, distrust, and reluctance toward adoption of digital healthcare innovations [7].

In developing countries, disparities in digital literacy and healthcare awareness continue to present challenges for implementation of technology-driven healthcare systems [8]. Although AI applications in dentistry are increasing, limited information is available regarding community awareness and understanding of artificial intelligence technologies in oral healthcare settings. Evaluating public awareness regarding AI technologies may help identify existing knowledge gaps and support development of educational strategies aimed at improving digital health literacy within community populations.

Therefore, the present study aimed to assess digital literacy and awareness regarding artificial intelligence technologies in oral healthcare among participants attending a community oral health screening setting.

MATERIALS AND METHODS

Study Design and Participants

A cross-sectional questionnaire-based survey was conducted among individuals attending a community oral health screening setting between October and November 2024. The study aimed to assess digital literacy and awareness regarding artificial intelligence technologies in oral healthcare. Participation in the survey was voluntary, and informed consent was obtained from all participants prior to inclusion in the study.

The study was conducted in accordance with the principles of the Declaration of Helsinki [9]. As the survey involved anonymous questionnaire-based responses without clinical intervention or collection of identifiable patient information, confidentiality and participant privacy were maintained throughout the study period.

A total of 250 participants aged between 35 and 65 years were included using convenience sampling. Individuals who were able to understand and independently respond to the questionnaire were included in the study, while those unwilling to participate or unable to comprehend the questionnaire were excluded.

Questionnaire and Data Collection

Data were collected using a structured questionnaire designed to assess awareness and familiarity regarding artificial intelligence technologies in healthcare and dentistry. The questionnaire consisted of items evaluating:

- Awareness of artificial intelligence
- Familiarity with AI applications in healthcare
- Knowledge regarding AI use in dentistry
- Sources of information related to AI technologies
- Perceptions regarding digital healthcare systems

Responses were recorded using multiple-choice and Likert-scale formats. The questionnaire underwent content validation by subject experts and was pilot-tested among 20 participants prior to the main survey. Internal reliability assessment demonstrated a Cronbach's alpha value of 0.84, indicating good reliability [10].

Participants completed the questionnaire independently under supervision to ensure completeness and minimize response bias. Completed questionnaires were reviewed and coded before statistical analysis.

Statistical Analysis

Data were entered and analyzed using IBM SPSS Statistics version 25.0. Descriptive statistics, including frequency and percentage, were used to summarize participant responses. Chi-square tests were applied to evaluate associations between demographic variables and awareness regarding artificial intelligence technologies. Statistical significance was set at $p < 0.05$.

RESULTS

A total of 250 participants aged between 35 and 65 years completed the questionnaire. The majority of participants belonged to the 35–45-year age group (36.8%), followed by 46–55 years (35.2%) and 56–65 years (28.0%). Most participants had completed secondary or graduate-level education (Table 1).

Awareness regarding artificial intelligence technologies varied among the study population. When participants were asked whether they had previously heard about artificial intelligence, 89 participants (35.6%) responded "Yes," while 78 participants (31.2%) responded "No," and 83 participants (33.2%) reported uncertainty regarding AI technologies (Table 2).

Participants demonstrated varying levels of familiarity regarding applications of artificial intelligence in healthcare and dentistry. A greater proportion of participants with higher educational attainment reported awareness regarding AI applications in healthcare settings compared with individuals with lower educational levels. Educational status demonstrated a statistically significant association with awareness regarding artificial intelligence technologies ($p = 0.021$) (Table 3).

Analysis of sources of information revealed that digital media and internet-based platforms represented the most common sources through which participants had heard about artificial intelligence technologies. Social media, online platforms, and television contributed substantially to awareness regarding AI-related healthcare information (Table 4).

No statistically significant association was observed between age group and awareness regarding artificial intelligence technologies ($p = 0.084$), although younger participants demonstrated comparatively greater familiarity with digital healthcare concepts than older participants (Table 5).

Overall, the findings suggest that educational attainment and digital exposure may play important roles in influencing community awareness regarding artificial intelligence technologies in oral healthcare.

Table 1: Demographic characteristics of study participants

Variable	Category	Frequency (n)	Percentage (%)
Age	35–45 years	92	36.8
	46–55 years	88	35.2
	56–65 years	70	28.0
Educational status	Primary education	54	21.6
	Secondary education	96	38.4
	Graduate	71	28.4
	Postgraduate	29	11.6

Table 2: Awareness regarding artificial intelligence technologies among participants

Response	Frequency (n)	Percentage (%)
Aware of AI	89	35.6
Not aware of AI	78	31.2
Uncertain regarding AI	83	33.2

Table 3: Association between educational status and awareness regarding artificial intelligence technologies

Educational status	Aware n (%)	Not aware/Uncertain n (%)	p-value
Primary education	18 (33.3)	36 (66.7)	0.021
Secondary education	32 (33.3)	64 (66.7)	
Graduate	28 (39.4)	43 (60.6)	
Postgraduate	11 (37.9)	18 (62.1)	

Table 4. Sources of awareness regarding artificial intelligence technologies

Source of information	Frequency (n)	Percentage (%)
Social media	82	32.8
Internet websites	61	24.4
Television	49	19.6
Healthcare professionals	31	12.4
Friends/Family	27	10.8

Table 5: Association between age group and awareness regarding artificial intelligence technologies

Age group	Aware n (%)	Not aware/Uncertain n (%)	p-value
35–45 years	39 (42.4)	53 (57.6)	0.084
46–55 years	31 (35.2)	57 (64.8)	
56–65 years	19 (27.1)	51 (72.9)	

DISCUSSION

The present study evaluated community awareness and digital literacy regarding artificial intelligence (AI) technologies in oral healthcare. The findings demonstrated variable levels of awareness among participants, with educational status showing a significant association with familiarity regarding AI applications in healthcare and dentistry. These observations suggest that digital literacy and technological exposure may play important roles in

shaping public understanding of emerging healthcare technologies.

Awareness regarding artificial intelligence technologies was limited among a substantial proportion of participants. Similar findings have been reported in previous healthcare studies, where public familiarity with AI systems remained inadequate despite increasing digitalization of healthcare services [11]. Limited awareness may be attributed to reduced technological exposure, inadequate digital literacy, and lack of structured public education regarding AI applications in healthcare. As AI continues to expand within dentistry and medicine, improving public understanding of these technologies may become increasingly important for successful integration into routine healthcare systems.

Educational attainment demonstrated a significant association with awareness regarding artificial intelligence technologies. Participants with higher educational levels exhibited comparatively greater familiarity with AI concepts and healthcare-related technological applications. Previous investigations evaluating digital healthcare literacy have similarly identified educational status as an important determinant influencing awareness and understanding of healthcare technologies [5,6]. Individuals with greater educational exposure may possess increased access to digital information sources and improved ability to interpret healthcare-related technological content.

Digital media and internet-based platforms represented the primary sources through which participants became aware of artificial intelligence technologies. Social media, online platforms, and digital communication systems now play a major role in dissemination of healthcare-related information within community populations [12]. These findings highlight the growing influence of digital media in shaping public perceptions regarding healthcare technologies and emphasize the importance of accurate and evidence-based dissemination of oral healthcare information through digital platforms.

Although younger participants demonstrated comparatively greater familiarity with digital healthcare concepts, no statistically significant association was observed between age group and awareness levels. Similar findings have been reported in studies evaluating healthcare technology awareness, where technological exposure and educational background appeared to exert greater influence than chronological age alone [13]. Increased accessibility of smartphones and internet services across age groups may contribute to broader exposure to healthcare-related digital information.

The increasing integration of artificial intelligence into oral healthcare systems presents important opportunities for improving healthcare accessibility, patient communication, and preventive oral health awareness [1,4]. AI-assisted technologies may support early disease detection, digital treatment planning, patient education, and healthcare communication within community settings. However, successful implementation of such systems requires adequate public awareness and digital literacy to ensure appropriate utilization and trust in technology-assisted healthcare services [7].

The present study has certain limitations. The cross-sectional design limits the ability to establish causal relationships, and the findings were derived from participants attending a single community oral health screening setting, which may limit generalizability. Additionally, questionnaire-based responses may be subject to reporting bias. Future multicentre studies involving larger and more diverse populations are recommended to further evaluate public awareness and digital literacy regarding artificial intelligence technologies in oral healthcare.

Within the limitations of the present study, educational status and digital exposure appeared to significantly influence community awareness regarding artificial intelligence technologies in oral healthcare. Improving digital literacy and public awareness may facilitate future integration of AI-assisted technologies into preventive and community oral healthcare systems.

CONCLUSION

Within the limitations of the present study, community awareness regarding artificial intelligence technologies in oral healthcare appeared to be influenced by educational status and digital literacy. Participants with greater educational attainment demonstrated comparatively better familiarity with AI applications in healthcare and dentistry.

Digital media represented a major source of awareness regarding emerging healthcare technologies. Improving public understanding of artificial intelligence and strengthening digital health literacy may support future integration of AI-assisted technologies into preventive oral healthcare, patient communication, and community-based oral health programs.

Conflicts of Interest: The authors declare no conflicts of interest.

Financial Support: The authors have declared that no financial support was received for this study.

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