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ORIGINAL RESEARCH

Public Knowledge and Acceptance of Artificial Intelligence–Assisted Physicians in Saudi Arabia: A Cross-Sectional Study

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Background: Artificial intelligence (AI) technologies are increasingly integrated into healthcare systems worldwide. However, successful implementation depends largely on public trust and acceptance. Limited evidence is available regarding public perceptions of AI-based medical consultation in Saudi Arabia.

Objective: This study aimed to assess public knowledge and acceptance of artificial intelligence doctors as a partial alternative to human physicians in Saudi Arabia and identify demographic factors influencing these perceptions.

Methods: A cross-sectional online survey was conducted among members of the general public in Saudi Arabia. The questionnaire assessed demographic characteristics, awareness of AI technologies, knowledge of AI healthcare applications, perceptions of AI doctors, and willingness to use AI-assisted medical consultation. Descriptive statistics were used to summarize responses, and Chi-square tests were performed to examine associations between demographic factors and participants' acceptance levels.

Results: A total of 303 participants completed the survey. Most respondents reported prior awareness of artificial intelligence applications in healthcare. However, acceptance of AI as a partial substitute for human physicians remained cautious. Participants acknowledged potential benefits such as efficiency and diagnostic support but expressed concerns regarding trust, reliability, and ethical considerations.

Conclusion: While awareness of AI technologies in healthcare appears relatively widespread among the Saudi public, acceptance of AI-based medical consultation remains moderate. Educational initiatives and transparent regulatory frameworks may enhance public trust and facilitate responsible integration of AI technologies into healthcare systems.

Keywords: artificial intelligence, healthcare, public perception, acceptance, Saudi Arabia, physicians

Introduction

Artificial intelligence (AI) has rapidly emerged as a transformative technology in modern healthcare.[1] AI-based systems have demonstrated potential in medical imaging interpretation, disease diagnosis, clinical decision support, and drug discovery. These technologies may enhance healthcare efficiency, reduce diagnostic errors, and support physicians in providing personalized patient care.[2,3] One of AI's key strengths is its ability to analyse vast amounts of medical data quickly, enabling faster and more objective decision-making compared to human practitioners.[4]

The integration of AI in healthcare offers numerous benefits. For instance, AI-based diagnostic systems can detect early signs of diseases such as cancer and cardiovascular conditions with high precision, often outperforming traditional diagnostic methods. AI is also being used in telemedicine, predictive analytics, and robotic-assisted surgeries, enhancing both the quality and accessibility of healthcare. Moreover, AI technologies support healthcare management systems by

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optimizing resource allocation and reducing operational costs. However, despite these advancements, challenges such as data bias, ethical considerations, and the need for human oversight remain major concern.[5]

Despite these potential advantages, successful implementation of AI in healthcare depends not only on technological performance but also on public acceptance and trust.[6] Patients' willingness to interact with AI-powered systems plays a crucial role in determining how effectively these technologies can be adopted in clinical settings. Concerns regarding data privacy, reliability, ethical issues, and lack of human interaction may influence public perceptions of AI in healthcare.[5–7]

Globally, several studies have investigated public perceptions of AI technologies in medicine. However, findings vary across countries due to differences in healthcare systems, cultural factors, and levels of technological exposure.[8] In Saudi Arabia, digital health technologies are increasingly being promoted as part of national healthcare transformation initiatives aligned with Vision 2030. Nevertheless, limited research has explored public knowledge and acceptance of AI-driven medical consultation within the Saudi population.[8]

Understanding public perceptions of AI in healthcare is essential for policymakers, healthcare providers, and technology developers. Such information may help identify barriers to adoption and guide strategies to enhance trust and responsible integration of AI technologies into healthcare services.

Methods

Study Design

A cross-sectional survey was conducted among members of the general public in Saudi Arabia between February 10 and April 28, 2025.

Study Population

The study targeted adults residing in Saudi Arabia. Participants were eligible if they were aged 18 years or older and able to complete the online questionnaire. Electronic consent was taken before starting the survey.

Survey Instrument

The questionnaire was adapted from previously published studies examining awareness and attitudes toward artificial intelligence in healthcare.[9] The survey included sections assessing demographic characteristics, awareness of AI technologies, knowledge of AI healthcare applications, perceptions toward AI doctors, and acceptance of AI-assisted medical consultation.

Data Collection

The survey was distributed online through social media platforms and community networks. Participation was voluntary and anonymous.

Sample Size Calculation

The minimum required sample size was calculated using a 95% confidence level and 5% margin of error. The estimated sample size was 384 participants. However, 303 completed responses were obtained and included in the final analysis.

Instrument Development and Validation

The questionnaire was originally developed in Arabic to ensure linguistic and cultural relevance. It was subsequently translated into English and back-translated into Arabic by bilingual experts to verify translation accuracy and conceptual equivalence. The survey instrument was adapted from previously validated questionnaires identified in related literature and was reviewed by academic experts in health informatics and medical ethics to confirm clarity, content validity, and alignment with the study objectives.

The final version of the instrument comprised five sections:

1. Sociodemographic characteristics: including age, gender, education level, occupation, and whether the respondent worked in healthcare.
2. Knowledge of AI: assessing participants' awareness, understanding, and prior exposure to AI technologies.
3. Acceptance and trust in AI: measuring willingness to engage with or rely on AI-assisted healthcare tools.
4. Concerns and barriers: evaluating apprehensions regarding AI, including data privacy, accuracy, and the absence of human empathy.
5. Perceived impact: exploring opinions on how AI may influence the quality, accessibility, and efficiency of healthcare services.

Attitudinal items were rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Ethical Considerations

The questionnaire link was disseminated digitally to reach a diverse population across Saudi Arabia. No personally identifiable information was collected. Participation was voluntary, and all responses were treated with strict confidentiality. Electronic informed consent was obtained at the beginning of the survey. The study adhered to the ethical principles outlined in the Declaration of Helsinki (2013 revision) and received ethical approval from the appropriate institutional review committee. Ethical approval was taken from Umm Al-Qura University IRB committee with the Approval No. (HAPO-02-K-012-2025-04-2636).

Data Analysis

Data were cleaned, coded, and analysed using IBM SPSS Statistics, Version 31.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics—including frequencies, percentages, means, and standard deviations—were used to summarize participants' demographic characteristics and survey responses. The relationships between sociodemographic variables and levels of knowledge or acceptance of AI were examined using Chi-square (χ^2) tests. A p-value of <0.05 was considered statistically significant for all inferential analyses.

Operational Definitions

Awareness: Participants' prior familiarity with artificial intelligence technologies in healthcare.

Knowledge: Participants' understanding of AI applications in medical diagnosis, treatment support, and healthcare management.

Acceptance: Participants' willingness to use AI-based medical consultation or allow AI systems to assist physicians in healthcare decision-making.

Results

Participant Characteristics

A total of 303 individuals participated in the study. The majority were female (63.0%), while males accounted for 37.0%. The age distribution revealed that most respondents were between 18–27 years (24.1%), 28–37 years (21.5%), and 38–47 years (21.5%), whereas only 22.4% were older than 50 years. Most participants held a bachelor's degree (68.3%), followed by those with a master's degree or higher (11.9%). Regarding occupation, 36.6% were employed in non-healthcare sectors, 20.8% were healthcare professionals, 15.2% were students, and 17.2% were unemployed. Only 27.7% reported working in healthcare-related professions, including 3.0% specialist physicians, 1.3% general practitioners, and 23.4% other healthcare professionals (Table 1).

Knowledge and Awareness of Artificial Intelligence in Healthcare

More than half of the respondents (53.1%) demonstrated basic knowledge of artificial intelligence (AI), while 18.8% had good knowledge, 24.1% reported no knowledge, and only 4.0% indicated an advanced level. Most participants (80.5%)

Table 1 Participants Demographics (n=303)

Variables	Category	Numbers	Percentage%
Gender	Male	112	37.0
	Female	191	63.0
	18–27 years old	73	24.1
	28–37 years old	65	21.5
	38–47 years old	65	21.5
	48–50 years old	29	9.6
	More than 50 years old	68	22.4
Educational level	Intermediate	5	1.7
	High school	26	8.6
	Diploma	28	9.2
	Bachelor's degree	207	68.3
	Master's degree or higher	36	11.9
Occupation	Student	46	15.0
	Healthcare employee	63	20.8
	Non-healthcare employee	111	36.6
	Unemployed	52	17.2
	Retired	31	10.2
Role in healthcare	Specialist physician	9	3.0
	General practitioner	4	1.3
	Other healthcare professional	71	23.4
	Not in healthcare	219	72.3
Knowledge level of AI in healthcare	None	73	24.1
	Basic	161	53.1
	Good	57	18.8
	Advanced	12	4.0
Acceptance of using AI in healthcare	Low	73	24.1
	Moderate	152	50.2
	High	57	18.8
	No acceptance	21	6.9

had prior awareness of AI, and 75.9% recognized that AI is currently utilized in healthcare settings. Social media was identified as the primary information source for AI in healthcare (58.4%), followed by news or scientific journals (11.9%), educational courses (6.9%), and university training (5.3%) (Table 2).

Table 2 Participants' Knowledge and Awareness About Artificial Intelligence (n=303)

Variables	Category	Numbers	Percentage%
Do you have prior knowledge of AI?	Yes	244	80.5
	No	59	19.5
Have you ever used AI applications in your daily life?	Yes, in healthcare	38	12.5
	No	94	31.0
	Yes, in other fields	171	56.4
Are you aware that AI is used in diagnosis and medical decision-making?	Yes	175	57.8
	No	128	42.2
What is your main source of information about AI in healthcare?	Social media	177	58.4
	News/Journals	36	11.9
	Courses	21	6.9
	University	16	5.3
	Never heard of it	53	17.5
Are you aware that AI is used in the healthcare field?	Yes	230	75.9
	No	73	24.1

Attitudes and Acceptance of AI in Healthcare

Regarding acceptance of AI in healthcare, approximately half of the participants (50.2%) reported moderate acceptance, while 18.8% expressed high acceptance, 24.1% low acceptance, and 6.9% no acceptance at all. Most respondents (62.7%) believed that AI in medicine would be beneficial, and 61.7% agreed that AI could enhance healthcare efficiency. However, 48.2% disagreed with the idea of AI serving as a partial substitute for human physicians, reflecting persistent skepticism toward AI-driven medical decision-making (Table 3).

Table 3 Participants' Perspectives About the Use of an Artificial Intelligence Doctor as a Partial Alternative for a Human Physician (n = 303)

Variables	Category	Numbers	Percentage%
Do you agree that AI can be a partial substitute for human doctors?	Yes	54	17.8
	No	146	48.2
	Not sure	103	34.0
Do you believe AI in medicine will be beneficial?	Yes	190	62.7
	No	18	5.9
	Not sure	95	31.4
Do you think AI will enable doctors to provide more efficient services?	Yes	187	61.7
	No	30	9.9
	Not sure	86	28.4
Do you think people around you are optimistic about AI in medicine?	Yes	102	33.7
	No	60	19.8
	Not sure	141	46.5

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Perceived benefits of AI-powered virtual doctors included improved access to care in remote areas, reduced workload for human clinicians, decreased medical errors, provision of unbiased consultations, and lower healthcare costs (Figure 1). Conversely, the most frequently reported concerns were the lack of human empathy, risk of misdiagnosis due to limited contextual understanding, data privacy issues, and fear of AI replacing human physicians (Figure 2).

Factors Associated with Knowledge of AI

Chi-square analyses demonstrated that knowledge of AI was significantly associated with age group ($p < 0.001$), occupation ($p < 0.001$), and role in healthcare ($p < 0.001$). Participants aged above 38 years and those employed in healthcare or technical professions exhibited greater knowledge levels compared with younger or non-healthcare participants. No significant associations were observed between knowledge level and gender or educational attainment (Table 4).

Factors Associated with Acceptance of AI

Acceptance levels of AI in healthcare varied across sociodemographic categories. Although gender and age were not significantly associated with acceptance, occupation showed a borderline association ($p = 0.051$), suggesting that healthcare workers tended to have more favourable attitudes than non-healthcare participants (Table 5).

Furthermore, acceptance was significantly associated with knowledge level ($p = 0.008$), where participants with higher AI knowledge demonstrated greater acceptance and trust toward its implementation in healthcare practice (Table 6). This positive relationship underscores the importance of education and awareness in shaping public attitudes toward emerging digital health technologies.

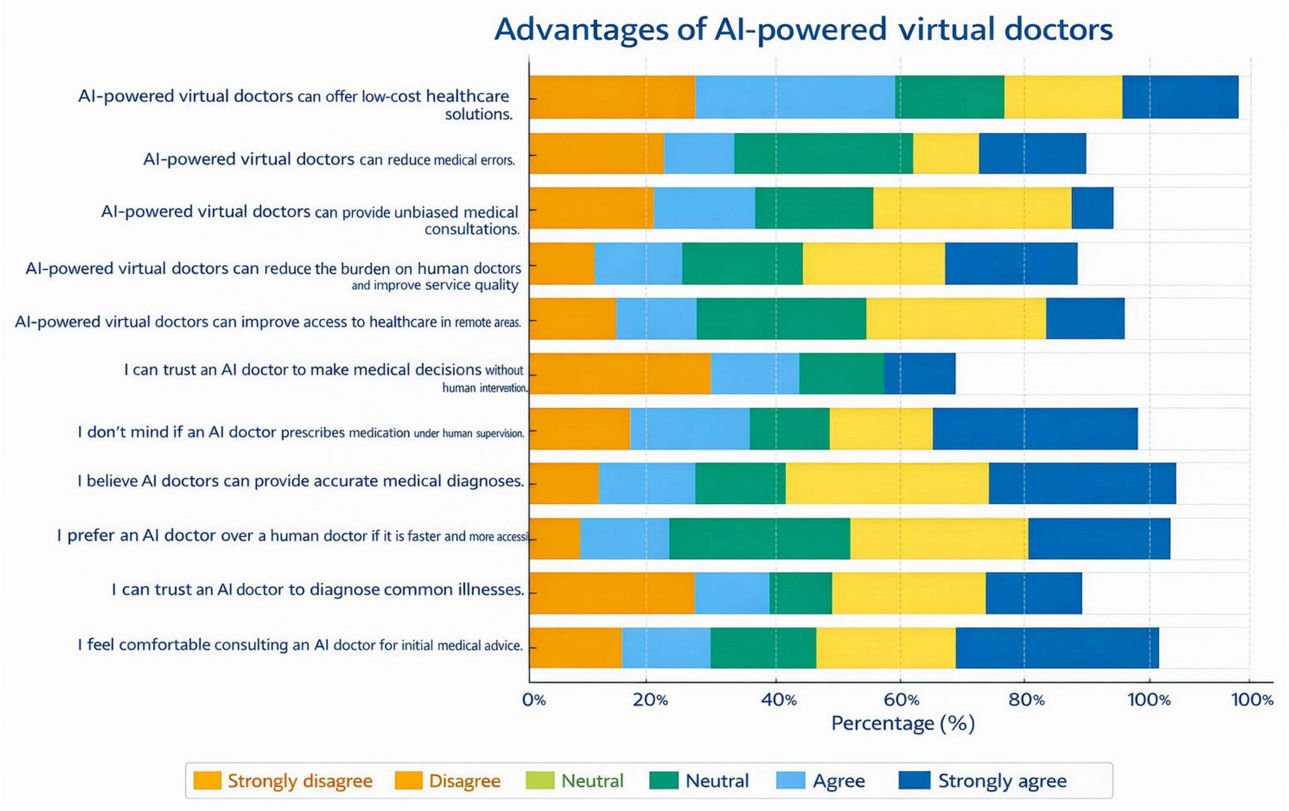

Figure 1 Perceived advantages of AI-powered virtual doctors among participants (n=303).

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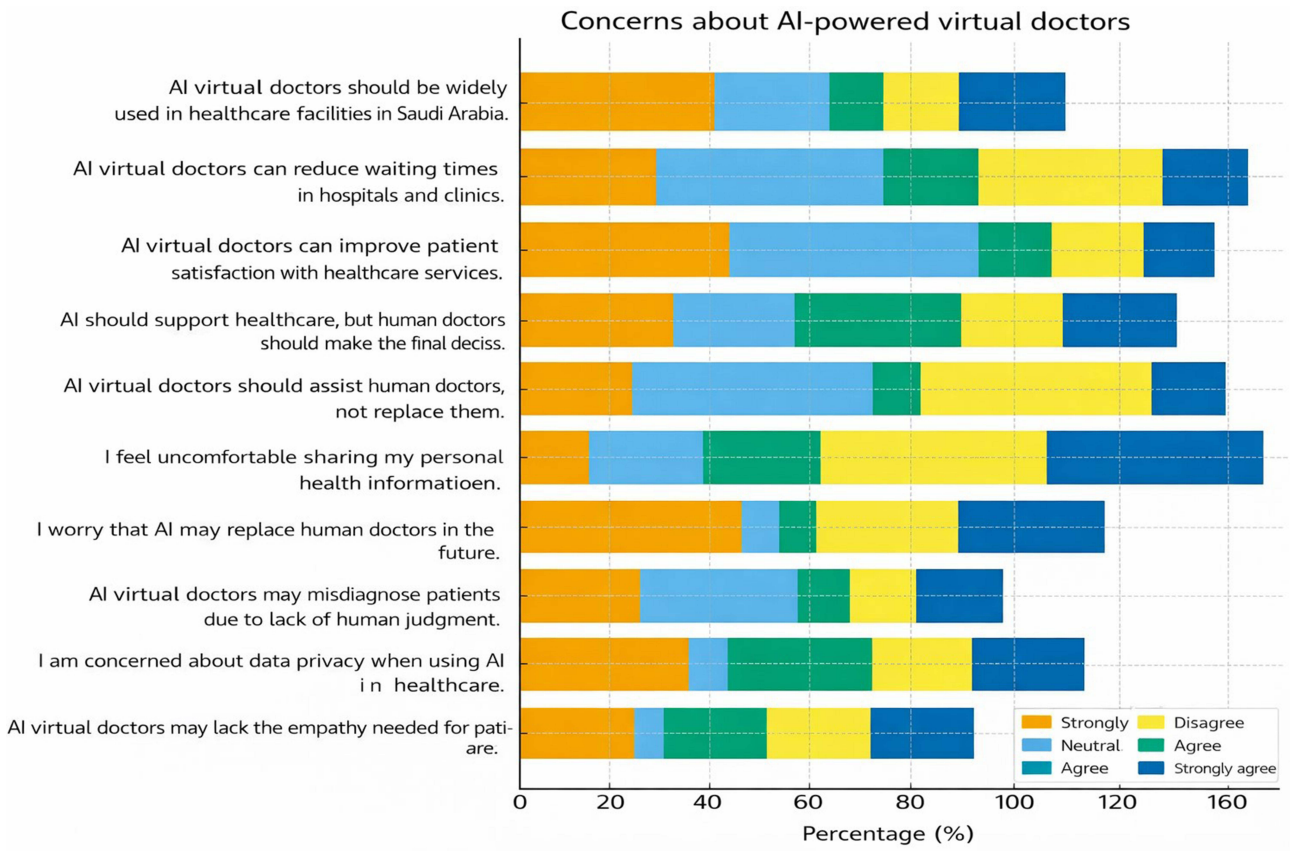

Figure 2 Concerns about AI-powered virtual doctors among participants (n=303).

Discussion

This study explored public and professional awareness, acceptance, and perceived barriers regarding artificial intelligence (AI) integration in healthcare in Saudi Arabia. The results contribute to the growing body of literature assessing how demographic, occupational, and educational factors influence attitudes toward AI applications in medicine.[10,11] The

Table 4 Knowledge of Artificial Intelligence Based on Sociodemographic Characteristics

Variables	Category	Knowledge Level of AI in Healthcare								P-value*
		None		Basic		Good		Advanced		
		N	%	N	%	N	%	N	%	
Gender	Male	23	7.6	63	20.8	3	7.6	112	1.0	0.517
	Female	50	16.5	98	32.3	34	11.2	9	3.0	
Age	18-27 years old	5	1.7	40	13.2	26	8.6	2	0.7	<0.001
	28-37 years old	14	4.7	39	12.9	10	3.3	2	0.7	
	38-47 years old	19	6.3	36	11.9	4	1.3	6	2.0	
	48-50 years old	11	3.6	11	3.6	6	2.0	1	0.3	
	More than 50 years old	24	7.9	32	10.6	11	3.6	1	0.3	

(*Continued*)

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Table 4 (Continued).

Variables	Category	Knowledge Level of AI in Healthcare								P-value*
		None		Basic		Good		Advanced		
		N	%	N	%	N	%	N	%	
Educational Level	Intermediate	3	1.0	2	0.7	0	0.0	0	0.0	0.27
	High school	8	2.6	14	4.6	4	1.3	0	0.0	
	Diploma	10	3.3	12	4.0	5	1.7	1	0.3	
	Bachelor's degree	48	15.8	114	37.6	38	12.5	7	2.3	
	Master's degree or higher	4	1.3	18	5.9	10	3.3	4	1.3	
Occupation	Student	3	1.0	25	8.3	17	5.6	1	0.3	<0.001
	Healthcare employee	8	2.6	40	13.2	14	4.6	1	0.3	
	Non-healthcare employee	32	10.6	60	19.0	12	4.0	7	2.3	
	Unemployed	17	5.6	24	7.9	8	2.6	3	1.0	
	Retired	13	4.3	12	4.0	6	2.0	0	0.0	
Role in healthcare	Specialist physician	2	0.7	6	2.0	0	0.0	1	0.3	<0.001
	General practitioner	0	0.0	2	0.7	2	0.7	0	0.0	
	Other healthcare professional	6	2.0	43	14.2	22	7.3	0	0.0	
	Not in healthcare	65	21.5	110	36.3	33	10.0	11	3.6	

Note: *Chi-square test.

Table 5 Acceptance of Artificial Intelligence Based on Sociodemographic Characteristics

Variable	Category	Acceptance Level of Using AI in Healthcare								p-value*
		Low		Moderate		High		No Acceptance		
		N	%	N	%	N	%	N	%	
Gender	Male	23	7.6	60	19.8	23	7.6	6	2.0	0.52
	Female	50	16.5	92	30.4	34	11.2	15	5.0	
Age	18-27 years old	8	2.6	45	14.9	18	5.9	2	0.7	0.201
	28-37 years old	17	5.6	30	9.9	13	4.3	5	1.7	
	38-47 years old	18	5.9	29	9.6	12	4.0	6	2.0	
	48-50 years old	12	4.0	11	3.6	3	1.0	3	1.0	
	More than 50 years old	17	5.6	36	11.9	10	3.3	5	1.7	
Educational Level	Intermediate	1	0.3	3	1.0	0	0.0	1	0.3	0.743
	High school	4	1.3	17	5.6	4	1.3	1	0.3	
	Diploma	6	2.0	14	4.6	6	2.0	2	0.7	
	Bachelor's degree	56	18.5	101	33.3	35	11.0	15	5.0	
	Master's degree or higher	6	2.0	16	5.3	12	4.0	2	0.7	

(*Continued*)

Table 5 (Continued).

Variable	Category	Acceptance Level of Using AI in Healthcare								p-value*
		Low		Moderate		High		No Acceptance		
		N	%	N	%	N	%	N	%	
Occupation	Student	3	1.0	29	9.6	10	3.0	4	1.3	0.051
	Healthcare employee	14	4.6	34	11.2	12	4.0	3	1.0	
	Non-healthcare employee	37	12.2	43	14.2	25	8.3	6	2.0	
	Unemployed	13	4.3	29	9.6	6	2.0	4	1.3	
	Retired	6	2.0	17	5.6	4	1.3	4	1.3	
Role in healthcare	Specialist physician	3	1.0	5	1.7	1	0.3	0	0.0	0.279
	General practitioner	0	0.0	2	0.7	2	0.7	0	0.0	
	Other healthcare professional	11	3.6	40	13.2	17	5.6	3	1.0	
	Not in healthcare	59	19.5	105	34.7	37	12.2	18	5.9	

Note: *Chi-square test.

Table 6 Association Between Knowledge and Acceptance of Artificial Intelligence

Variables	Category	Acceptance Level of Using AI in Healthcare								p-value*
		Low		Moderate		High		No Acceptance		
		N	%	N	%	N	%	N	%	
Knowledge level of AI in healthcare	None	21	6.90	31	10.20	10	3.30	11	3.60	0.008
	Basic	43	14.2	81	26.70	29	9.60	8	2.60	
	Good	8	2.60	35	11.60	13	4.30	1	0.30	
	Advanced	1	0.30	5	1.70	5	1.70	1	0.30	

Note:*Chi-square test.

findings suggest that while awareness of AI in healthcare is relatively widespread, acceptance of AI doctors remains cautious due to concerns about trust, reliability, and ethical considerations.

Moreover, our results demonstrated a generally positive perception of AI in healthcare, consistent with previous Saudi and international studies reporting growing optimism toward AI-assisted medical technologies.[9,11,12] Many participants, especially younger and highly educated individuals, exhibited greater awareness of AI applications, aligning with prior research linking technological literacy with education level.[12,13] A 2025 survey of Saudi medical students similarly revealed that those with prior exposure to AI tools had higher readiness scores and more positive attitudes.[12] Despite increasing awareness, several participants expressed uncertainty about the reliability and ethical use of AI-driven systems.[14,15] This observation reinforces global findings that awareness does not necessarily translate into trust or readiness for clinical adoption.[16,17]

Acceptance of AI as a partial substitute for human doctors was primarily influenced by occupation, echoing earlier evidence that healthcare experience shapes attitudes toward AI.[11,13] Healthcare professionals often express both enthusiasm and caution—acknowledging efficiency benefits but also fearing potential loss of clinical autonomy or human judgment.[15,16,] Public participants outside healthcare were more accepting of AI in administrative and diagnostic roles but less so in direct patient interaction, suggesting the persistence of concerns related to empathy and accountability.[9,17,]

These attitudes mirror findings from other Gulf-region studies emphasizing the cultural and ethical dimensions of AI acceptance.[9,18]

Although participants recognized AI's potential to improve diagnostic accuracy, reduce human error, and expand access to care, significant barriers remain. The most cited obstacles were limited AI education, lack of institutional support, and concerns about privacy and data security.[5,8,19] This aligns with recent systematic reviews identifying workforce training, governance, and ethical uncertainty as major impediments to AI adoption.[7,10,20] A Saudi review of the healthcare sector further found that only a small percentage of hospitals had implemented AI-based systems due to cost, infrastructure, and policy limitations.[1,21] Globally, similar constraints persist in areas such as algorithm transparency, interoperability, and regulatory oversight.[15,22] Building organizational readiness and developing AI governance frameworks are essential to ensure safe and equitable deployment.[13,23]

Moreover, the results underscore the need for national strategies promoting AI literacy, ethics, and infrastructure development. Integrating AI-focused education into medical and allied health curricula could enhance acceptance and preparedness.[4,6,19] Structured training programs emphasizing clinical safety, patient communication, and ethical awareness can reduce misconceptions and build trust among practitioners.[12,18] Additionally, collaboration between the Ministry of Health, academic institutions, and technology providers is vital to establish regulatory frameworks ensuring transparency, data protection, and algorithmic fairness.[9,20,21,23]

Longitudinal and qualitative studies are recommended to track evolving perceptions of AI as technologies advance. Further exploration of patient perspectives, particularly in diagnostic and decision-support contexts, will provide a more comprehensive understanding of societal readiness.[15,22–27,] Strengthening interdisciplinary cooperation and policy alignment with Vision 2030 can accelerate the safe, efficient, and ethical implementation of AI in Saudi healthcare.[28–30]

It should be noted that this study has a number of limitations. At first the cross-sectional survey design records respondents' opinions at one particular moment in time, which might not accurately represent how attitudes about AI change as the technology develops. Second, there were only 303 participants in the sample, and a larger percentage of females and people not in the medical field may have impacted how broadly the results may be applied. Third, participants may overestimate or underestimate their level of acceptance and awareness about AI, which could lead to bias in reported results. Lastly, other potentially significant characteristics, such as cultural background, socioeconomic level, and past exposure to AI technologies, were not evaluated because this study concentrated on fundamental demographic information. Recommendations larger and more varied populations should be included in future research to enhance generalizability and enable subgroup analysis. As AI is increasingly incorporated into healthcare systems, longitudinal research approaches are advised for following variations in awareness and acceptance.

Although many participants acknowledged potential benefits of artificial intelligence in healthcare, their acceptance of AI as a substitute for human physicians remained cautious. This apparent discrepancy may reflect the distinction between perceived usefulness and trust in autonomous medical decision-making. While individuals may recognize the efficiency and analytical power of AI systems, many still prefer human physicians due to concerns about empathy, accountability, and ethical responsibility in clinical care. Further understanding of differences in public and professional perceptions may also be established by investigating the influence of contextual and cultural factors. Lastly, building confidence and acceptance of AI in medical practice will need to address issues with privacy, accuracy, and the doctor-patient relationship.

Conclusion

This study provides insight into public perceptions of artificial intelligence in healthcare within Saudi Arabia. Although awareness of AI technologies appears relatively widespread, acceptance of AI-based medical consultation as a partial alternative to human physicians remains moderate. Concerns regarding trust, reliability, and ethical implications continue to influence public attitudes. These findings highlight the need for public education, transparent communication, and appropriate regulatory frameworks to support the responsible integration of artificial intelligence technologies into healthcare systems.

Data Sharing Statement

Data is available upon request from the correspondence author.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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