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Original Article

Impact of Social Media on Knowledge, Attitude, and Performance of the Post-discharge COVID-19 Patients: An Educational Intervention

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ABSTRACT

Background: Considering the significance of adherence to treatment in patients with COVID-19 and the role and benefits of education through social media, this study aimed to investigate the impact of social media-based intervention on improving the knowledge, attitude, and performance of patients with COVID-19 following their hospital discharge.

Methods: This interventional study was carried out from November 2021 to July 2022 at a hospital in Tehran, Iran, involving patients diagnosed with COVID-19. The participants were categorized into two groups: an intervention group that received social media-based training and a control group that underwent conventional training. A total of 60 eligible patients were selected through convenience sampling and randomly assigned to either the intervention group (n=30) or the control group (n=30). The participants' knowledge, attitudes, and performance were assessed using a questionnaire developed by the researchers, both prior to and two weeks after the educational intervention. Data analysis was performed using SPSS version 24, employing independent and paired T-tests as well as Analysis of Covariance (ANCOVA) for statistical evaluation.

Results: A comparison of pre-test and post-test variables between the two groups demonstrated a significant difference in the intervention group (P=0.001). Furthermore, the analysis of between-group differences indicated that the intervention led to a substantial enhancement in post-test scores regarding attitude, knowledge, and performance in the intervention group when compared to the control group (P<0.001).

Conclusion: The study's findings indicate that interventions delivered via social media significantly improve the knowledge, attitudes, and behaviors of patients with COVID-19 after their hospital discharge. These results underscore the critical role of social media in enhancing patients' awareness and skills in health management.

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Keywords: Knowledge, Attitude, Performance, Social Media, Self Care, COVID-19

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Introduction

The emergence and widespread impact of the COVID-19 pandemic posed a significant challenge to healthcare systems globally. The intricate nature of managing this crisis, especially within the context of Iran's distinct situation, combined with the unpredictable characteristics of the virus and insufficient prior experience, has fostered opportunities for various innovations and inventive approaches (1). This disease has significantly impacted not only individuals' physical health but has also profoundly influenced their mental well-being and social interactions (2).

Non-compliance with therapy is recognized as a significant global issue, and extensive research has been conducted on this topic (3). It is essential to educate patients about the importance of adhering to their medication schedules. Non-adherence to pharmacological treatment may occur intentionally, as a result of adverse drug effects or random complications, or simply due to forgetfulness (4). Advanced technologies, when integrated with dependable network services, significantly enhance healthcare delivery and broaden access to a broader population (5). Social media platforms have been widely adopted in health-related contexts by various user groups. For numerous individuals, these platforms served as a primary source of information about COVID-19, particularly for patients seeking guidance (6).

The use of social media has surged due to advancements in mobile devices and broadband networks (7). As of now, more than half of the global population actively participates on social media platforms. This extensive engagement has positioned social media as an essential tool for communication, information sharing, and social support, particularly during the isolation experienced during the COVID-19 pandemic (8, 9). Social media refers to internet-based communication platforms, whether for mass or personal use, that allow users to interact in real-time or asynchronously (10).

Mobile technology serves as a crucial mechanism for delivering health services to a vast population. It represents a key aspect of information and communication technology, which has also influenced the educational domain, leading to the concept of mobile-based learning. The advancement of health systems, coupled with an increasing focus on patient self-management and significant progress in mobile technologies, has led to the exploration of this technology as a means to improve the quality of healthcare services (11). The capabilities of mobile technology facilitate a range of training opportunities for learners in real-world contexts. Mobile devices provide the flexibility for learners to engage with educational content anytime and anywhere, extending learning beyond traditional classroom settings (12). The mobility and affordability of mobile technologies allow for limitless learning experiences. Additionally, mobile tools are adept at supporting diverse communication methods and participatory features, which are essential for fostering collaborative knowledge construction (13). The advancements in mobile technology enable the implementation of diverse training programs in real-world settings pertinent to patient care (14).

Mobile and web-based training programs are increasingly becoming popular, often superseding traditional in-person training sessions (15). With internet access, individuals can leverage online resources to make informed decisions regarding their health (16). Research teams around the world are exploring the effectiveness of mobile-based training in health promotion and disease prevention. The rapid evolution of mobile applications has introduced innovative methods for enhancing health awareness and preventing diseases. A substantial body of research has demonstrated that mobile phones serve as practical tools for implementing educational interventions in multiple health areas, including the management of type 2 diabetes (17), promotion of weight loss and physical activity (18), and enhancement of self-management practices (19). The findings suggest that innovative technologies can significantly contribute to the enhancement

of patient education and the improvement of health outcomes. Prior studies have shown that mobile technologies are effective in increasing patients' self-care knowledge and awareness levels (20-22). Conversely, some researchers have explored the impact of these technologies during outbreaks of infectious diseases, yielding mixed results (23, 24). In the absence of clear and consistent guidance, individuals often rely on social media to obtain information regarding crises, public health recommendations, and other health-related issues (25, 26).

Given the significance of post-discharge follow-up in the management of COVID-19 patients and its role in mitigating disease recurrence, along with the advantages of educational interventions via social media platforms, this study aimed to assess the impact of a social media-based intervention on enhancing the knowledge, attitudes, and practices of COVID-19 patients following their discharge from the hospital.

Methods

Study Design and Setting

This study employed an educational intervention design, utilizing a pre-test/post-test control group framework. The research was carried out in a hospital in Tehran, Iran, from November 2021 to June 2022. Participants were divided into two groups: one received instruction via social media, while the other was taught using traditional methods. The results of both groups were then compared.

Participants and Sampling

The study population comprised all patients diagnosed with COVID-19 who were discharged from the hospital following treatment. The inclusion criteria required a confirmed COVID-19 diagnosis by an infectious disease specialist, positive PCR test results, and evidence of pulmonary involvement as indicated by lung CT scans. Additionally, participants needed to possess literacy skills in reading and writing, as well as the ability to effectively use mobile phones and read SMS messages. Patients were excluded from the study if they missed more than two intervention sessions or expressed unwillingness to participate.

A convenience sampling method was utilized, leading to random assignment of participants into two groups: an intervention group receiving social media-based instruction and a control group undergoing conventional training. Based on prior research findings (27), a sample size of 30 participants was determined, accounting for an anticipated attrition rate of 20% and aiming for a 95% confidence interval, resulting in a total sample size of N=56. The participants' recruitment process is illustrated in Figure 1.

$$n = \frac{\left(Z_{1-\frac{\alpha}{2}} + Z_{1-\beta}\right)^2 (S_1^2 + S_2^2)^2}{(\mu_1 - \mu_2)^2} = 28$$

Intervention Procedure

The intervention group participated in a two-week supplementary support program delivered through WhatsApp. Participants received educational resources that emphasized essential information about medication side effects and adherence to guidelines from reputable scientific sources. These materials were uploaded daily between 10 AM and 12 PM throughout the duration of the program. The intervention was implemented in collaboration with an infectious disease specialist.

Patients were provided with a series of daily text messages (14 in total), educational video clips (eight clips, each lasting between three to five minutes), podcasts (eight episodes, each ranging from two to four minutes), educational images (12 images), and infographics (two in total). The educational materials were developed following multimedia learning principles. The content covered topics such as side effects, medication precautions, daily medication reminders, adherence to prescribed medications and dietary regimens, as well as necessary para-clinical measures. Periodic communication was established through phone calls to confirm comprehension of the material,

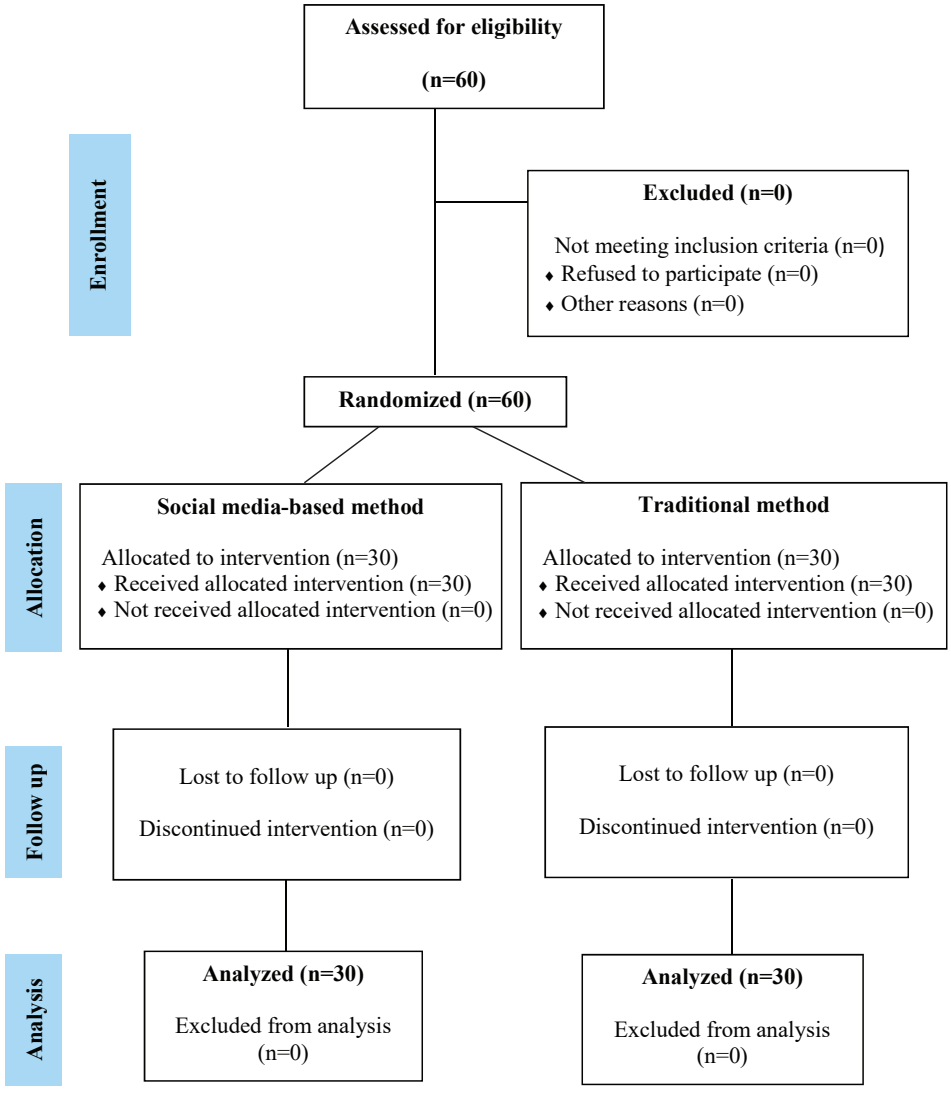

Figure 1: The patient's recruitment flow diagram

address inquiries, and promote reciprocal engagement. The determination of each patient's medication intake frequency was based on the specific prescriptions provided by the specialist. Additionally, a daily regimen outlining the appropriate administration of medications and required para-clinical interventions was developed and dispatched to patients on designated treatment days. This information was conveyed to the patients by the nurse in the COVID-19 ward, who also served as the researcher.

Control group: The control group utilized the standard procedure, which involved providing patients with a discharge teaching sheet. This sheet included a physician's medical prescription along with nursing recommendations regarding adherence to prescribed medications and necessary para-clinical actions. Additionally, it specified the date for the next patient visit and included oral instructions.

Two weeks following the training, participants from both groups completed the post-test. By the end of the study, educational materials were also made available to the control group.

Tools/Instruments

Data collection was conducted using a questionnaire specifically developed by the researchers, following the guidelines established by the Ministry of Health concerning COVID-19. The questionnaire was designed for patients to self-report. The initial section gathered demographic

data, followed by inquiries divided into three key dimensions: *knowledge*, which comprised ten questions assessing patient information; *attitude*, represented by ten items rated on a 5-point Likert scale ranging from "Very Satisfied" to "Very Dissatisfied"; and *performance*, which included 10 yes/no questions evaluating adherence to health recommendations related to COVID-19.

Validity and Reliability: To ensure the instruments were valid and appropriate for the study's objectives, they were reviewed by faculty members from Tehran University of Medical Sciences. Following their evaluation and feedback on the tools, final modifications were implemented based on their insights, which contributed to establishing face validity. The assessment of content validity was conducted using the Content Validity Ratio (CVR) and Content Validity Index (CVI) methodologies. The content validity assessment resulted in a CVI of 0.78 and a CVR of 0.75, which collectively affirmed the content validity of the instruments.

The tests were administered to 10 patients to assess their reliability. The reliability coefficients for the knowledge and attitude questionnaire, calculated using Cronbach's Alpha, were 0.88 and 0.75, respectively. For the performance questionnaire, which was evaluated using Kuder-Richardson, the reliability coefficient was 0.74. Overall, these values indicate a favorable level of reliability for all three tools used in the research.

Data Collection

Questionnaires were electronically distributed to both groups via the ePoll platform prior to the intervention's commencement, and post-tests were administered two weeks afterward. Notably, all patients engaged in the intervention, which contributed to the reliability of the findings.

Data Analysis

The analysis of the data was conducted using SPSS version 24, incorporating a range of statistical techniques. These techniques involved evaluating the normality of the data through the one-sample Kolmogorov-Smirnov test, comparing the means of both groups prior to and following the intervention with an independent sample t-test, performing descriptive analysis of the questionnaire results in percentage format, and assessing the differences between pre- and post-test data using a paired sample t-test. Furthermore, ANCOVA was applied to compare post-test scores across the research variables. A significance threshold was established at $P<0.01$.

Ethics - The patients were informed about the purpose and objectives of the survey. The questionnaires were gathered and filled out anonymously, ensuring participants' privacy. Informed consent was obtained from all patients in the study. The research was carried out in compliance with the protocols established by Tehran University of Medical Sciences.

Results

Demographic characteristics

The study included 48 males (80%) and 12 females (20%) across both groups. The predominant age group was individuals aged 21 to 40, comprising 12 participants (20%) in the intervention group and 9 participants (35%) in the control group. The demographic data indicate that both groups are approximately similar in terms of gender, age, education level, and marital status (Table 1).

Based on the independent t-test, there was no significant difference in the variables of knowledge ($P=0.673$), attitude ($P=0.190$), and performance ($P=0.846$) between the intervention and control groups in the pre-test (Table 2).

Table 3 shows the comparison between pre-test and post-test scores in the intervention and control groups.

The intervention group experienced significant improvements across all variables (knowledge, attitude, and performance), while the control group showed no significant changes. These results indicate the effectiveness of the intervention in improving the examined variables.

Table 1: Demographic characteristics of the participants

Variable		Intervention group	Control group	Total
Gender	Male	25 (42%)	23 (38%)	48 (80%)
	Female	05 (8%)	07 (12%)	12 (20%)
Age	Under 20	04 (7%)	06 (10%)	10 (17%)
	21 to 40	12 (20%)	09 (15%)	21 (35%)
	41 to 60	10 (17%)	09 (15%)	19 (32%)
	Over 61	04 (7%)	06 (10%)	10 (17%)
Education Level	Below Diploma	05 (8%)	06 (10%)	11 (18%)
	Diploma	07 (12%)	10 (17%)	17 (29%)
	Bachelor's Degree	13 (22%)	09 (15%)	22 (37%)
	Master's Degree and Above	05 (8%)	05 (8%)	10 (16%)
Marital Status	Married	10 (17%)	08 (13%)	18 (30%)
	Single	20 (33%)	22 (37%)	42 (70%)

Table 2: Mean differences of pre-test scores in research variables for intervention and the control group

Variable	Group	N	Observed Difference	t	df	Significance Level
Knowledge	Intervention	30	-0.46	-0.67	58	0.673
	Control	30				
Attitude	Intervention	30	-1.93	-1.38	58	0.190
	Control	30				
Performance	Intervention	30	-0.36	-1.22	58	0.846
	Control	30				

Table 3: Comparison of variable scores between the intervention and control groups

Variable	Group	N	Pre-Test	Post-Test	t	Significance Level
			Mean±SD	Mean±SD		
Knowledge	Intervention	30	23.56±2.52	25.66±2.78	-0.13	0.001
	Control	30	24.03±2.84	24.13±2.75	-0.59	0.557
	Between-group comparison	-	-	-	2.14	0.036
Attitude	Intervention	30	36.06±4.39	39.53±4.61	-12.26	0.001
	Control	30	38±6.28	36.96±4.39	1.04	0.304
	Between-group comparison	-	-	-	2.20	0.031
Performance	Intervention	30	7.20±1.24	8.93±1.28	-18.22	0.001
	Control	30	7.56±1.07	7.93±1.76	-1.77	0.086
	Between-group comparison	-	-	-	2.51	0.015

* SD: Standard Deviation

Also, the results of the dependent t-tests for comparing pre-test and post-test variables in the control and intervention groups showed a significant difference between the pre-test and post-test in the intervention group for the variables of knowledge, attitude, and performance (P=0.001). However, no statistically significant differences were observed in the control group when comparing pre-test and post-test results for the variables of knowledge (P=0.557), attitude (P=0.304), and performance (P=0.086).

The independent t-test results for the between-group comparison indicate that the intervention has significantly improved the post-test scores in terms of attitude,

Table 4: Comparison of post-test scores for the research variables between groups

Variable	Mean Square	F	P value
Knowledge	54.57	64.30	<0.001
Attitude	203.86	18.78	<0.001
Performance	30.73	44.74	<0.001

knowledge, and performance in the intervention group compared to the control group (P<0.001).

Table 4 presents the ANCOVA results for comparing post-test scores while controlling for pre-test scores across all dependent variables in both the intervention and control groups.

The findings revealed that after controlling for pre-test scores, significant differences were observed between the intervention and control groups regarding knowledge, attitude, and performance (P<0.001). This indicates that the intervention had a significant effect on the knowledge, attitude, and performance of patients with COVID-19.

Discussion

This research examined the impact of social media intervention on the knowledge, attitudes, and behaviors of COVID-19 patients after their discharge from the hospital in Tehran, Iran. The results demonstrated that the intervention significantly enhanced patients' understanding of compliance with COVID-19 protocols when compared to a control group. These outcomes align with findings from multiple studies (20, 22, 28, 29). Furthermore, another study revealed that utilizing the Multi-Messenger Educational Program via WhatsApp increased the awareness and knowledge levels among COVID-19 patients (30). The overall findings suggest that educational interventions through virtual communication can enhance patient satisfaction, promote learning, and improve self-care practices among discharged COVID-19 patients (31). The COVID-19 pandemic necessitated significant restrictions, yet remote training and treatment via virtual communication have proven beneficial for patient satisfaction, learning enhancement, and self-care promotion. Remote healthcare is recognized as an effective alternative to traditional in-person visits under specific circumstances (21). Increasingly, diverse populations are receiving education and care through virtual platforms (32). This approach allows patients to engage in training from home, thereby saving time and costs while eliminating constraints related to location and scheduling (33). Currently, this method is being integrated as a vital component of healthcare systems across many countries. The World Health Organization (WHO) advocates for comprehensive healthcare delivery, particularly for chronic patients, endorsing virtual training as an effective communication channel between patients and healthcare providers (34).

The findings of this study indicate that interventions delivered through social media significantly influence attitudes related to COVID-19 and contribute to positive changes in these attitudes. This aligns with the conclusions drawn from several prior studies (21, 30, 31). Furthermore, virtual education utilizing advanced educational tools offers optimal conditions to enhance educational dynamics. The advantages of remote education surpass those of traditional methods, mainly due to its flexibility in terms of time and location, the provision of multimedia resources, and the facilitation of interaction between instructors and learners.

By reducing training duration, increasing durability, and enriching the learning experience (34), this technology facilitates rapid access to health counseling services, lowers costs, provides access to specialized skills, and significantly improves quality of life. Moreover, it enables individuals to maintain a virtual presence instead of a physical one, minimizing travel time while allowing for the efficient acquisition of substantial information remotely (35). A study indicated that remote education

during the COVID-19 pandemic significantly enhances sailors' knowledge and awareness regarding contagious disease prevention, leading to improved insights and attitudes, as well as better performance in this area (21). Additionally, another study indicated that virtual education positively influences the attitudes and clinical performance of operating room staff (36).

The information provided through distance learning in nursing or virtual education aims to enhance self-care knowledge, mainly focusing on improving patient skills related to physical and mental health, pain management, and other disease-related challenges, ultimately fostering a more positive attitude towards the illness. Remote training facilitates the delivery of care via communication methods like educational videos, the Internet, and telephone interactions. Utilizing telephone communication not only proves effective in lowering costs and improving access to care but also strengthens the relationship between patients and healthcare providers. This mode of communication helps eliminate barriers related to time and location while positively influencing the patient's perspective toward their healthcare experience (37).

Furthermore, the results of this study demonstrated that interventions utilizing social media significantly enhanced patient outcomes when compared to the control group. This aligns with the findings reported by other studies (20-22). Virtual training refers to the use of information and communication technologies to deliver health and medical services remotely. These services encompass electronic visits, virtual reviews, remote evaluation of recorded videos or images, telephone evaluations, and management services, including medical discussions and consultations (38, 39). Research has shown that virtual education programs for patients can positively influence self-care, emotional well-being, physical function, and awareness regarding COVID-19 (22). The research indicated that distance medicine, utilized as a counseling approach in diabetes education programs, effectively guided patients in adhering to insulin protocols and resulted in their satisfaction with the guidance received (21). In parallel, another study highlighted that new virtual methods demonstrate that telephone training and care were primary modalities of remote healthcare, with an increasing trend in video consultations during the COVID-19 pandemic (40). These findings underscore the potential of integrating digital platforms into healthcare strategies to optimize patient engagement and improve health outcomes across various conditions, consistent with the findings of the present study.

Limitations and Suggestions

The sample in this investigation included patients with COVID-19 discharged from a single hospital. Consequently, caution should be exercised when extrapolating the findings of this study to other diseases or patient populations in different cities. This research employed a cross-sectional design, highlighting the necessity for longitudinal studies to assess the efficacy of the implemented protocols concerning the specific dimensions of the research variables. Challenges such as slow internet access and electronic training systems, along with some learners' insufficient familiarity with social media, hindered the educational process. It is recommended that further studies be conducted to evaluate the long-term impacts of the educational treatment program on the psychological effects of COVID-19.

Conclusion

This study investigated the effects of a social media-based intervention on the knowledge, attitudes, and performance of COVID-19 patients following their discharge from the hospital. The findings indicate that social media-based interventions significantly improve the knowledge, attitudes, and performance of COVID-19 patients post-discharge. Although challenges like limited Internet access were noted, the potential for remote education to improve health outcomes is clear. Future studies should consider investigating the long-term effects of these interventions. Ultimately, incorporating

remote education into healthcare strategies may represent a practical approach to enhancing patient support and facilitating recovery.

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Authors' Contribution

ME performed the experiments and data collection. MZ and MH designed the study and drafted the paper incorporating contributions from all authors. The final manuscript was approved by all of the authors.

Ethical Considerations

The patients were informed about the purpose and objectives of the survey. Each participant was required to fill out the questionnaire anonymously, which helped maintain their privacy and confidentiality throughout the study. Informed consent was obtained from all patients involved in the study. The research adhered strictly to the established protocols set forth by the ethical committee at Tehran University of Medical Sciences, Tehran, Iran, under the ethics approval code IR.TUMS.MEDICINE.REC.1400.1037.

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There is nothing to declare.

Conflicts of Interest

There are no conflicts of interest.

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