

Exploring The Opinion Of E-Medicine Application Users: A Qualitative Study In Karachi Pakistan

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Abstract

Background: The blistering development of digital health technologies has added to the dependence on the use of e-medicine applications in accessing pharmacological and healthcare information. It is necessary to understand the perceptions and experiences of users with these applications to enhance usability and reliability, and patient-centered outcomes. The research was conducted to gather the views, experiences, and expectations of users on the variety of e-medicine applications in Karachi, Pakistan. **Methodology:** A semi-structured face-to-face interview was chosen as qualitative exploratory research was performed in November to December 2023. Purposive sampling was used to select the participants aged between

18 and 65 years and they were required to have used mobile e-medicine applications. A total of 22 participants were used to saturating the data. To be credible and trustworthy, independent researcher's audio-recorded interviews, transcribed them word-to-word, translated them to English and performed thematic analysis with NVivo software.

Results: The gender of the participants was dominated by females (63.63%). The age of participants mostly fell within the range of 20-30 years (63.63). There were twelve themes of major themes such as the patterns of application use, usability expectations, benefits, risk, and satisfaction. Medscape, Pharmapedia, and Pharma Plus are some of

the frequently used applications. The most popular apps were utilized by the users to get all the necessary information about drugs, dosage instructions, and check-ins. Simplicity, correct and current information and offline access were some of the desired features. The positive aspects were better education, convenience, and timesaving, whereas the negative issues were false information, risk of self-medication, technical problems, and advertisements.

Conclusion: The use of e-medicine applications is viewed as a useful tool to obtain information about medication and assist in decision-making. The mechanisms of information accuracy, usability, and quality assurance should be enhanced to facilitate safe use and improve their contribution to the healthcare delivery process.

Introduction

A greater investment in telehealth and digitalization has resulted from the growing use of digital health (DH) technology by healthcare professionals (HCPs) to provide healthcare services (1). Telehealth is the use of electronic information and telecommunications methods, such as the phone, videoconferencing, text messaging, email, internet, health apps, social media, or fax, to improve a patient's health(2). Over time, telehealth has become increasingly popular and extensively used, often surpassing in-person visits, as technology makes it possible to provide healthcare services to those who live in remote places(3, 4). In-person healthcare was replaced by telemedicine during the worldwide coronavirus disease 2019 (COVID-19) pandemic, and post-pandemic circumstances continue to evolve. Global healthcare systems and providers now have new prospects thanks to these new digital healthcare initiatives and services. Research was conducted on perceptions of mobile health apps and features to support psychosocial well-being among frontline healthcare workers during the COVID-19 pandemic exploring their experience of conventional psychological wellness programs as well as the usefulness of MHealth apps for well-being. Interviews were carried out with frontline workers using visual materials from existing features of mHealth apps. Thematic analysis was conducted, and themes were mapped to key nudge strategies. The research study has also explained the potential of mHealth apps on well-being applications. The research study highlighted personalized wellness tools with in-app counseling, peer support, and tangible rewards for supporting usage in front line healthcare workers(5). In 2020, Jacquelin Floch conducted a combination of methods of research on mobile health self-management for CF treatment. In 2019, the study team developed an online application for medical experts and developed a self-management application for patients and parents. Six European CF competence centers participated in this six-month clinical trial to test the technology. The research indicated support for the nutrition management and enzyme dosage calculating aspects, which improved participants' self-efficacy(6).

A study explored the needs and perceptions of twenty patients with heart failure regarding the implementation of mobile treatments for improved self-care. Four themes emerged: the need for accurate and personalized health information, useful application features, adoption barriers, and expected benefits. The study participants required their health information and reminder data to be tailored to ensure better self-care; however, the adoption barriers associated with application use hindered further development(7). A Qualitative research explored young people preferences on user interface design for mobile sexual health treatments and found four themes arising from nine focus groups: security and confidentiality, trustworthiness, customer assistance, and task-technology-context fit. Twenty design recommendations emerged, and personalization features ranked highly. Despite the naivety of participants regarding the risks, they trusted the new technologies(8).

Misa Lio observed the advantages of a mobile health application prototype for asthmatic children and their careers. A mixed-method study was conducted using semi-

structured interviews and topic assessment. The children and adults similarly the interactive learning, social engagement, and simple design of the application (9). In Guangzhou, China, Jiong Tu conducted research on how older adults perceived and used mobile health technology. The study concluded that certain characteristics such as education, age, experience, and housing can determine readiness for adoption. Through thematic analysis, it was found that significant hindrances in the smooth integration of technology were observed, which was due to a shifting social context in China. Initiatives to promote the adoption of older adults should be targeted (10).

Methodology

Exploring the Opinion of Users for Different e-Medicine Applications

The focus of the research was on observing how consumers feel about various e-medicine apps. Given the increasing acceptance of electronic health records, e-medicine apps have become some of the most important bases for accessing medical health services. User experience and feedback are paramount in the whole effort to improve the usability and operations of these applications in serving the healthcare needs of consumers. This research, therefore, will provide insights into the designers and health professionals in the design and implementation of e-medicine applications that will, in turn, enhance the outcomes of the patient's and users' satisfaction. The figure represents the methodology steps utilized in exploring users' opinions toward different e-medicine applications.

Research Design

The qualitative study investigated the experiences, attitudes, and behaviors of online e-medicine app users in Karachi, Pakistan.

Research Setting

This study was conducted in the city of Karachi Pakistan. This qualitative study used a thematic analysis methodology to thoroughly understand the opinions, experiences, preferences, and issues of online mobile app users in Karachi, Pakistan.

Participants and Sampling

This study was conducted in Karachi with different users of e-medicine mobile applications. Purposive sampling was adopted to ensure diversity across the board in terms of sex, age, and educational level, and continued until saturation was reached. As soon as saturation was reached, a total of twenty users responded, but for further verification, we conducted two additional interviews, and thus twenty-two users were chosen for final data analysis. Participants were given written informed consent forms to attest to their agreement to participate in the study.

Sample Selection Criteria

Sample selection criteria were based on the following inclusion and exclusion criteria.

Inclusion Criteria

Respondents must fall within an age limit, such as between the ages of 18 and 65. Every user had to have a smartphone that interacted with the mobile e-medicine apps. Users should either presently use or have previously utilized mobile e-medicine apps. Respondents had to declare if they were interested in participating in the research or evaluation.

Exclusion Criteria

People who fell outside of the defined age range, for example, those under 18 or over 65 were not included.

People who lacked a suitable smartphone or had only limited access to cell phones were not included.

Users with little or no technological background were not allowed to participate. Those users who were not interested in participating in the study.

Interview Guide

Following the study goals, an interview guide was developed to explore other aspects of the use of e-medicine applications whereby open-ended questions were designed. The interview consisted of their reasons for the use of specific e-medicine applications, the purposes of the e-medicine apps, the reasons behind their choosing one application over the other app, the difficulties they got into, advantages they present, and suggestions to improve features in an e-medicine application. This interview guide consisted of different questions associated with the experience of users in an e-medicine app; therefore, an expert assessment was reached to endorse the authenticity of the interview considering that the questions were sufficiently detailed, relevant, and well-constructed.

Data Collection

The main technique for gathering data was semi-structured interviews. The collection was conducted from November 2023 to December 2023. Participants were able to express their ideas and experiences using e-medicine applications during these sessions. These sessions were conducted by individual participants, and the duration of these interviews was 20 to 30 minutes. These sessions were conducted face-to-face. These interviews were audio-recorded and transcribed verbatim. The interviews were done in Urdu and English since it is widely spoken there, allowing for easy and unrestricted conversation. 22 users were interviewed.

Data Analysis

The interview recordings had been translated and transferred into English. The NVivo program was used to do a qualitative analysis of information on the verbatim transcripts of each interview by two researchers. To investigate the data and find significant patterns, the investigator used a thematic analysis technique. Following that, the investigators worked together to iteratively evaluate and modify the codes, polishing them to create a complete collection of themes that reflected the substance of the discussions and interviews. The study consisted of correlating the initial information to the developing topic labels and definitions, which resulted in the integration, inclusion, and deletion of duplicate themes. Finally, twelve unique themes emerged, and the findings section includes a full analysis of these topics, supplemented by relevant excerpts from the respondents' replies. Further verification of data analysis themes and codes was done by a third researcher to avoid any disagreement.

Data Trustworthiness

Data accuracy and reliability were checked by the criteria of Lincoln. This was accomplished via the participant-researcher partnership over an extended period. After the initial codes were extracted, we asked those who took part for their thoughts on the reliability of the codes and conclusions if they disagreed, we modified the codes, and two experts in qualitative research supervised them, resulting in the necessary agreement being reached on the chosen codes and classifications.

Ethical Considerations

The ethical approval was obtained from the ethical committee of Jinnah University for women in Karachi Pakistan. Participants signed informed permission forms, and their confidentiality and anonymity were rigorously upheld during the research.

Results

Demographic Characteristics of E-Medicine Application Users

At first, interviews were carried out with a total of twenty-five users of the e-medicine application. Among the twenty-five users of e-medicine applications, a total of three users displayed a lack of interest. A total of twenty-two users were interviewed. Table 1 shows the demographic characteristics of e-medicine application users. Among the twenty-two users of the e-medicine application, there were eight males and fourteen females. All users' ages ranged from 20 to 30. Most of the users have completed only their undergraduate education, while only one user has pursued higher study.

Table1: Demographics Characteristics of E-Medicine Application Users

Gender		
	Frequency	Percent
Male	8	36.36%
Female	14	63.63%
Age		
	Frequency	Percent
20-25	12	54.54%
26-30	10	45.45%
Education		
	Frequency	Percent
Graduation	21	95.45%
Higher Education	1	4.545%

The Thematic Content of the Analysis

The interview's theme content analysis produced twelve main topics. These themes and subthemes are compiled in Table 2 below.

Table2: Themes and Subthemes of Content Analysis

Themes	Subthemes
Name and use of e-medicine applications	Medscape, Pharmapedia, Pharma Plus, Combination applications, regional application, other applications
Purpose of e-medicine applications	Comprehensive Drug Information, Drug Interactions and Side Effects, Dosage Forms and Administration Directions
Use frequency of e-medicine applications.	Use daily, Multiple times in a week, As needed, and Occasional use.
Platforms for e-medicine application	Android Google Play Store, iPhone Apple Store
Essential Features of E-medicine Application	Simple and easy to use, Accurate and comprehensive information, Prescription and Dosage Calculations, Search and Update Capabilities, Offline availability, and Guidance on medication use.
Importance of App Usability and Simplicity	Simple and easy to use, other functionalities
Risks associated with e-medicine application use	Incomplete and wrong information, Risk of Self-Medication, and Lack of Professional Consultation
Expectations and requirements of	Comprehensive Drug Information, Timely updates and availability of new drugs, Community Interaction

potential users of e-medicine applications	
Factors that make e-medicine application beneficial	Improving Patient Engagement, Ease of Information Collection, easy access, Support for Healthcare Professionals, Education benefits, Reliable and correct usage, Time-saving and quick results, Overall Benefits Acceptance
User Satisfaction and Emotional Response to E-Medicine Applications	Feel Informed and Confident, feel relaxed and satisfied, feel good, feel grateful, feel time saved.
An issue with the use of e-medicine applications	Performance issues, Lack of updated and comprehensive info, Complexity and usability issues, Advertisements issue
Recommendation of e-medicine application to a friend	Helpfulness and Utility, Source of information

Theme 1: Name and Use of E-Medicine Applications

Medscape

The Medscape app is widely used by users, establishing it as a highly favored option among medical professionals searching for trustworthy and comprehensive medical information. This application is highly preferred because of its vast database, user-friendly interface, and thorough coverage of several medical subjects. User 1 stated that they use the Medscape app, a feeling that was also expressed by User 13 and corroborated by User 16, who utilized both Medscape and Pharma Plus.

"I use the Medscape app." (User1 and 13)

"I use Medscape and Pharma Plus apps." (User16)

Pharmapedia

Pharmapedia is particularly well-liked by users in Pakistan. User 4 highlighted the usefulness of the app by saying, "I use Pharmapedia," emphasizing how it may provide information on commonly used medications in Pakistan. Users 6 and 19 both agreed with this statement, highlighting Pharmapedia's significance to the regional medical community.

"I use Pharmapedia." (Users 4, 7, and 19)

"I generally use Pharmapedia and Medscape sometimes." (User 6)

"I use Pharmapedia and Pharma Plus." (User 10)

Pharmaplus

Users also utilized Pharma Plus, which is another important application, particularly for those who are stationed in Pakistan. "I use Pharma Plus and Medscape applications," Users 3 and 20 say, demonstrating their frequent usage of the application and gratitude for its localized information. Furthermore, user 8's usage of "Pharma Plus, Drug Dictionary, Pharmacy Dictionary" demonstrated the extensive functionality of the application.

"I use Pharma Plus and Medscape applications." (Users 3 and 20)

"I use Pharma Plus, Drug Dictionary, pharmacy dictionary." (User 8)

Combination Applications

A significant number of users chose to use a blend of e-medicine applications to assure their access to a diverse array of info.

"I generally use Pharmapedia and Medscape sometimes." (User 6)

They were demonstrating an equitable dependence on many sources. User 18 also highlighted the use of both Pharmapedia and Medscape, exemplifying the widespread approach of using numerous applications to get full information.

"I use Pharmapedia and Medscape." (User 18)

Regional Application

The significance of applications tailored to certain regions was emphasized by many users who expressed a preference for apps that exclusively cater to the Pakistani market. User 2 explained that they used Pharmapedia and Pharma Plus as their primary sources for obtaining information on medications. These applications included data on the commonly used medications in Pakistan. The localized e-medicine resources are very beneficial and user-friendly, highlighting their importance. Users 12 and 17, who used the Pharma Guide, as well as user 11, who referred to Pharmacopeia Pakistan, endorse this perspective.

"I use Pharmapedia and Pharma Plus for any information related to medicines. Because these apps contain information about the drugs frequently used in Pakistan. They are really helpful and simple to use." (User 2)

"I use Pharma Guide." (Users 12 and 17)

"I use pharmacopeia Pakistan." (User 11)

Other Applications

Some users utilized e-medicine applications such as Med Space, Pharm Easy-Healthcare, E-Med, Drug Dictionary, Pharmacy Dictionary, Pharma Guide, and Pharmacopoeia Pakistan in addition to the big apps. User 5 exemplified the range of options available for obtaining medical information by mentioning the usage of Med Space, Pharm Easy-Healthcare App, and E-Med. This highlighted the diverse preferences among users when it comes to accessing healthcare resources. Participant 8's use of "Pharma Plus, Drug Dictionary, Pharmacy Dictionary" exemplified the diverse spectrum of e-medicine apps employed by various users.

"I use Med Space, Pharm Easy-Healthcare App, and E-Med." (user 5)

"I use Pharma Plus, Drug Dictionary, pharmacy dictionary." (User 8)

Theme 2: Purpose of E-Medicine Applications

Comprehensive Drug Information

User 1 mentioned that the main function of e-medicine applications is to provide thorough pharmacological information and highlighted the function of the applications in providing comprehensive pharmacological data.

"E-medicine apps provide knowledge about the medicines that include adult dose, pediatric doses, drug classes, interaction side effects, etc. " (user1)

User 4 also made a similar point, highlighting the applications' ability to provide comprehensive detail of drug information that included all basic pharmacological details like the mechanism of action, indication, and side effects of each drug.

"The purpose of the app is to gain basic information about drugs like the medicine brand name, their Mechanism of action, indication, side effects, contraindications. " (user 4)

Drug Interactions and Side Effects

Many users emphasized the significance of e-medicine applications in furnishing details on drug interactions and adverse effects.

"The purpose of the app is to get knowledge about indications, side effects, and the proper dosage of a drug. " (user11)

"The purpose of the app is to find out the dose, class of drug and interaction, and side effects. " (user13)

"To provide knowledge and information, on toxicity, and therapeutic uses related to drugs ". (user14)

User 7 highlighted the function of the applications in spotting possible drug interactions.

"It helps me to find out medicine generic, MOA, dose, interaction, side effects, etc. ". (user7)

Dosage Forms and Administration Directions

User 12 further highlighted the applications' thorough commitment to medication safety.

"The purpose of the Pharma Guide app is to provide comprehensive information about different medicines, including their uses, dosages, side effects, and interactions. " (User 12)

E-medicine applications that provide vital details on dosage forms, dosages, and administration directions are a recurring subject. User 3 highlighted the function of the applications in assisting with the administration of medication.

"They provide the details of dosage forms, doses, and alternate medicines. " (User 3)

User 9 highlighted the value of the applications in supporting well-informed drug administration decision-making.

"It helps me to find out medicine generic, moa, dose, interaction, side effects, etc." (user 9)

Theme 3: Use Frequency of E-Medicine Applications

Use Daily

Many users said that they used e-medicine applications regularly, emphasizing how important they are to their workday routines. User 3 stated that they rely on these apps indicating a frequent use of them to get daily medical information.

"On a daily basis." (user3)

In a similar vein, user 4 reported using the apps that these resources are necessary for day-to-day tasks.

"Most often daily basis. " (user4)

Multiple Times in a Week

Some users indicate a frequent but not daily usage pattern, using their e-medicine applications numerous times a week.

"Multiple times in a week. " (Users 1 and 7)

"I often use these apps like 4 to 5 times a week or whenever I need to know about some prescribed medicines." (User 5)

As Needed

Most users utilize their e-medicine applications on an as-needed basis, indicating a flexible use pattern that is contingent upon the demands of their line of work.

"I use the app in a day or multiple times a day. Whenever any information related to medicine is needed." (user2)

"Whenever I need it, I use it." (Users 9 and 20)

"I use the Pharma Guide app quite frequently, especially when I need to look up information about specific medications." (User 12)

Occasional Use

A lesser frequency of use has been shown by the few individuals who reported utilizing their e-medicine applications sometimes or sometimes.

"I use it sometimes" (users 6 and 10)

"Like twice a week or as needed." (User 15)

Theme 4: Platforms for E-Medicine Applications

Android Google Play Store

Most users utilized the Android Google Play Store as their primary platform for obtaining e-medicine apps. The preference was consistently emphasized in most of the replies of users.

"I use the Android Google Play Store platform for e-medicine. " (Users 2-15, 17-22)

An experience like users 2-15 and 17-22. The strong inclination for the Android platform in this research indicates that it is readily accessible and favored by most users, maybe because it is generally available and offers a large range of e-medicine apps.

iPhone Apple Store

Conversely, a limited number of users indicated using the iPhone App Store platform for e-medicine apps. Although a small portion, this highlighted the fact that there were people who favored the iOS platform due to its distinct features, user-friendliness, or personal device preferences.

"I utilize the App Store iPhone platform for e-medicine." (User16)

Theme 5: Essential Features of E-Medicine Applications

Simple and Easy to Use

Users often emphasized the significance of a design that was easy to understand and navigate. The app's straightforward layout ensures accessibility for all users, irrespective of their technical proficiency.

"The essential feature of an app must have been its simplicity so that anyone can use it for beneficial purposes." (User 2)

"It should be easy to use." (User 10)

"It should be simple and easy." (Users 13, 14, 15, 16, 17, 19, 21, 22)

Accurate and Comprehensive Information

Accurate and current information is essential. Users anticipated comprehensive pharmacologic knowledge, which included methods of action, indications, therapeutic applications, doses, side effects, warnings, and interactions.

"Essential features for an e-medicine app, in my opinion, include reliable and up-to-date information on a wide range of medications." (User 12)

"Proper info and accurate info on drugs." (User 18)

"Complete Pharmacology of medicines including Mechanism of action, Indications, Therapeutic uses, Dosage, Adverse effects, Contraindications, Interactions." (User 5)

"All the leaflet information should be in a single application like dosage, contraindication, uses, adverse effects, side effects, drug class, mechanism of action, and so on." (User 8)

Prescription and Dosage Calculations

Users highlighted the need to be able to compute doses for both adults and children, as well as be able to identify alternative brands, to effectively manage and keep records of prescribed medicine.

"These apps should be calculating the adult and Pead doses and alternate brands." (Users 3, 20)

"Prescription medicine & report keeping." (User 1)

"These apps should calculate the adult and Pead doses and alternate brands." (User 20)

Search and Update Capabilities

Users underlined that to locate accurate details fast as well as make assured the app was up to date with the most recent medication data, effective search features, and timely updates were crucial.

"When I search for some medicine, it shows in one search and all the necessary information should be there." (User 7)

"The app should have an update option so that all new information about the drugs will be available." (User 9)

Offline Availability

Many users highlighted that the application should be available in the offline version. It will be helpful in those areas where internet connection and availability are limited so users can rely on an offline application.

"It's offline use and most importantly app should contain proper and correct information." (User 2)

Guidance on Medication Use

Users need thorough and detailed instructions on the administration of medicine, including information about when it should be used, when it should not be used, and other important factors that need to be considered before starting any therapy.

"Guidance about proper indication, use, and rationality of the drug and about its contraindications and important points that should be noted before taking any medication." (User 11).

Theme 6: Importance of App Usability and Simplicity

Simple and Easy to Use

Many users mentioned application must be simple easy and friendly user to use for both medical and non-medical persons. To provide accurate info and overcome the confusion and wrong information.

"The application must be simple to use as many lay people need information related to any drug they are using." (User 2)

"It should be simple and easy to use." (User 3)

"It's essential for me that an app be easy to use because it's a matter of saving my time not being stuck in a single thing." (User 5)

"It's quite essential for me that the app should be simple as many options can confuse the user and lead to misguidance or wrong information regarding the drug. Simple searching and proper information can guide the user well." (User 6)

Other Functionalities

Users highlighted other or additional functionalities of e-medicine applications that included different language availability, offline versions, and easy-to-use methods.

"App must be offline." (user12)

"It must be available in different languages." (user14)

"It must be easy to operate." (User 16)

Theme 7: Risks Associated with E-Medicine Application Use

Incomplete and Wrong Information

Users highlighted the major negative consequences that might result from using e-medicine applications which provide incorrect or inadequate medication information, citing concerns about the possible hazards involved.

"Sometimes the drug information is incomplete or wrong which could be associated with greater risk for the person. This might cause serious health issues for many individuals." (User 2)

"Patient safety could be at risk if these apps contain wrong information about medicines like wrong dosage wrong indications wrong combinations etc." (User5)

"Some information is not authentic so there is a chance of side effects and toxicity." (User 9)

Risk of Self-Medication and Lack of Professional Consultation

Users reflected the hazards associated with individuals exclusively relying on e-medicine applications for medical guidance, which might result in the self-administration of medicines without adequate consultation with healthcare practitioners.

"People can start taking medication just by knowing its indications without consulting any physician and that can be a potential risk associated with such type of apps." (User 11)

"It can be hazardous, especially in developing countries where people can't afford doctor fees and lab charges. They can use it for self-medication which can ultimately cause more harm than good." (User 13)

"Risks associated with using e-medicine apps could include relying solely on the app for medical advice without consulting a healthcare professional." (User 17)

Theme 8: Expectations and Requirements of Potential Users of E-Medicine Applications

Comprehensive Drug Information

Users anticipated that e-medicine applications would provide exhaustive and precise information about all accessible drugs, hence assuring them dependable particulars for well-informed choices.

"An app should have contained all information on any available drug in the market. Also, the information in the app should have been 100% correct." (user 2)

"Provide complete and correct medicines." (user 15)

Timely Updates and Availability of New Drugs

Users underline the timely update and availability of new drug info as an expectation and requirement of e-medicine applications. This expectation makes the user rely on e-medicine applications.

"Potential users of e-medicine apps would likely expect accurate and trustworthy information, easy navigation, timely updates, and a secure platform to protect their health data." (User 12)

Community Interaction

Consumers appreciated interactive aspects that enabled them to ask other users or medical experts for help, which enhanced their knowledge of drugs and how to take them.

"There should be an open community where people can ask questions and experts answer them." (user 14)

Theme 9: Factors that Make E-Medicine Application Beneficial in Improving Patient Engagement

User 1 mentioned that e-medicine applications are beneficial for improving patient engagement by providing all medicine-related information and easy accessibility.

"Yeah, it is very beneficial for us because it improves Patient Engagement."(user 1)

Ease of Information Collection

Users valued how easy and fast it was to get information regarding medications. They considered the app to be very helpful because of how quickly and efficiently they obtained the necessary information.

"It is 100% beneficial for the users because anyone can easily collect information regarding the medicines."(user2)

"It is beneficial because you can get info in one click."(user3)

Easily Access

Users considered the app to be extremely helpful since it made it easy to get medication information without having to do a lot of research, which was especially helpful when they were short on time.

"This mobile app is very convenient because we can access information about drugs easily in just a minute instead of overlooking the pharmacopeia. " (User 4)

Support for Healthcare Professionals

Clinicians considered the e-medicine app useful because it helped with clinical decision-making by offering rapid references and clarifying medication use.

"It is beneficial for a healthcare professional can easily go through the basic usage and indications of drugs if he or she is getting confused."(user 6)

Education Benefit

Users praised the app for its educational material's value in improving their comprehension of drugs and correct use.

"Yes, it can be beneficial. It can broaden your skill and knowledge or not beneficial in a case if you are relying on an app and not consulting your doctor." (User 8)

Reliable and Correct Usage

Users acknowledged the app's advantages when it was used properly, delivering reliable and precise information about drugs.

"Yes, it is beneficial if it is used correctly."(User 11)

Time-Saving and Quick Result

Users have often noted that the substantial time savings offered by e-medicine applications is their primary advantage. These applications save users time and effort through manuals or on the web for the necessary information.

"The main benefit of an e-medicine app is to provide quick response without wasting time."(user 1)

"One of the most important advantages of the E-medicine application is timesaving. You can check your medication information within minutes. Also, the correct doses and contraindications."(user2)

"It saves the Time."(user4)

"The main benefit is Timesaving. "(user14)

"The instant result like in Google I have to search for the most relevant article but in apps, it gives direct results."(user13)

Overall Benefits Acceptance

Numerous users confirmed the app's overall advantages, demonstrating the general public's acceptance and contentment with its functionalities and features.

"Yes, it is beneficial." (User 7,12-15)

Theme 10: User Satisfaction and Emotional Response to E-Medicine Applications Feel Informed and Confident

Users who have used e-medicine applications reported feeling more confident and informed about their prescriptions. Their renewed trust in medical knowledge is indicative of this.

"After utilizing an e-medicine application, I generally feel more informed and confident about the medications I may be taking or considering. "(user 12)

"I feel good because it boosts my knowledge as well as I get sure about medication information. " (user)

"I feel good after using the e-medicine app because it provides good information about the medicine. " (user1)

Feel Relaxed and Satisfied.

Several users reported feeling pleased and at ease after employing the mobile application, suggesting that it efficiently fits their goals and lessens the anxiety associated with looking for medical information online.

"I feel relaxed and satisfied. " (user20,3)

**"I feel relaxed and satisfied as it often provides me with the information I need.
"(user6)**

Feel Good

A generally positive assessment is conveyed by users who said they felt well after using the e-medicine program, indicating contentment with the whole experience.

"I feel good."(user (4,7)

"I feel good after using the e-medicine app because it provides good information about medicine."(user1)

Feel Grateful

Some users complimented the app's effectiveness and convenience, emphasizing how simple it is to get information without having to do a lot of research.

"Grateful because I don't have to dig into books, I can have info about drugs in one click."(user 14)

Feel Time Saved

Users complimented the e-medicine app's time-saving capabilities and noted how it was more effective than conventional techniques since it accumulated knowledge in one location.

**"I feel like I saved my time from wasting on the internet to search for a basic detail.
" (user11)**

Theme 11: An Issue with the Use of E-Medicine Applications

Performance Issue

Users grumbled about the app's speed and quickness, which detracted from their entire experience.

"The Slow-running issues are most common."(user1)

"Slow working sometimes."(user13)

"Technical issues like the internet slow working etc."(user 15)

Lack of Updated and Comprehensive Info

Some users experienced a lack of updated and missing information that made them frustrated.

"Sometimes I did not find new drugs." (User 3 and User 20)

"It doesn't include the newly discovered or invented drug or newly launched brand so it is difficult sometimes." (User 4)

"Sometimes the e-medicine app doesn't contain the desired information I am searching for." (User 5)

"Lack of drugs, and lack of required information." (User 8)

"References are not given, and no information is available about most running brands." (User 18)

"Lack of drugs." (User 19)

Complexity and Usability Issues

Users encountered it challenging to access and use some e-medicine applications efficiently because they were complicated or not user-friendly.

"Medscape is quite complex so it took me time to understand. The application, as well as there were a lot of options that were not available offline, and this caused me issues."(user 6)

Advertisements Issue

The user experience was often disturbed by intrusive advertisements, leading to annoyance and impeding the seamless usage of e-medicine applications.

"Ads in between use." (User 14)

"Adds during use." (User 16 and User 21)

"Adds during use and hanged apps." (User 17)

Theme 12: Recommendation of E-Medicine application to a friend

Helpfulness and Utility

Users commended the e-medicine app for its overall efficacy and usefulness in delivering essential pharmacological information, making it a vital instrument for healthcare professionals, pharmacists, and regular users.

"I will recommend it to my friends because it is helpful to get info about drugs." (User 1)

"I will surely recommend e-medicine apps to my friends because it is really helpful for healthcare practitioners and pharmacists." (User 2)

"Because these are very helpful that's why I recommend them to my friends." (User 3)

"Mostly prefer it because it is beneficial." (User 4)

"Yes, I would recommend it because they are so useful for me and I believe it's beneficial for them too." (User 7)

"I will recommend this app to my friend because it is really helpful for getting information related to medicine." (User 10)

"I will surely recommend them because they are highly helpful in containing a concise and definite amount of filtered information regarding a drug and its usage." (User 11)

"Yes, I will recommend it because it provides knowledge about medicines." (User 19)

"Yes, I will because it provides details of drugs." (User 18)

"Yes, I will Because these are very helpful." (User 20)

Source of Information

Many users found e-medicine applications a reliable filtered and detailed source of knowledge and information on medicines which makes it a trusted and credible resource for learning and reference purposes.

" Yes, I will recommend it to my friend it is beneficial." (User 5)

"I will recommend it to my friend because it is a good way of info." (User 6)

"I would recommend the Pharma Guide app to a friend because it is a source of information about medications." (User 17)

"I would recommend the Pharma Guide app to a friend because it is a source of information about medications." (User 21)

"I would recommend the Pharma Guide app to a friend because it is a source of information about drugs." (User 22)

"Yes, I will recommend it because it provides details of drugs." (User 14)

"Yes, I will recommend it because it is the source of info." (User 15)

"Yes, I will because it provides detailed info on drugs." (User 16)

Discussion

This study's findings have shown the opinions of users for different e-medicine applications. This is the first study conducted on the opinions of users of different e-medicine similar qualitative studies on oral health applications (11). Another study was done on the management of COPD self-management by using mobile applications(12). The demographic attributes and characteristics of e-medicine applications convey valuable information on the usual pattern of people who utilize these applications. The majority interviewed were young between the ages of 20 to 30 same as the study carried out in 2015 on the usage of health and fitness apps by college students in the Southwest US to alter their behavior(13). Female portions were higher as compared to males. The maximum user's education qualifications were graduated.

The interviews were conducted by the semi-structured interview guides as Keven Anderson did to investigate mobile self-care apps with a focus on use trends, anticipated advantages, and suggestions for app layout and operation(14). The thematic analysis was executed in this study to explore the user experiences related to e-medicine(15-17). The thematic content of interviews demonstrated that applications have diverse uses and prospects for e-medicine users. Application users highlighted numerous applications like Medscape, Pharmapedia, Pharma Plus, and Drug India Index

demonstrating preference platforms that deliver extensive and inclusive information on medicines. The users also mentioned regional and local applications that are used in specific countries like the Pharmapedia application that offers the details of all market brands that are available in Pakistan which enhanced the importance and use of these applications.

Primarily, these application's purpose was to acquire comprehensive detailed drug information including dose, side effects, drug interactions, and instructions for drug administration. This suggested that the primary purpose of these applications is to provide a reliable source of pharmacological information that supports medical care providers in making well-informed conclusions. New and updated information regularly of these applications is highlighted in theme 5 under the heading of essential features of e-medicine applications that demonstrated the importance of accurate and updated information's crucial role in clinical settings.

The use frequency of e-medicine applications used by users at different frequencies. Some use them regularly, while some as per needed. This diversity indicates that some users depend on these applications almost exclusively, presumably due to the nature of their occupations, while others use them when needed. Numerous users Prefer the Android (Google Play Store) platform for downloading e-medicine applications rare users have chosen the iPhone store. This inclination might be explicated by the multiple and approachability of e-medicine applications on the Google Play Store at low or free cost(18, 19).

This study also highlighted the key characteristics of e-medicine applications that users expected from these applications including simple, easy to use, offline availability, updated and accurate comprehensive information. These applications are required to assist both the medical healthcare providers and layperson reflected in the focus on serviceability and easiness Users also highlighted the risk factors associated with the use of e-medicine in theme no 7 predominantly inaccurate and lack of information leading to self-medication and lack of doctor consultation. These risk factors highlighted that the application's information must be up-to-date and inaccurate and offer reliable and accurate information.

Regarding user satisfaction, most user responses were positive with users reporting feelings of knowledge, self-assurance, and contentment with the applications. However, some issues were faced by users during the use of e-medicine applications such as slow speed, performance, lack of new and updated information, advertisements, and complexity of applications all these issues need to be improved to enhance the confidence and trust of e-medicine users on these applications. Overall findings of these results revealed that e-medicine applications are useful and reliable resources for medical and non-medical persons. These applications offer quick and immediate information about drugs and improve the patients' improvement and support in decision-making(20, 21). The applications ' excellent responses and recommendations from users serve as additional proof of their usefulness in contemporary healthcare settings(22, 23). To retain them reliable and successful, however, recurrent upgrades, user-friendly design, and hazard mitigation are necessary.

Conclusion

This paper shows the increased importance of e-medicine applications as convenient tools of pharmacological information acquisition, as well as healthcare learning and practice. The users had general satisfaction associated with convenience, time-saving, and increased confidence in making decisions regarding medications. Nevertheless, the issues of inaccurate information, lack of usability, and the possibility of self-medicating present the danger of poorer quality assurance and user-focused design. To use it safely, one needs to increase content validation, frequent updates, and incorporate professional healthcare guidance. E-medicine applications have a high potential of enhancing healthcare access and transfer of knowledge especially in the developing environment.

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