

Knowledge and attitude of Saudi Arabian citizens towards telemedicine during the COVID-19 pandemic

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Background: The objective of this study was to investigate the knowledge and attitudes of Saudi Arabian citizens towards telemedicine during the coronavirus disease 2019 (COVID-19) pandemic.

Methods: A cross-sectional survey was designed to carry out this study. The electronic survey, prepared using Google Forms, was distributed to 1500 randomly selected citizens of Saudi Arabia. A total of 330 participants completed and returned the questionnaire. Basic statistics were used to describe the data.

Results: The majority of the respondents (73.9%) were female. More than half of them (54.8%) were >35 y of age and had graduate or postgraduate degrees (65.5%). A total of 96.7% of the respondents were Saudis. Most of the participants (70.0%) were familiar with the term 'telemedicine' and thought that telemedicine (92.1%) could reduce transportation costs. Of the respondents, 58.8% had not seen a telemedicine system before and 67.0% indicated that they had not previously used telemedicine services. A total of 87.3% of the participants agreed or strongly agreed that telemedicine was a useful tool during the COVID-19 pandemic. Also, more than half of the participants agreed or strongly agreed that telemedicine facilitates the diagnosis of people (58.8%), increases communication (58.2%), reduces clinic visits (85.9%) and performs tasks quickly (70.3%). Also, 51.5% of the respondents disagreed or strongly disagreed that telemedicine affects patient privacy.

Conclusions: The outcomes indicated that most of the participants had a positive attitude towards the use of telemedicine as a response to the COVID-19 pandemic in Saudi Arabia. They believed that telemedicine saves time, labour and costs and is an effective tool to treat coronavirus patients at a safe distance. However, the government should develop programs to raise awareness in the population about the use of telemedicine for the treatment of various diseases that afflict the Saudi Arabian people. Likewise, a legal framework must be implemented to protect the privacy of patients and healthcare providers.

Keywords: attitude, COVID-19 pandemic, knowledge, Saudi Arabia, telemedicine.

Introduction

The coronavirus disease 2019 (COVID-19) pandemic that originated in Wuhan, China, in late 2019 has caused significant impacts on the availability of resources in hospitals, clinics and other medical centres in almost every country in the world.^{1–3} Faced with this situation, healthcare providers are adopting

strategies such as social distancing to prevent and reduce the advance of the pandemic.⁴ In this sense, telemedicine and other digital tools derived from information and communication technologies can help manage the COVID-19 pandemic since these techniques facilitate the treatment of patients at safe distances.^{5–7}

According to the World Health Organization (WHO), telemedicine uses information and communication technologies to promote health, provide medical care, exchange medical information and educate healthcare providers and patients over long distances.⁸ Likewise, these technologies are used by healthcare professionals to diagnose, treat and prevent diseases where distance is a crucial factor.⁸ Telemedicine systems use smartphones, computers, tablets, internet platforms, webcams, microphones, teleworking devices, video calls, video conference systems, video communication, e-mail and other digital and virtual connections that facilitate communication between patients and healthcare providers at long distances.^{2,5,9-11}

Due to the COVID-19 pandemic and mandatory social distancing to minimize exposure to and spread of the infection, telemedicine has been used in remote monitoring of COVID-19, diabetes, cardiovascular diseases, dermatology, urology, neurology, obstetric care, oncology and other illnesses in numerous countries around the world, including as the USA, China, Italy, Australia, Saudi Arabia and Japan.^{2,3,5,7,9,12-23} As an example, a previous study showed that telemedical technology was used in an emergency department of a hospital in the USA to create a protective barrier to minimize the transmission of COVID-19 between healthcare providers and patients.⁷ Also, during the COVID-19 pandemic, telemedicine has been used in the USA and Italy for the treatment of patients affected with neurological diseases.¹⁶ In China, the government implemented telemedicine techniques to perform COVID-19 detection, triage and treatment.³ Likewise, in Saudi Arabia, telemedicine was an important tool in the treatment of diabetic patients.²² The use of telemedicine during the COVID-19 pandemic also reduced the use of personal protective equipment, decreased the number of patient visits, decreased the exposure of healthcare workers to coronavirus and minimized face-to-face interactions between physicians, nurses and patients.^{3,16,18}

Although telemedicine is an important tool for providing long-distance health services, some obstacles and barriers must be overcome to achieve maximum benefits in the application of this tool.^{11,24} For instance, both patients and doctors require technical support to handle computers, tablets, internet platforms, tele-diagnosis systems, telemonitoring devices, teleradiology instruments, computed tomography scanners and other virtual techniques. Furthermore, it is necessary to implement legal structures and mechanisms to maintain the privacy and confidentiality of patients.^{22,24}

Most of the studies related to cost-effectiveness and resource allocation were identified in western countries such as the USA and UK, whereas the relevant research and development has been increasing in Brazil, Russia, India, China and South Africa (BRICS) and the Emerging 7 nations (China, India, Russia, Brazil, Mexico, Indonesia and Turkey), while in the Middle East it is comparatively low.^{25,26} As for Saudi Arabia, only a few studies related to telemedicine and the COVID-19 pandemic have been published.^{22,24,27} One of these studies deals with the use of telemedicine in the treatment of patients with diabetes and the others analyse the opinion of doctors and patients towards telemedicine during the COVID-19 pandemic. Based on these considerations, the objective of this study was to investigate the knowledge and attitudes of Saudi Arabian citizens towards telemedicine during the COVID-19 pandemic. This study could

help public authorities to design efficient strategies to implement telemedicine in Saudi Arabia.

Methods

Study settings

A cross-sectional survey was designed to investigate the knowledge and attitudes of Saudi citizens towards telemedicine during the COVID-19 pandemic. The electronic survey, prepared using Google Forms, was distributed to 1500 randomly selected citizens of Saudi Arabia. A total of 330 participants completed and returned the questionnaire.

Description of the questionnaire

The questionnaire (see Appendix 1) was designed by the research team. Some questions were adapted from a previous study carried out in Egypt.²⁸ The survey had 15 questions distributed in three sections. The first section had four questions related to the demographics of the participants (age, gender, nationality and education level). The second section consisted of four questions (yes, no) intended to obtain information on the telemedicine knowledge of the participants (Have you heard the term telemedicine before? Have you observed a telemedicine process previously? Will telemedicine reduce transportation costs? Have you ever used telemedicine services before?). The third section had seven questions designed to determine the attitudes of the participants towards telemedicine during the COVID-19 pandemic (Is telemedicine useful during the COVID-19 pandemic? Does telemedicine facilitate the diagnosis of people? Does telemedicine increase communication? Does telemedicine decrease clinic visits? Does telemedicine perform tasks quickly? Does telemedicine provide comprehensive healthcare? Does telemedicine threaten information privacy?) These questions were assessed using a Likert scale (strongly agree, agree, neutral, disagree and strongly disagree).

Survey instructions and an explanatory introduction were included at the beginning of the questionnaire to indicate the purpose of the survey. The investigator's e-mail address was provided to the participants to answer any questions. In addition, the participants were thanked for their participation in the study. The survey was pretested and validated by academic experts from Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia.

Data collection

The survey was distributed through WhatsApp, Snapchat and Twitter. The survey was in Arabic and English. The time required to answer the survey was <10 min.

Data analysis

The data were analysed using basic statistical methods. The information is presented as percentages in tables and figures.

Table 1. Demographic information (N=330)

Variables	n (%)
Gender	
Male	86 (26.1)
Female	244 (73.9)
Nationality	
Saudi	319 (96.7)
Non-Saudi	11 (3.3)
Age (years)	
18–25	81 (24.5)
26–35	68 (20.6)
36–45	70 (21.2)
>45	111 (33.6)
Education level	
Primary	7 (2.1)
Intermediate	13 (3.9)
High school	94 (28.5)
Graduate	197 (59.7)
Postgraduate	19 (5.8)

Results

The demographic information of the participants is shown in Table 1. The majority of the respondents (73.9% [n=224]) were female. Also, more than half of them (54.8% [n=181]) were >35 y of age and had graduate or postgraduate degrees (65.5% [n=216]). Furthermore, 96.7% (n=319) of the respondents were Saudis.

Table 2 indicates that more than half of the participants (231 [70%]) were familiar with the term ‘telemedicine’ and thought that telemedicine (92.1% [n=304]) could reduce transportation costs. The table also shows that 58.8% (n=194) of the respondents had not seen a telemedicine system before. Furthermore, 67% (n=221) indicated that they had not previously used telemedicine services.

Regarding the attitudes of the participants towards telemedicine during the COVID-19 pandemic, Table 3 shows that 87.3% (n=287) of the participants agreed or strongly agreed that telemedicine was a useful tool during the pandemic. Also, more than half of the participants agreed or strongly agreed that telemedicine facilitates diagnosis (58.8% [n=194]), increases communication (58.2% [n=192]), reduces clinic visits (85.9% [n=284]) and performs tasks quickly (70.3% [n=232]). Also, approximately half of the participants (51.5% [n=58]) disagreed or strongly disagreed that telemedicine affects patient privacy.

Discussion

The results of this study on the knowledge and attitudes of Saudi Arabian citizens towards telemedicine during the COVID-19 pandemic indicated that the majority of participants (87.3%) agreed or strongly agreed that telemedicine was a useful tool for managing the COVID-19 pandemic. In general, other

studies agree with this opinion and suggest that telemedicine plays an important role in treating patients affected by the COVID-19 pandemic.^{3,9,11,13,28–32} The aforementioned studies show that telemedicine is one of the main tools that can provide effective health services to patients during the COVID-19 pandemic. Also, a previous study revealed that a group of patients affected by COVID-19 showed an acceptable attitude and satisfaction towards the telemedicine processes applied in Saudi Arabia during the pandemic.²⁵ Thus several hospitals in Saudi Arabia are using telemedicine programs to treat patients during the COVID-19 pandemic.³¹

The majority of the participants (70%) knew the term ‘telemedicine’ and 33% of them had used this system before. Previous statistics indicated that 21% of Saudi Arabian people had used telemedicine in 2018.³⁰ However, more than half of the participants were unaware of the services that telemedicine can provide. This result suggests that public authorities should develop information campaigns to raise awareness about the importance of telemedicine in the management of diseases such as the coronavirus and other illnesses.²⁵

A total of 92% of the respondents believed that telemedicine reduced transportation time and costs. Similarly, some preceding studies have suggested that telemedicine is an accessible and convenient tool that decreases travel time and operational costs.^{5,27,29,33} Also, 70.3% of the participants agreed or strongly agreed that telemedicine allows tasks to be performed quickly. These benefits accessible through the use of telemedicine save time, labour and costs.^{3,11}

More than half of the participants agreed or strongly agreed that telemedicine helps to diagnose the public, improves communication among healthcare providers and patients and decreases the number of visits to health centres. Vidal-Alaball et al.²⁹ suggest that this tool reduces the time to diagnose and treat patients. Also, other studies found that telemedicine increases communication among healthcare professionals and reduces visits to hospitals.^{27,33} The aforementioned advantages are important contributions offered by the utilization of telemedicine in healthcare settings.

Regarding the risks involved in the use of telemedicine, 51.5% of the respondents disagreed or strongly disagreed that telemedicine threatens patient privacy. Concerning this issue, several authors have pointed out that there are some security risks in the use of telemedicine that can affect patient privacy.^{23,28,29} Also, a previous study indicated that an ethical and legal framework is required to properly implement telemedicine.²⁴

Studies have found that telemedicine use and knowledge among the people in South Africa^{34–36} is very low, reflecting a lack of awareness and poor adoption strategies. However, studies in China^{37,38} and Russia^{39,40} have identified increasing adoption of telemedicine applications among their citizens; however, there are a few issues, including ineffective legal regulations and a lack of transparency and privacy, that are affecting the adoption of telemedicine in these countries. Similarly, India^{42,43} and Brazil⁴¹ are also expanding the adoption of telemedicine solutions, but remoteness and a lack of access to technology are affecting the adoption of telemedicine while an ever-increasing prevalence of chronic, lifestyle and long-term illnesses is increasing the demand

Table 2. Participants knowledge of telemedicine (N=330)

Questions	Yes, n (%)	No, n (%)
Have you heard the term telemedicine before?	231 (70.0)	99 (30.0)
Have you seen a telemedicine process previously?	136 (41.2)	194 (58.8)
Does telemedicine reduce time and transportation costs?	304 (92.1)	26 (7.9)
Have you ever used telemedicine services before?	109 (33.0)	221 (67.0)

Table 3. Participants' attitudes towards telemedicine (N=330)

Questions	Strongly agree, n (%)	Agree, n (%)	Neutral, n (%)	Disagree, n (%)	Strongly disagree, n (%)
Is telemedicine useful during the COVID-19 pandemic?	149 (45.5)	138 (41.8)	32 (9.7)	10 (3.0)	1 (0.3)
Does telemedicine facilitate the diagnosis of people?	61 (18.5)	133 (40.3)	97 (29.4)	34 (10.3)	5 (1.5)
Does telemedicine increase communication?	61 (18.5)	131 (39.7)	82 (24.8)	51 (15.5)	5 (1.5)
Does telemedicine decrease visits to clinics?	126 (38.0)	158 (47.9)	39 (11.8)	6 (1.8)	1 (0.3)
Does telemedicine perform tasks quickly?	98 (29.7)	134 (40.6)	75 (22.7)	20 (6.1)	3 (0.9)
Does telemedicine provide comprehensive healthcare?	38 (11.5)	104 (31.5)	122 (37)	59 (17.9)	7 (2.1)
Does telemedicine threaten information privacy?	17 (5.2)	41 (12.4)	102 (30.9)	135 (40.9)	35 (10.6)

for telemedicine in these countries. Comparing the results from Saudi Arabia, it is clear that security concerns such as privacy are one of the major obstacles identified in the implementation of telemedicine, similar to India, while positive attitudes towards telemedicine were identified among participants, similar to the BRICS nations.

The main limitations of this research were the small sample size and the short time available to conduct the research. Another limitation was that no statistical analysis was performed to measure the reliability and validity of the survey used for data collection. Therefore it is recommended to overcome these limitations in future studies. Also, it is suggested to investigate the type of applications used in telemedicine during the COVID-19 pandemic in Saudi Arabia.

Conclusions

The results indicated that the participants had a positive attitude towards the use of telemedicine as a response to the COVID-19 pandemic in Saudi Arabia. They considered that telemedicine saves time, labour and costs and is an effective tool to treat COVID-19 patients at a safe distance. However, the government should develop programs to raise awareness in the population about the use of telemedicine for the treatment of various diseases that afflict the Saudi Arabian people. Likewise, a legal framework must be implemented to protect the privacy of patients and healthcare providers.

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Appendix 1. Knowledge and attitudes of Saudi Arabian citizens towards telemedicine during the COVID-19 pandemic

Demographic information (questions)

Age (years):

1, 18–25; 2, 26–35; 3, 36–45; 4, ≥ 45

Gender:

1, male; 2, female

Nationality:

1, Saudi; 2, non-Saudi

Education level:

1, primary; 2, secondary; 3, high school; 4, graduate; 5, postgraduate

Knowledge level of participants (questions)

Have you heard the term telemedicine before?

1, yes; 2, no

Have you seen a telemedicine process previously?

1, yes; 2, no

Does telemedicine reduce time and transportation costs?

1, yes; 2, no

Have you ever used telemedicine services before?

1, yes; 2, no

Attitude towards telemedicine (questions)

Is telemedicine useful during the COVID-19 pandemic?

1, strongly agree; 2, agree; 3, neutral; 4, disagree; 5, strongly disagree

Does telemedicine facilitate the diagnosis of people?

1, strongly agree; 2, agree; 3, neutral; 4, disagree; 5, strongly disagree

Does telemedicine increase communication?

1, strongly agree; 2, agree; 3, neutral; 4, disagree; 5, strongly disagree

Does telemedicine decrease visits to clinics?

1, strongly agree; 2, agree; 3, neutral; 4, disagree; 5, strongly disagree

Does telemedicine perform tasks quickly?

1, strongly agree; 2, agree; 3, neutral; 4, disagree; 5, strongly disagree

Does telemedicine provide comprehensive healthcare?

1, strongly agree; 2, agree; 3, neutral; 4, disagree; 5, strongly disagree

Does telemedicine threaten information privacy?

1, strongly agree; 2, agree; 3, neutral; 4, disagree; 5, strongly disagree