Patient Preference and Adherence

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Knowledge, Attitudes, and Perceptions of Chronic Patients in Saudi Arabia Regarding the Use of Artificial Intelligence to Improve Medication Adherence

Safaa M Alsanosi[1], Asayel Q Aldajani[2], Hasnaa A Gheliwi[2], Manar M Alotibi[2], Ghadi S Bokhari[2], Orjuwan A Almatrafi[2], Abdulelah K Alqawlaq[3], Jakleen Z Abujamai[3], Mohammed Shaikhomer[4], Yosra Z Alhindi[1], Asim M Alshanberi[3]

[1]Department of Pharmacology and Toxicology, Faculty of Medicine, Umm Al Qura University, Makkah, Saudi Arabia; [2]Faculty of Medicine, Umm Al-Qura University, Makkah, Saudi Arabia; [3]General Medicine Program, Batterjee Medical College, Jeddah, Saudi Arabia; [4]Department of Internal Medicine, Faculty of Medicine, King Abdulaziz University, Jeddah, Saudi Arabia

Correspondence: Safaa M Alsanosi, Department of Pharmacology and Toxicology, Faculty of Medicine, Umm Al Qura University, Makkah, Saudi Arabia, Email smsanosi@uqu.edu.sa

Background: Artificial intelligence (AI) is advancing healthcare globally and in Saudi Arabia, enhancing patient care, diagnostics, and administrative efficiency, despite challenges such as data privacy and regulation. This study explores knowledge, attitudes, and perceptions (KAP) regarding AI in medication adherence among chronic patients in Makkah region, Saudi Arabia.

Methods: A cross-sectional study was conducted among patients with chronic diseases in the Makkah region, Saudi Arabia, from 1 July to 31 December 2024. The study included adult patients with chronic diseases (≥18 years) receiving primary care in the Makkah region. KAP levels were analyzed using descriptive statistics and composite scores, with demographic associations evaluated through Pearson chi-square tests ($p<0.05$).

Results: A total of 385 participants were included in the study. Most participants were women (60%), and those belonging to the 50 years or older group comprised the highest percentage (51.2%). The most reported chronic conditions were diabetes (30.7%), hypertension (19.7%), and asthma (14%). Knowledge levels were at a good level among 72.7% of the study participants, and 45.5% expressed a positive attitude towards AI's role. Perception was high among 50.9% of the respondents but low among 23.4%. Demographic factors, particularly age, significantly improved KAP (p-values of 0.048, 0.046, and 0.031, respectively). A positive attitude towards AI's role in medication adherence was observed in 58.2% of the participants with good knowledge levels compared to only 11.4% of those with poor knowledge ($p=0.001$). Variations in perception levels regarding AI's role in medication adherence were evident across demographics, with statistically significant associations found for age and overall knowledge level (p-values of 0.031 and 0.001, respectively).

Conclusion: The results highlight AI's potential to enhance medication adherence and healthcare efficiency while maintaining a human-centred approach. To ensure effective integration, it's crucial to address concerns related to privacy, trust, and reduced human interaction. AI should be positioned as a supportive tool that complements—not replaces—human care, with transparent governance and targeted education playing key roles.

Keywords: knowledge, attitude, perception, artificial intelligence, medication adherence, chronic patients

Introduction

Artificial intelligence has emerged as a groundbreaking technology with the potential to revolutionise healthcare systems worldwide, including in Saudi Arabia.[1] In recent years, there has been growing interest in applying AI across various healthcare domains to improve patient care, enhance diagnostic accuracy, and optimise treatment outcomes.[2] The adoption of AI in Saudi Arabia's healthcare sector is advancing rapidly, driven by the nation's commitment to strengthening healthcare infrastructure and fostering digital transformation.[3]

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The rising life expectancy and an ageing population have increased reliance on long-term medications for chronic disease management.[4] However, the full potential of these treatments is often undermined, as nearly half of patients fail to adhere to the prescribed regimens.[5] The WHO defines medication adherence as the extent to which a patient's behaviour aligns with agreed recommendations from healthcare providers.[6] Challenges in adherence include the absence of a universal standard for adherence thresholds and the limited use of interventions to measure and improve adherence in clinical practice.[7] Adherence is generally higher among patients with acute conditions compared to those with chronic diseases, such as diabetes, hypertension, and depression, which exhibit the highest rates of nonadherence.[8]

In Saudi Arabia, chronic diseases are largely managed at primary care centres, where electronic prescriptions are sent directly to pharmacies. Despite these efforts, adherence among chronic disease patients remains low, contributing to adverse outcomes and higher healthcare costs.[9,10] Medication nonadherence is a significant issue in Saudi Arabia, particularly among patients with chronic diseases. In the Makkah region, 42% of patients reported forgetting their medications, and 49% lacked regular follow-ups—although 78% claimed adherence to the instructions and 61% followed their prescribed medication schedules.[7] Among elderly patients in Riyadh, 35.1% exhibited lower adherence levels, while in Taif, 84.1% of psychiatric patients were nonadherent due to factors such as unemployment, insufficient family support, lack of health education, and side effects.[11,12] These findings highlight the importance of implementing targeted strategies to enhance medication adherence and overall health outcomes.[13] Tackling this challenge requires assessing adherence rates and identifying the influencing factors within primary care settings, which can lead to better patient outcomes and alleviate the strain on secondary care services.[14]

AI plays a vital role in healthcare by aiding clinical decision-making, diagnosing illnesses, forecasting patient outcomes, and tailoring treatment plans to individual needs.[15] Moreover, AI-driven telemedicine and remote monitoring systems improve access to healthcare in rural or underserved regions, enhance patient engagement, and contribute to a more efficient use of healthcare resources.[16] While challenges such as data privacy, security, regulatory frameworks, and integration persist, ongoing investments in AI-driven healthcare initiatives in Saudi Arabia underscore its potential to create a more efficient, accessible, and patient-centred healthcare system.

Although challenges like data privacy, security, regulatory frameworks, and system integration remain, continuous investments in AI-driven healthcare initiatives in Saudi Arabia highlight its potential to deliver a more efficient, accessible, and patient-focused healthcare system.[17,18] Despite this increasing focus, limited research examines AI's role in improving medication adherence globally and in the Saudi context. For instance, Kvedar et al (2020) explored the use of AI-driven digital technologies to improve medication adherence among patients with chronic illnesses in the United States.[19] Chen et al (2021, 2025) highlighted AI's potential in enhancing medication adherence via tools like predictive analytics and reminders. However, due to heterogeneous methodologies and low-quality evidence, especially in kidney transplant populations, definitive conclusions remain limited.[20,21] However, very few studies have explored these topics in Gulf countries, particularly Saudi Arabia. For example, Time-based behavioural reminders (40%) and mobile apps (33%) were the most used adherence strategies. Employment, especially working over 8 hours daily, was associated with higher adherence, while fieldwork reduced it significantly. Promoting simple, personalised tools and addressing challenges faced by individuals with complex or irregular schedules is vital for improving adherence and should be explored further in future research.[9] This research gap emphasises the significance of the current study in tackling an underexplored yet vital aspect of AI's application in healthcare. This study explores the knowledge, attitudes, and perceptions (KAP) of chronic patients in the Makkah region of Saudi Arabia regarding the use of AI to improve medication adherence.

Method

Ethical Approval

The study was approved by the Research Ethics Committee of the Faculty of Medicine at Umm Al-Qura University in Makkah, Saudi Arabia, in accordance with the Declaration of Helsinki (approval number HAPO-02-K-012-2024-05-2135).

Study Design

A cross-sectional study was conducted among patients with chronic diseases in Makkah, Saudi Arabia. The participants were randomly invited to complete an electronic questionnaire over the six months from 1 July to 31 December 2024.

Recruitment was conducted through social media platforms, including X, Instagram, WhatsApp, Telegram, and email. The questionnaire outlined the research purpose, and the participants were informed that their involvement was entirely voluntary. To maintain confidentiality, no personal information that could identify the participants was collected.

Questionnaire Tool

The questionnaire was adapted from a previous study by Prabahar et al.[22] Clinical pharmacology and AI experts provided feedback and suggestions to improve the questionnaire. Their suggestions were incorporated into the final version. The questionnaire contained four sections and was designed using cloud-based questionnaire development software (Google Forms). It was initially prepared in English and subsequently translated into Arabic, the local spoken language, by proficient bilingual speakers. The translation was revised to ensure suitability for the general population. The questionnaire was divided into four main parts: sociodemographic information, knowledge of AI in relation to medication adherence, attitudes towards AI in relation to medication adherence, and patient perceptions of AI in relation to medication adherence.

Study Population (Inclusion and Exclusion Criteria)

The selection criteria included adults (men and nonpregnant women) aged 18 years and above who had chronic diseases and were receiving primary care in the Makkah region, Saudi Arabia. Exclusion criteria included the inability to provide informed consent, pregnancy, or a concomitant serious medical or surgical condition requiring hospitalisation.

Sample Size and Data Collection

The minimum sample size required for this study was calculated using OpenEpi version 3.0[12] based on the following parameters: the population size in Makkah is approximately 2,042,000 inhabitants,[13] and the confidence interval (CI) was set at 95%. The calculated sample size was 385 participants. All responses to the questionnaire were downloaded from the Google Forms website and stored on a secure server. A complete case analysis was conducted using data from respondents who answered all questions in the five-part survey. Participants who provided incomplete responses were excluded. The data were exported from the Google Forms and transferred to Microsoft Excel for further processing.

Statistical Analysis

The data were analysed using SPSS version 23.0 (SPSS Inc., Chicago, IL, USA). Categorical variables were presented as frequencies and percentages. The Pearson chi-square test was used to assess differences, with a p-value<0.05 considered statistically significant. All statistical methods used were two-tailed, with an alpha level of 0.05, considering significance if the p-value <0.05. An overall knowledge score was computed by summing the correct answers; each correct answer was assigned 1 point, and incorrect answers were assigned 0 points.

Participants with a knowledge score of less than 60% of the total correct answers were categorised as having poor knowledge levels, while those with scores between 60% and 100% were considered to have good knowledge levels. For attitude and perception, the composite mean score was calculated for all items. Participants with a composite mean score of less than 2 were considered to have a negative attitude and low perception; scores between 2 and 2.5 indicated a neutral attitude and moderate perception, while scores between 2.5 and 3 reflected a positive attitude and high perception.

Descriptive analysis for categorical data was conducted using frequencies and percentages, whereas numerical data were presented as means with standard deviations. The participants' KAP regarding AI's role in medication adherence were tabulated, and overall KAP levels were graphed. Cross-tabulations were performed to examine factors associated with patients' KAP using Pearson's chi-square test and the exact probability test for small frequency distributions.

Results

A total of 385 eligible patients completed the study questionnaire. The patients' ages ranged from 18 to over 50 years, with a mean age of 48.5±10.6 years. Regarding education, 259 (67.3%) participants had undergraduate degrees and 34 (8.8%) held postgraduate qualifications. A total of 256 participants (66.5%) were married. Family income was reported

as less than 5000 SR for 130 participants (33.8%), 5000–10,000 SR for 92 participants (23.9%), more than 10,000–-15,000 SR for 89 participants (23.1%) and more than 15,000 SR for 74 participants (19.2%).

In terms of chronic diseases, the most commonly reported conditions were diabetes mellitus (30.7%), hypertension (19.7%), and asthma (14%), with other conditions including thyroid disease, cardiac disease, rheumatoid arthritis, and osteoarthritis (Table 1).

Table 2 presents the study participants' KAP regarding AI's role in medication adherence. Concerning knowledge, the highest agreement (87.3%) was observed for AI applications' role in reminding patients to take their medication; this high percentage reflects strong acceptance of this practical and user-friendly function. Additionally, 85.2% of the respondents agreed that AI could effectively provide medication-related educational information, indicating confidence in AI's reliability as an information source. Regarding monitoring and adherence prediction, 79.2% believed that AI-based applications could be utilised to monitor medication adherence. However, only 59% agreed that AI could forecast instances of nonadherence, reflecting some scepticism regarding AI's predictive accuracy.

Table 1 Bio-Demographic Data of Study Chronic Patients in Makkah, Saudi Arabia (n=385)

Socio-Demographic Data	No	%
Age in years		
• 18–29	71	18.4%
• 30–49	117	30.4%
• 50+	197	51.2%
Gender		
• Male	154	40.0%
• Female	231	60.0%
Level of education		
• Basic**	92	23.9%
• Undergraduate	259	67.3%
• Post-graduate	34	8.8%
Marital status		
• Single	82	21.3%
• Married	256	66.5%
• Divorced / widow	47	12.2%
Have children		
• Yes	276	91.1%
• No	27	8.9%
Family income		
• < 5000 SR	130	33.8%
• 5000–10,000 SR	92	23.9%
• > 10,000–15,000 SR	89	23.1%
• > 15,000 SR	74	19.2%
Chronic disease you suffer from		
• HTN	72	19.7%
• DM	112	30.7%
• Asthma	51	14.0%
• Others	150	64.4%

Notes: **a basic education (including elementary, intermediate, and high school education).

Table 2 Knowledge, Attitudes, and Perceptions of the Study Participants Regarding the Use of Artificial Intelligence to Improve Medication Adherence

KAP	Agree		Disagree		Not Sure	
	No	%	No	%	No	%
Knowledge						
• AI application can be used to follow with a primary health center	276	71.7%	24	6.2%	85	22.1%
• AI-based applications can be used in Monitoring Medication Adherence	305	79.2%	14	3.6%	66	17.1%
• AI applications can make Personalized Treatment Recommendations, which can improve medication adherence	262	68.1%	40	10.4%	83	21.6%
• AI applications can be used to predict Adverse Drug Reactions resulting from medication non-adherence	260	67.5%	40	10.4%	85	22.1%
• AI-based applications can remind patients to take their medicine	336	87.3%	11	2.9%	38	9.9%
• AI can offer educational information concerning medications, including instructions on how to use them and the recommended treatment duration	328	85.2%	24	6.2%	33	8.6%
• AI can forecast potential instances of medication non-adherence	227	59.0%	40	10.4%	118	30.6%
• AI-based applications can help manage prescription refills (for both: patients and healthcare professionals)	270	70.1%	32	8.3%	83	21.6%
Attitude						
• I think that the use of AI improves medication adherence	295	76.6%	16	4.2%	74	19.2%
• I would like my personal, medical adherence to be supported by Artificial Intelligence	275	71.4%	30	7.8%	80	20.8%
• I prefer utilizing AI to enhance my medication adherence.	296	76.9%	19	4.9%	70	18.2%
• I am not concerned about the accuracy of the AI application for tracking my medication adherence.	230	59.7%	51	13.2%	104	27.0%
• I will trust the decision made by the AI regarding my medication adherence compared to those made by my doctor	171	44.4%	93	24.2%	121	31.4%
• I am more afraid of an AI technical malfunction when analyzing my medication data than of a doctor's wrong decision.	227	59.0%	48	12.5%	110	28.6%
• I have concerns about the privacy and security of my medication data regarding AI.	240	62.3%	55	14.3%	90	23.4%
• AI can be effectively integrated into healthcare systems to enhance medication adherence	299	77.7%	25	6.5%	61	15.8%
Perception						
• The utilization of AI in promoting medication adherence is set to bring about a beneficial transformation.	291	75.6%	18	4.7%	76	19.7%
• The use of AI in medication adherence found to be useful	277	71.9%	17	4.4%	91	23.6%
• The use of AI in medication adherence will improve the quality of patient care	296	76.9%	17	4.4%	72	18.7%
• The use of AI in medication adherence will improve the process of therapy selection	264	68.6%	22	5.7%	99	25.7%
• The use of AI in medication adherence will negatively affect patient autonomy	195	50.6%	61	15.8%	129	33.5%
• Patients see AI as a promising tool for enhancing medication adherence through personalized reminders and monitoring.	310	80.5%	22	5.7%	53	13.8%
• Patients will have reservations about the lack of human interaction when using AI	239	62.1%	39	10.1%	107	27.8%
• Patient perception of AI in medication adherence ranges from embracing it as a convenient solution to preferring a traditional approach with direct interaction with healthcare professionals.	257	66.8%	25	6.5%	103	26.8%

Lower levels of agreement were observed for AI's capacity to make personalised treatment recommendations (68.1%) and predict adverse drug reactions (67.5%), suggesting potential concerns about AI's ability to handle complex, individualised care aspects. Concerning attitude, a significant portion of the participants agreed that AI could improve adherence (76.6%) and expressed a preference for AI's role in enhancing adherence (76.9%). However, only 44.4% of the participants trusted AI decisions over those of their doctors. A substantial proportion (62.3%) raised concerns about privacy and security.

Regarding accuracy and technical concerns, 59.7% of the participants reported no worries about AI's accuracy. Despite this, 59% expressed concerns about potential technical malfunctions. In terms of perception, strong agreement

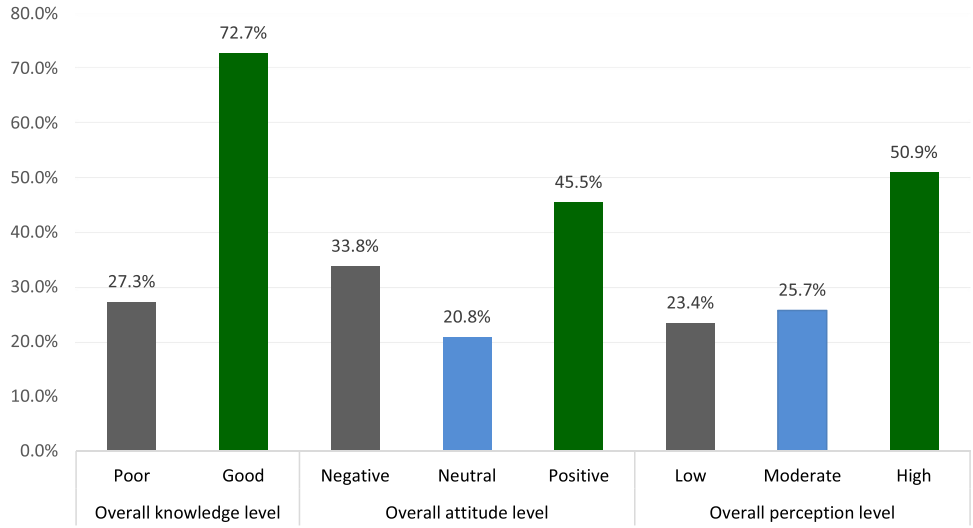

Figure 1 Overall knowledge, attitude, and perception levels among the study participants regarding the use of artificial intelligence to improve medication adherence.

(76.9%) was reported regarding AI's role in improving patient care quality, with 75.6% anticipating a beneficial transformation in adherence practices through AI. Nonetheless, 50.6% of the participants felt that AI could negatively affect patient autonomy, and 62.1% anticipated issues related to a lack of human interaction.

As shown in Figure 1, the study participants' overall KAP levels regarding AI in medication adherence were assessed. Regarding knowledge, 72.7% of the participants demonstrated good overall knowledge, while 27.3% had poor knowledge about AI's role in improving medication adherence. Regarding attitude, 45.5% expressed a positive attitude towards AI's role, while 33.8% exhibited a negative attitude. Perception was found to be high among 50.9% of respondents but low among 23.4%.

Table 3 outlines the factors associated with the study participants' overall knowledge of AI's role in medication adherence. Younger participants showed significantly higher knowledge levels, with 87.9% of younger participants demonstrating good knowledge levels compared to 68.5% of older participants (p=0.048). Male participants also exhibited higher knowledge levels, with 78.6% demonstrating good knowledge, compared to only 68.8% of the female participants. This difference was statistically significant (p=0.036).

Table 3 Factors Associated with the Study Participants' Overall Knowledge About AI's Role in Medication Adherence

Factors	Overall Knowledge Level				p-Value
	Poor		Good		
	No	%	No	%	
Age in years					0.048*
18–29	15	21.1%	56	78.9%	
30–49	28	23.9%	89	76.1%	
50+	62	31.5%	135	68.5%	
Gender					0.036*
Male	33	21.4%	121	78.6%	
Female	72	31.2%	159	68.8%	
Level of education					0.417
Basic	30	32.6%	62	67.4%	
Undergraduate	66	25.5%	193	74.5%	
Post-graduate	9	26.5%	25	73.5%	

(*Continued*)

Table 3 (Continued).

Factors	Overall Knowledge Level				p-Value
	Poor		Good		
	No	%	No	%	
Marital status					0.468
Single	18	22.0%	64	78.0%	
Married	74	28.9%	182	71.1%	
Divorced / widow	13	27.7%	34	72.3%	
Have children					0.578^
Yes	78	28.3%	198	71.7%	
No	9	33.3%	18	66.7%	
Family income					0.368
< 5000 SR	41	31.5%	89	68.5%	
5000–10,000 SR	26	28.3%	66	71.7%	
>10,000–15,000 SR	23	25.8%	66	74.2%	
> 15,000 SR	15	20.3%	59	79.7%	

Notes: P: Pearson X^2 test. ^: Exact probability test. *P < 0.05 (significant).

Factors influencing the study participants' overall attitudes towards AI's role in improving medication adherence are detailed in Table 4. Among middle-aged participants, 53% expressed a positive attitude towards AI, compared to 40.6% of older participants (p=0.046). Similarly, a positive attitude was more common among participants with good knowledge levels, with 58.2% reporting a positive attitude compared to only 11.4% of those with poor knowledge (p=0.001).

Table 5 highlights variations in the participants' perceptions of AI's role in medication adherence across demographics. Statistically significant associations were identified for age and overall knowledge level (p-values of.031 and.001, respectively). Younger participants (18–29 years) demonstrated the highest proportion of a high perception of AI's role (62.0%), followed by the 30–49 age group (56.4%) and participants aged 50 and above (43.7%). Additionally, 65.4% of the participants with good knowledge levels demonstrated high perception, compared to only 12.4% of those

Table 4 Factors Associated with the Study Participants' Overall Attitude Toward AI's Role in Medication Adherence

Factors	Overall Attitude Level						p-Value
	Negative		Neutral		Positive		
	No	%	No	%	No	%	
Age in years							0.046*
18–29	27	38.0%	11	15.5%	33	46.5%	
30–49	35	29.9%	20	17.1%	62	53.0%	
50+	68	34.5%	49	24.9%	80	40.6%	
Gender							0.289
Male	58	37.7%	27	17.5%	69	44.8%	
Female	72	31.2%	53	22.9%	106	45.9%	
Level of education							0.094
Basic	30	32.6%	25	27.2%	37	40.2%	
Undergraduate	92	35.5%	44	17.0%	123	47.5%	
Post-graduate	8	23.5%	11	32.4%	15	44.1%	

(*Continued*)

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Table 4 (Continued).

Factors	Overall Attitude Level						p-Value
	Negative		Neutral		Positive		
	No	%	No	%	No	%	
Marital status							0.339
Single	35	42.7%	13	15.9%	34	41.5%	
Married	82	32.0%	57	22.3%	117	45.7%	
Divorced / widow	13	27.7%	10	21.3%	24	51.1%	
Have children							0.783^
Yes	88	31.9%	60	21.7%	128	46.4%	
No	7	25.9%	7	25.9%	13	48.1%	
Family income							0.738
< 5000 SR	47	36.2%	29	22.3%	54	41.5%	
5000–10,000 SR	26	28.3%	19	20.7%	47	51.1%	
>10,000–15,000 SR	31	34.8%	15	16.9%	43	48.3%	
> 15,000 SR	26	35.1%	17	23.0%	31	41.9%	
Overall knowledge level							0.001*
Poor	44	41.9%	49	46.7%	12	11.4%	
Good	86	30.7%	31	11.1%	163	58.2%	

Notes: P: Pearson X^2 test. ^: Exact probability test. *P < 0.05 (significant).

Table 5 Factors Associated with the Study Participants' Overall Perception of AI's Role in Medication Adherence

Factors	Overall Perception Level						p-Value
	Low		Moderate		High		
	No	%	No	%	No	%	
Age in years							0.031*
18–29	13	18.3%	14	19.7%	44	62.0%	
30–49	28	23.9%	23	19.7%	66	56.4%	
50+	49	24.9%	62	31.5%	86	43.7%	
Gender							0.161
Male	36	23.4%	32	20.8%	86	55.8%	
Female	54	23.4%	67	29.0%	110	47.6%	
Level of education							0.128
Basic	22	23.9%	30	32.6%	40	43.5%	
Undergraduate	57	22.0%	59	22.8%	143	55.2%	
Post-graduate	11	32.4%	10	29.4%	13	38.2%	
Marital status							0.745
Single	18	22.0%	17	20.7%	47	57.3%	
Married	61	23.8%	69	27.0%	126	49.2%	
Divorced / widow	11	23.4%	13	27.7%	23	48.9%	

(*Continued*)

Table 5 (Continued).

Factors	Overall Perception Level						p-Value
	Low		Moderate		High		
	No	%	No	%	No	%	
Have children							0.677^
Yes	67	24.3%	73	26.4%	136	49.3%	
No	5	18.5%	9	33.3%	13	48.1%	
Family income							0.810
< 5000 SR	26	20.0%	35	26.9%	69	53.1%	
5000–10,000 SR	20	21.7%	24	26.1%	48	52.2%	
>10,000–15,000 SR	23	25.8%	20	22.5%	46	51.7%	
> 15,000 SR	21	28.4%	20	27.0%	33	44.6%	
Overall knowledge level							0.001*
Poor	27	25.7%	65	61.9%	13	12.4%	
Good	63	22.5%	34	12.1%	183	65.4%	

Notes: P: Pearson X^2 test. ^: Exact probability test. *P < 0.05 (significant).

with poor knowledge. In contrast, gender, nationality, education, marital status, family income, and parental status did not show significant associations with AI perception levels.

Discussion

This study assessed KAP regarding the use of AI to improve medication adherence among chronic patients in the Makkah region of Saudi Arabia. The findings revealed significant insights into the potential and limitations of AI integration in healthcare, specifically for enhancing medication adherence.

Demographic factors significantly influenced KAP levels. Younger participants exhibited higher knowledge and more positive perceptions of AI's role. Among participants aged 18–29 years, 62% displayed high perception levels, compared to 43.7% of those aged 50 and above (p=0.031). Similarly, participants with good knowledge also demonstrated significantly more positive attitudes (p=0.001). These findings align with prior research showing that awareness and familiarity with technology promote acceptance.[23] Younger participants' higher knowledge and positive perceptions of AI stem from their greater digital literacy, exposure to AI through education, and openness to innovation.[24] Their adaptability and lower scepticism about privacy enhance their optimism about AI's transformative role in healthcare.[14,16]

The results demonstrated high awareness of AI's role in medication adherence. A total of 87.3% of the participants acknowledged AI's ability to remind patients to take their medications, and 85.2% agreed on its effectiveness in providing medication-related educational information. These findings align with prior research highlighting AI's role in supporting patient engagement and educational interventions in healthcare.[1,2] Additionally, 79.2% of respondents believed that AI could monitor adherence, emphasising its utility in routine healthcare management. However, only 59% trusted AI's ability to predict nonadherence, reflecting scepticism about its predictive precision—a concern also noted in studies addressing the limitations of AI in complex clinical scenarios.[9,25] Scepticism about AI's ability to predict nonadherence arises from data limitations, algorithmic biases, and the multifactorial nature of human behaviour, which are challenging to model accurately.[26] AI often struggles with incomplete data, generalization errors, and a lack of transparency in decision-making processes.[25] Ethical concerns, such as false predictions and their impact on trust and the absence of robust real-world validation, further undermine confidence.[27] To build trust, AI systems need explainable models, better data integration, and alignment with clinical workflows.

The participants demonstrated positive attitudes towards AI's potential in enhancing medication adherence, with 76.6% agreeing that AI could improve adherence and 76.9% expressing a preference for AI-assisted interventions. Despite this optimism, only 44.4% of the participants trusted AI decisions over those made by their doctors, indicating

a significant gap in trust. This result echoes previous findings showing that participants expressed a preference for traditional healthcare approaches despite acknowledging AI's benefits.[28] Privacy and security concerns were also prominent, with 62.3% of the participants expressing apprehension about data protection.[15] These concerns align with global literature emphasising the importance of robust regulatory frameworks to mitigate privacy risks associated with AI adoption in healthcare.[29]

A substantial proportion of the participants (76.9%) believed that AI could improve patient care quality, and 75.6% anticipated a transformative impact on adherence practices. These findings underscore optimism about AI's integration into healthcare. However, concerns regarding reduced human interaction (62.1%) and the potential effects on patient autonomy (50.6%) highlight significant ethical considerations. Several studies have reported similar concerns, emphasizing the importance of balancing technological innovation with the preservation of the human touch in healthcare delivery.[30–32]

A few limitations should be acknowledged when interpreting the findings of this study. First, the use of an online survey may have limited the representativeness of the results, as it might have excluded responses from patients who do not engage with social media platforms. Second, the study did not explore specific classes or subclasses of medications associated with nonadherence, which could have provided more detailed insights.

Despite these limitations, the present study conducted among patients with chronic diseases in Saudi Arabia will add to our knowledge in this area, as we still have aA limited number of studies have addressed the use of AI in medication adherence among chronic patients in general. Moreover, this study underscores AI's transformative potential in addressing medication adherence issues in Saudi Arabia. Addressing trust deficits, data privacy concerns, and technical limitations is essential to unlocking its full potential. Transparent AI systems, improved patient education, and robust governance frameworks are critical for success. Furthermore, integrating AI as a complementary tool rather than as a replacement for human healthcare providers could help alleviate concerns about diminished human interaction and patient autonomy.

Positioning AI as a complementary tool enhances human-centric healthcare by automating routine tasks, preserving patient autonomy through empowerment, and ensuring ethical care via human oversight. Policymakers can use these findings to create regulations and safeguards, while healthcare providers can design workflows that balance AI efficiency with compassionate care. AI developers benefit by designing user-centred, explainable tools, and patients gain from empowered decision-making and trust-building. Advocacy groups can promote ethical AI integration, and academic institutions can use these insights for research and training. Overall, this study informs policies and systems that balance AI's benefits with the essential role of human empathy and clinical judgment.

Conclusion

The study demonstrates that patients with chronic conditions are highly aware of AI's potential to enhance medication adherence through reminders and education, with younger patients showing greater knowledge and positive attitudes towards AI. Tailored educational strategies, such as workshops for older adults or digital tools for younger patients, can address demographic differences in KAP. Despite optimism about AI's role in healthcare, concerns about privacy, trust, and reduced human interaction persist, particularly among less knowledgeable patients. Transparent AI systems, such as those offering clear explanations of data usage or opt-in consent, can alleviate these concerns. The study uniquely contributes to AI healthcare literature by focusing on patient-specific KAP in chronic condition management, emphasising age as a key factor and advocating for patient-centred approaches. It calls for improved governance and transparency to ensure AI's effective integration as a complementary tool.

Disclosure

The authors have no conflict of interest to disclose.

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