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Effect of Diabetes Self-Management Education and Support Using social media on Glycemic Control Among Patients with Diabetes Type 2

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Abstract:

Background: Diabetes Self-Management Education and Support (DSMES) is considered a basic intervention in diabetes management; In order to maintain the behaviors required to control DM in the context of a patient's daily life, diabetes support may need to go beyond standard healthcare settings.

Purpose: This study looked at how patients with uncontrolled diabetes' glycemic control was affected by WhatsApp applications that provided diabetic self-management education and support.

Method: Patients with uncontrolled DM participated in a randomized, two-arm parallel interventional study with a 3-month patient follow-up. Using a straightforward randomization procedure, 140 people were divided into the interventional group (n = 70) and the control group (n = 70). A three-month follow-up phase saw individuals in the intervention group received Diabetes Self-Management and Support (DSMES) intervention via WhatsApp in addition to usual care. They received daily educational information and behavioral support messages. The informational material utilized to promote diabetic self-management practices was (AADE7 Self-Care Behaviors®). The control group participants received 'usual care' provided by the diabetes-specialized nurse. Glycemic control was measured by HbA1C baseline and after the intervention. Data were analyzed using SPSS-25 at a significant level of $p<.05$.

Result: A total of 140 patients with DM2. The mean age of the participants was 53.70 (SD= 9.67) years, with a mean duration of 10 (SD=5.8) years; 72 (51%) of the participants were women; 117 (50%). Following the intervention for three months, the intervention group's mean HbA1C was less by 7 % (SD= .85) than the control group 8.16 (SD=1.44) p = .00), and 54.3% of the individuals in the targeted group reached the ADA treatment goal for HbA1c below 7, versus 17% at the control group with a significant p-value ($p<.05$).

Conclusion: Diabetes education and support via WhatsApp showed significant improvement in glycemic control, this demonstrates that DSMES via WhatsApp In poor nations like Jordan, intervention may be clinically significant.

Keywords: Diabetes Self-Management and Support; Diabetes Self-Management Education; Diabetes-Specialized Nurse; Diabetes.

1. Introduction

Diabetes Mellitus (DM), which is commonly known as Diabetes, is a significant cause of morbidity and mortality worldwide. (1.5) million deaths are directly attributed to DM each year. The global prevalence of DM is extremely high, since about 463 million adults are living with DM, and by 2045, the number will increase to 700 million (IDF, 2019). Around 79% of adults with DM are living in low- and middle-income countries (IDF, 2019). In addition, DM is increasing among Jordanians from 13% in 1994 to 17% in 2004, 22% in 2009, and 23.7% in 2017 (Ajlouni et al., 2019).

Poor glycemic control considers a global health problem and has a negative impact on patients, the healthcare system, and the community (IDF, 2019). Damage to the eye, kidneys, nerves, heart, and peripheral vascular system are just a few of the numerous significant, life-threatening consequences it can cause. Therefore, it is essential to properly and efficiently treat hyperglycemia to avoid disease complications and enhance patient outcomes. The research claims that glycemic management minimizes problems associated with diabetes, which lessens the strain on the healthcare system and medical costs (ADA, 2019; Adu et al., 2019).

Diabetes Self-Management (DSM) is considered the cornerstone of managing diabetes and shall integrate with other diabetes management interventions either pharmacological or otherwise (Emara et al, 2021). There are several therapies available to help people manage their diabetes on their own, ranging from passive treatments (such as information supply) to more aggressive interventions (e.g., interventions to change behaviors or increase self-efficacy) (ADA, 2021).

Many educated patients have good knowledge about diabetes and its management, but they did not adhere to self-care activities. Some literature argues that Diabetes Self-Management Education (DSME) enhances glycemic control, but it is not enough on its own. Patients with diabetes need ongoing follow-up and support from diabetes specialists to enhance patients' abilities on managing themselves (ADA, 2020).

The American Diabetes Association (ADA) has recommended using Diabetes Self-Management Education and Support (DSMES), which is an education and support model of care designed and provided using a PCC that respects patients' needs and surrounded context with coordination of diabetes nurse and other health care providers' efforts, to achieve the seven self-care behaviors ((a) healthy eating, (b) being active, (c) monitoring, (d) taking medication, (e) problem-solving, (f) reducing risks, and (g) healthy coping) of a patient as reliable outcome measures (American Association of Diabetes Educators (ADA.2020 ; AADE, 2020).

Globally, previous studies reported that DSMES improves HbA1c levels and lowers the possibility of potentially fatal complications and supports lifestyle modification as part of DM management (Powers et al., 2020). For patients with uncontrolled blood sugar, To maintain the behaviors required to control DM in the context of a patient's everyday life, continuing assistance may need to go beyond conventional healthcare settings. There is mounting evidence that mobile phones are being used for this (Alzahrani and Alanzi, 2019).

The usage of information technology has increased significantly recently, which has enhanced communication. In social media described as the web-based applications that enable people to collaborate a live conversation with other users, communicate, and acquire and share information, ideas, and photos. For those with diabetes, social networking has emerged as a useful tool for enhancing self-management abilities (Volpp and Mohta, 2018).

An novel approach to encourage patient self-management education is urgently needed, and there is a fantastic chance for its implementation and assessment (AADE, 2020). We need to design follow-up and education programs combined with ongoing support for DM2 patients. This will provide educational and supportive messages and permit two-way communications between patients and care providers. After reviewing the relevant literature in different databases, there are very limited studies related to the effect of the instructional WhatsApp group on self-care and HbA1C.

1.2: Objective of the study

The purpose of this study is to examine the effect of diabetes self-management education and support using WhatsApp applications on glycemic control among patients with uncontrolled diabetes.

H1: The number of patients with controlled blood sugar will be higher among patients who will receive diabetes self-management education and WhatsApp support versus patients who receive usual care.

H2: Patients with uncontrolled blood sugar who will receive diabetes self-management education and WhatsApp support will have better glycemic control than patients who receive usual care.

Methodology:

2.1: Study Design

A three-month patient follow-up was included in the research design, which was a randomized, two-arm parallel interventional trial done among individuals with uncontrolled diabetes. The study design followed CONSORT 2010 criteria. The study was conducted at the Royal Medical Services- Prince Hashim bin Abdallah the second Hospital (PHMH) in Aqaba governorate at the south of Jordan.

2.2: Population and Sample Size

The study population is patients with DM2 who attended the diabetes clinic in PHMH hospital during the study period whose qualifications were satisfied and had voluntarily agreed to take part in the research. They were asked to participate if they: (1) were diagnosed with DM2 and received DSME at the diabetes clinic in PHMH, 2) were 18 years old or more, 3) were able to read and write Arabic, 4) agreed to participate in the study, and 5) had uncontrolled blood sugar with HbA1C 8 % or more, were able to use WhatsApp application. Patients were excluded if they had one of the exclusion criteria: (1) the presence of mental disorders; (2) the presence of acute diabetes complications or an inability to care for oneself; (3) the presence of other serious diseases, such as severe cardiovascular and cerebrovascular diseases, severe kidney disease, cancer, and visual impairment caused by T2DM complications;(4) gestational diabetes; and (5) the fact that one has already received systematic diabetes education.

The size of the sample was calculated using the G Power software version 3.1.9.7 (Faul, Erdfelder, Buchner, and Lang, 2009). The sample was estimated based on the independent T-test for differences of two means with an error probability α of (0.05), a power (1-β) of (0.80), and a medium effect size of (0.50). The required total sample is 128. The sample was increased by 10% to compensate for attrition and missing data compensation to 140 participants (70 participants in each group). A convenience The sampling approach was utilized to enroll the participants from the targeted hospitals. Using a straightforward randomization procedure, all

(140) agreed participants were randomly assigned to one of two groups: the interventional group (n=70), or the control group (n=70) (Friedman et al., 2015).

2.3: Study Intervention:

Usual care:

- Monthly follow-up at the diabetes education clinic by a diabetes specialist nurse DSN**,** in which patients received individual assessment and tailored education and support for diabetes self-management behaviors adherence.
- structured individualized DSME, provided by a (DSN). The curriculum of education was inspired and modified from the information on diabetic self-management practices in the educational materials (AADE7 Self-Care Behaviors®).
- Basic education topics "DM disease process and treatment options, integrating nutritional management into the lifestyle, integrating physical activity into the lifestyle, using medication(s) safely and for maximum therapeutic effectiveness, monitoring blood glucose and other parameters, and interpreting and using the results for self-management decision-making, preventing, detecting, and treating acute complications and chronic complications, developing personal strategies to promote health and behavior change".
- A vibrant, well-illustrated instructional manual and flyers customized for the region were given to all participants after the educational sessions.
- Assess medication effectiveness according to self-glucose pattern and medication adjustment if needed.
- Assessing occurrences of acute or chronic DM complications and managing them.
- Refer patients to other health care providers if needed.

Intervention:

- Participants in the intervention group got daily instructional information about diabetic self-management practices over WhatsApp throughout a three-month follow-up period (AADE7 Self-Care Behaviors®).
- Sending reminders for medication taking and self-monitoring of blood glucose.
- Daily WhatsApp-supported messages related to one of the self-management behaviors.
- Weekly follow-ups for patients for adherence to self-management behaviors.
- Weekly assessments for hyperglycemia and adjust treatment if needed.
- WhatsApp bidirectional contact between the participants and the researchers, allowing individuals to ask questions and receive free feedback.

2.4: Measurements*:*

Data was collected using pre-prepared questionnaires filled by the researcher from the selected participants, including a cover letter, consent form, socio-demographic variables, clinical data, laboratory measures, and Anthropometric measurements.

2.5: Study outcome:

Glycemic Control: Glycemic control was measured by an HbA1C test. In this study, two readings for HbA1C were performed, one was pre-intervention, and the second was post-intervention. HbA1C less than 7% is considered controlled, and 7% or above considered uncontrolled (ADA, 2021). HbA1C was measured by a chemistry analyzer device, manufactured by Roche, Cobas 600-C501 model, with a serial number of 1998-04.

2.6: Data analysis:

The IBM SPSS Statistics version 25 was used to analyze data. The means, standard deviations, percentages, and frequencies of the research variables were calculated using descriptive statistics and describe the socio-demographic characteristics of the participants. A chi-square test was used to examine the effect of DSMES using WhatsApp on an increasing number of patients with HbA1C <7%, and an independent T-test was used to examine In the event that the means diverge between interventional groups and usual care groups. Also, pair T-test was utilized to examine In the event that the means diverge within the same groups after applying the intervention.

2. Result

3.1: Participants' characteristics:

One hundred and forty patients with uncontrolled blood sugar were randomly divided into two groups: 70 patients in the interventional group (IG) received WhatsApp support and usual care, and 70 patients were in the control group (CG). However, all 140 participants in both groups finished the research across the 3-month follow-up period (Figure 1).

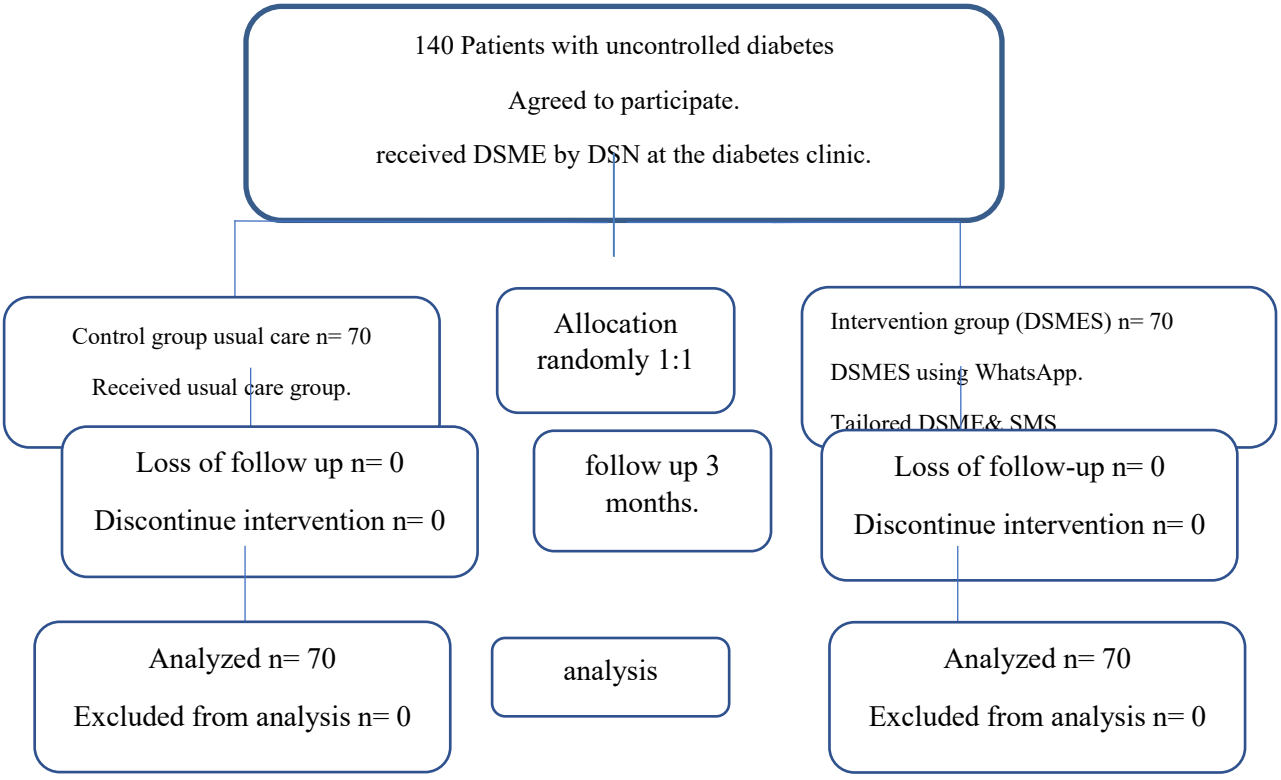

Figure 1. Participants flow in the study (Consort,2010)

As shown in Table 1. total of 140 individuals with DM2; the mean (SD) participants' ages was 53.70 (9.67) years, with a DM2 duration of 10 years (5.8) years, 116 (83%) were married, 72 (51%) of the participants were women, and 117 (50%) were educational level secondary or less. 97(69%) of them were not employed, and 48 (34%) were current smokers. Regarding DM comorbidities, about 120 (85.7%), 94 (67%), and 86 (61.4%) of the participant were diagnosed with dyslipidemia, hypertension, and obesity, respectively. DM complications were common among the participants, 44 (31.4%) had CVD, 52 (37.1%) had neuropathy, 22 (15.7%) had retinopathy, and 51 (36.4%) had renal impairment.

Table (1): Demographic and clinical characteristics of study participants by study groups.

Variables	Total participant n(%)	Control group n (%)	Intervention group n(%)
Gender			
Male	68 (48.6)	32(45.7)	36(51.4)
Female	72(51.4)	38(54.3)	34(48.6)
Age			
<60years	89(63.6)	50(71.4)	39(55.7)
≥60years	51(36.4)	20(28.6)	31(44.3)
Marital status			
Married	116(82.9)	62(88.6)	54(77.1)
Not married	24(17.1)	8(11.4)	16(22.9)
Education			
≤ secondary	117 (83.6)	57(81.4)	60 (85.7)
>secondary	23(16.4)	13(18.6)	10 (14.3)
Smoking			
Smoker	48 (34.3)	25 (35.7%)	23 (32.9%)
Ex-smoker	24 (17.1)	12 (17.1%)	12 (17.1%)
Non-smoker	68 (48.6)	33 (47.1%)	35 (50.0%)
BMI			
Normal	15(10.7)	8 (11.4%)	7 (10%)
Overweight	39 (27.9)	17 (24.3%)	22 (31.4%)
Obese	86 (61.4)	45 (64.3%)	41 (58.6%)
Dm duration			
≤ 10 years	81 (57.9)	44 (62.9)	37 (52.9)
>10 years	59 (42.1)	26 (37.1)	33 (47.1)
DM medication			
OHA	72 (51.4)	43 (61.4)	29 (41.4)
Insulin	68 (48.6)	27 (38.6)	41 (58.6)
Dyslipidemia			
No	20 (14.3)	11 (15.7)	9 (12.9)
Yes	120 (85.7)	59 (84.3)	61 (87.1)
Hypertension			
No	46 (32.9)	26 (37.1)	20 (28.6)
Yes	94 (67.1)	44 (62.9)	50 (71.4)
CVD			
No	96 (68.6)	53(75.7)	43 (61.4)
Yes	44 (31.4)	17 (24.3)	27 (38.6)
Neuropathy			
No	88 (62.9)	46 (65.7)	42 (60)
Yes	52 (37.1)	24 (34.3)	28 (40)
Retinopathy			
No	118 (84.4)	62 (88.6)	56 (80)
Yes	22 (15.7)	8 (11.4)	14 (20)
Renal impairment			
No	89 (63.6)	44 (62.9)	45 (64.3)
Yes	51 (36.4)	26 (37.1)	25 (35.7)

The result in Table (2) showed that the number of patients with controlled HbA1C <7 was significantly higher 38 (54.3%) in the IG compared to the CG, which was 12 (17%) with a significant p-value $p < .05$. furthermore, As shown in Table (3), patients in the IG had a lower

mean of HbA1C by 7 % (SD= .85) than the CG, which was 8.16 (SD=1.44) with a significant difference in the mean of (1.13) (t = 5.66 p = .00). Also, patients in the IG had better glycemic control by a 1.13 decrease in HbA1C than the CG with a significant p-value p<.05.

Table (2): Chi-square test

HbA1C post 3 months	Intervention group	Control group	P value
<7	38 (54.3%)	12 (17.1)	.00
≥7	32 (45.7%)	58 (82.9%)	

Table (3): HbA1c post 3-month differences in the mean between the intervention versus the control groups.

Baseline HbA1c	Control group (n=70)	Intervention group (n= 70)	Independent t-test		
	Mean (SD)	Mean (SD)	t-test	Mean difference	P value
HbA1C Post 3 months	8.16(1.44)	7.02(.85)	5.66	1.13	.00
*Statistically significant while comparing baseline with 3 months					

3. Discussion

This study assessed the usefulness of WhatsApp as a tool to improve communication and achieve better glycemic control among DM patients. This study is important as there is increasing use of social media in nursing practice.

Using social media to bypass the obstacles to direct physical contact, the current research methodology includes direct engagement with DM2 patients. The intervention provided free, widely available, high-quality information to people with DM. It is frequently recommended that healthcare practitioners use social media to facilitate rapid, direct, and efficient contact with patients (Sherifali, et al., 2018; ADA, 2021).

Using social media to bypass the obstacles to direct physical contact, the current research methodology includes direct engagement with DM2 patients. The intervention provided free, widely available, high-quality information to people with DM. It is frequently recommended that healthcare practitioners use social media to facilitate rapid, direct, and efficient contact with patients. These research results were in line with other studies that demonstrated social media was a novel and workable approach of enhancing glycemic control in patients with diabetes (Lee et al., 2022). Additionally, prior research shown that patient education and reminders, whether conventional or nonconventional, were both linked to increased patient adherence to recommendations and improved patient outcomes (Siopis et al., 2023; Al Omar et al., 2020).

The findings of this study showed that social media initiatives have the potential to enhance healthcare outcomes. The use of social media in clinical practice has been demonstrated in several prior studies to help healthcare practitioners to implement efficient patient assistance and enhance patient engagement and satisfaction (Chen et al., 2020; Dong et al., 2018; Robson and Hosseinzadeh, 2021).

Limitations:

The limitations of the study were the lack of diabetes specialist nurses in the setting of the study. Also, the study intervention was conducted by the researcher alone, which means that it was difficult to increase the study period to avoid decreasing the level of interest. Finally, this study was for the purpose of Doctoral graduation, which made it difficult to increase the study duration.

Strength:

Using a patient-centered approach in providing the intervention for the participants, using the WhatsApp application, and DSN support, all of which support the study by utilizing the theoretical, patient-centered approach by DSN in an innovative feasible method. Moreover, the RCT design helps to support the significant effect of DSMES via WhatsApp on glycemic control. Using a patient-centered approach in providing patient support for both groups help to provide tailored DSMES. The fact that this study was carried out in a realistic, naturalistic environment is its main strength.

Recommendations:

Future research with a longer duration, and different outcomes, in different settings, should be conducted to enhance this study results to be generalized. more studies that support the role of DSN in providing care using social media applications. Also, social media support is cheap, feasible, and has high access to the population; therefore, it is an intervention that could be added to DM patients' care in different socio-economic populations. By taking into account these findings, developing and launching specific channels and social networks related to diabetes, creating highly qualified DSN, and overseeing the caliber of information exchanged by these networks, health planners and policymakers can assist in lowering in-person visits while also saving patients' time and money.

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