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ORIGINAL ARTICLE

The effectiveness of a smartphone-based online peer group on type II diabetes mellitus patients self-empowerment in a primary healthcare center in Indonesia

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ABSTRACT

Objective: Self-empowerment is an important factor that influences a person's ability to perform effective diabetes management. One effort that can be done to improve self-empowerment is by providing a smartphone-based online peer-group. This research determined the effect of smartphone-based online peer groups on type 2 diabetes mellitus (T2DM) patients self-empowerment in four primary healthcare centers in Indonesia.
Methods: This quasi-experimental research was conducted in four healthcare centers in Indonesia. The total sample was 71 divided into two groups (control and intervention). The control group received standard education from the healthcare center, whereas the intervention group underwent an online peer-group. Self-empowerment was measured before and after intervention using the Diabetes Empowerment Scale-Short Form (DES-SF) questionnaire (Indonesian version). General Linear Model was used in statistical analysis.
Results: The mean age of respondents was 56.4 ± 8.8 and 56.9 ± 7.1 years old, 59.5%, and 76.5% had good family support, and 70.3% and 50% of respondents had not received diabetes education for the control and intervention groups, respectively. The average pretest self-empowerment score was 27.03 ± 3.73 and 27.59 ± 3.53 (diff. 0.56; 95%CI -1.16; 2.29), and the post-test score was 27.43 ± 4.13 and 32.76 ± 4.38 (diff. 5.33; 95%CI 3.32; 7.35) for the control and intervention groups, respectively. Online peer-group improve self-empowerment significantly in the intervention group.
Conclusion: Smartphone-based online peer-group can improve self-empowerment in patients with T2DM.

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INTRODUCTION

Type 2 diabetes mellitus (T2DM) is one of the biggest health problems in the world. According to International Diabetes Federation[1], there are more than 350 million people with diabetes and are predicted to increase to 700 million by 2045. T2DM management is the key to optimal diabetes care but requires a lifetime commitment. Furthermore, patients with DM are needed to develop thinking strategies and problem solving[2].

Self-empowerment is a critical factor in DM management because it can influence the optimal management directly[3]. Self-empowerment also describes how individuals develop abilities in DM management by controlling their lifestyle and environment. Furthermore, it can demonstrate the power of individuals to make decisions related to lifestyle choices[4].

According to the American Diabetes Association[5], improving self-empowerment in patients with DM may be achieved by providing education through Diabetes Self-Management Education and Support (DSMES). Many educational methods have been developed, which are called remote telehealth programs or telenursing[6-8]. According to Heisler[9], modern education on the Internet will provide more benefits than in-person intervention. Participants are more comfortable discussing without having to be ashamed to speak in public and can reach a wide area, facilitating those who are difficult to come face to face in education programs[9].

With the development of telenursing, one of the suggested innovations is by applying to the online peer group. This strategy is expected to be one of the educational efforts that can improve patient self-empowerment that improves the health outcomes of patients with diabetes. This study aimed to determine the effects of smartphone-based online peer groups on T2DM patient's self-empowerment in four primary healthcare centers in Indonesia.

METHODS

This was a quasi-experimental research using pre- and post-test with a controlled group. The study was conducted in four primary healthcare centers in Yogyakarta City, Indonesia. The inclusion criteria were willing to be respondents, registered as patients in the working area of the research center, aged ≥ 18 years old, diagnosed with T2DM, having a personal smartphone, being able to operate the WhatsApp® application independently. Individuals who joined in another diabetes education group or did not speak Bahasa fluently, both verbally and in writing, were excluded.

The sample size was calculated to be 27 respondents for each group and, considering the attrition rate, 32 respondents for each group entered the study. The process of selecting respondents is shown in Figure 1. The empowerment score measurement used the Indonesian version of the Diabetes Empowerment Scale-Short Form (DES-SF) modified by Agrimon[10]. The questionnaire was measured using a 5-point Likert scale, namely, 1 = strongly disagree; 2 = disagree; 3 = doubt; 4 = agree; 5 = strongly agree. The range of scores obtained is 8 to 40. Higher scores indicate better self-empowerment in diabetes management performed by patients[11]. The Indonesian version of DES-SF was then modified with Indonesian grammar with language experts and tested the validity and reliability by the researcher. The Cronbach's alpha value is 0.764, and the r value is 0.387.
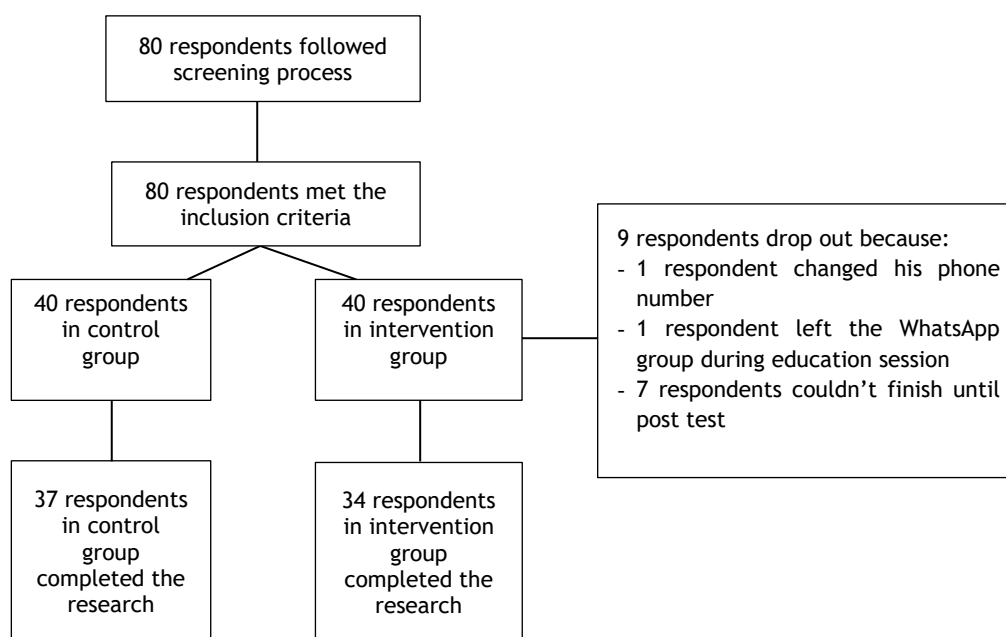
Figure 1 – Recruitment of respondents.

Research preparation was conducted by compiling an educational module modified from the 2014 American Association Diabetes Educator (AADE) curriculum standard and approved by an endocrine specialist. The material made in the education module contained a review of diabetes, peer groups, health insurance, healthy diet, physical activity and exercise, blood sugar examination, foot care, DM treatment, and stress management for patients with diabetes (Table 1). This education module was done in the form of pictures that would be uploaded in online peer groups using WhatsApp® application.

The control group received standard education from the primary healthcare center, and the intervention group received education through the online peer group. Respondents in the intervention group were included in the WhatsApp® group, which consisted of 8 to 10 respondents per group (4 online peer groups). The intervention group received an education program following the topic determined, and education would be conducted for 15 days with the change of educational topic every three days. The schedule of educational activities can be seen in Table 2.

Data collection on empowerment was carried out before and after the intervention. This research had received approval from the Ethics Commission of the Faculty of Medicine, Public Health, and Nursing, Universitas Gadjah Mada. Analysis of empowerment score using the Kolmogorov–Smirnov Test with p-value > 0.05 to determine data distribution[12]. Furthermore, the General Linear Model test was conducted to determine the difference in the pre and post-test empowerment scores of the two groups using the SPSS (IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.). The significance value was 0.05[12].

Table 1 – Topics of the education module used in the study.

Topics	Descriptions
Review of diabetes	Brief concept of type 2 diabetes mellitus Clinical manifestation of type 2 diabetes mellitus How to manage type 2 diabetes mellitus
Peer group	Brief concept of peer group support The advantages of peer group support The advantages of online peer group
Health insurance	How to register as member in National Health Insurance What is covered by National Health Insurance
Healthy diet	Principles of diet in diabetes mellitus (quantity, time, and kind of food) A list of recommended, restricted, and avoided foods Examples of daily food menu
Physical activity and exercise	The advantages of physical activity/exercise Tips for diabetic people to do physical activity/exercise Recommendation of physical activity/exercise that could be done by diabetic people
Blood sugar examination	The best timing for monitoring blood sugar Target of blood sugar for diabetic people
Foot care	How to do foot examination independently How to do foot exercise for diabetic people
Medication	Examples of medicine for diabetes Practical tips for taking medication
Stress management for diabetic patients	What can we do to cope with stress in diabetes mellitus The important of family support for diabetic people

RESULTS

The respondents' characteristics in this study included age, education level, employment status, income, duration of diabetes, family/social support, and educational history about diabetes. Most respondents were over 55 years or felt into the category of older adults. Respondents in the control group had a history of diabetes longer than the intervention group, with a mean of 6.84 years. Most education levels were junior high school (32.4%) for the control group and senior high school (44.1%) for the intervention group. Most of the respondents were in the status of workers, 54.1% for the control group, and 50% for the intervention group. The control group's income was lower than the Regional Minimum Wage (RMW; 139 USD) (51.4%), and for the intervention group was mostly higher than the RMW (58.8%). Most respondents had family/social support, equal to 59.5% for the control group and 76.5% for the intervention group. Most of the respondents had never received education about diabetes, which was 70.3% for the control group and 50% for the intervention group.

Based on the analysis results (p > 0.05), it can be concluded that there were no significant differences in demographic data between the control and intervention groups, or the two demographic data of each group were homogeneous.

The pretest empowerment score showed no

statistically significant difference between the control and the intervention groups before online peer group intervention. However, the average self-empowerment post-test score in the intervention group was statistically higher than the control group. The analysis of differences in self-empowerment scores between groups (control and intervention) is shown in Table 3. It was also found that online peer group interventions increased the empowerment score by 28.8% and was included in the small effect category.

Table 2 – Online peer group education schedule.

Time	Activities
1st Week	
Monday **07.00 p.m. – 08.00 p.m.**	1. Made group member introductions 2. Explained the purpose of the online peer group 3. Explained the description of education that will be given 4. Provided education about diabetes and peer groups 5. A discussion session on the experience of treating diabetes 6. Made a contract during the next discussion 7. Discussions would continue in flexible time
Wednesday **07.00 p.m. – 08.00 p.m.**	1. Provided education about healthy diets in diabetes 2. Discussion about eating-related experiences healthy in diabetic patients 3. Made a contract during the next discussion 4. Discussion would continue with flexible time
Friday **07.00 p.m. – 08.00 p.m.**	1. Provided education about exercise in diabetes 2. Discussion of sports-related experiences in diabetic patients 3. Made a contract during the next discussion 4. Discussion would continue with flexible time
Week 2nd	
Monday **07.00 p.m. – 08.00 p.m.**	1. Provided education regarding the treatment of diabetes 2. Discussion about experiences related to treatment for diabetes in diabetic patients 3. Made a contract during the next discussion 4. Discussions would continue with flexible time
Wednesday **07.00 p.m. – 08.00 p.m.**	1. Provided education regarding foot care in diabetes 2. Discussion of foot care-related experiences in diabetes in diabetic patients 3. Made a contract during the next discussion 4. Discussion would continue with flexible time
Friday **07.00 p.m. – 08.00 p.m.**	1. Provided education regarding blood glucose examination in diabetes 2. Discussion of experiences related to blood glucose examination in diabetes in diabetic patients 3. Made a contract during the next discussion 4. Discussion would continue with flexible time
Week 3rd	
Monday **07.00 p.m. – 08.00 p.m.**	1. Provided education regarding stress management and health insurance for diabetes 2. Discussion of experiences related to stress management and health insurance on diabetes in diabetic patients 3. Closing

Table 3 – Results of analysis of differences in empowerment score of the control and intervention groups in type 2 DM patients in Yogyakarta City, Indonesia.

Self-empowerment score	Control (n=37)	Intervention (n=34)	Difference (IC 95%)	p-value	Effect size
	Mean ± SD				
pre-test	27.03 ± 3.73	27.59 ± 3.53	0.56 (-1.16; 2.29)	0.518	0.288
post-test	27.43 ± 4.13	32.76 ± 4.38	5.33 (3.32; 7.35)	< 0.001	

Source: primary data (2019). Analysis test using General Linear Model, p-value < 0.05; SD = standard deviation; IC = confident interval.

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DISCUSSION

Self-empowerment is a process that facilitates patients to gain knowledge and self-awareness to influence behavior in improving the quality of life[13]. Health workers have an essential role in enabling patients to improve self-empowerment. One effort that can be done in enhancing patient self-empowerment is diabetes mellitus self-management education[5]. The diabetes self-management education program conducted in this study was done through smartphone-based online peer groups.

Online peer groups significantly influence self-empowerment in patients with diabetes mellitus in Yogyakarta, Indonesia. T2DM patients who received interventions from online peer groups had a significant increase in self-empowerment scores compared with patients with DM who only received standard education programs such as counseling and consultation during a routine control. The online peer group is an educational program using social media in the form of WhatsApp® and can be done remotely. The online peer group is also a remote telehealth method or called distance education[14]. Distance education is accessible for patients with DM to obtain information at any time, especially for T2DM patients in the productive age range who still have full-time employment.

Zamanzadeh et al.[14] conducted a study by providing education to patients with T2DM through short messages sent to each respondent every day accompanied by telephone education three times a week and found increased self-empowerment scores who received distance education. In this study, it was found that there was a significant increase in self-empowerment scores compared to the control group, who only received regular education programs in the care. Distance education provides several advantages, including not requiring the patient to attend classes directly. This is beneficial, especially for patients in the productive age range and that still have busy work. Besides other benefits, it can also save on educational costs such as print educational media, meals, and more.

The results of this study were also supported by other conducted by Naccashian[15], which proved a significant increase in self-empowerment scores after an educational intervention with the content of Diabetes Self-Management Education given in 6 class sessions for 30 to 90 min each session. Increased self-empowerment can occur because participants can ask questions and discuss ideas with his/her peers at the end of the education session. This is called a one-on-one connection, which is a significant relationship to improve patients with T2DM self-empowerment. This agrees with recent research that provides education to the content of Diabetes Self-Management Education, given opportunities for members to ask questions, discuss and follow-up with other online peer group members as a useful form of support and information.

The results of Atak et al.[16], however, did not show significant self-empowerment scores in patients with DM who received education. This result was considered to be related to the short duration of the educational session, approximately 1.5 h, considered impossible for respondents to start setting goals, make plans, and change the behavior of DM self-management. Besides, there was no time for self-management evaluation or follow-up.

Improving self-empowerment in patients with diabetes is one of the roles of health workers by emphasizing good collaboration with them. One effort can be made by providing education about diabetes self-management. Good self-empowerment shows high motivation from patients to regulate the goal of treatment of diabetes actively. Individuals who have good self-empowerment perceptions will be able to take advantage of their knowledge. Self-empowerment is also associated with increased adherence to medication, knowledge, and self-care in patients with T2DM[17], and improved influence in health literacy. Besides, self-empowerment has been proven to improve self-efficacy, self-care behavior, and glycemic control[18].

Online peer groups can improve self-empowerment in T2DM patients because, in educational activities, members are given information about diabetes self-management, which is a WHO recommendation. Also, there is a reciprocal relationship between health workers and patients and between patients themselves in peer group online activities. Health workers can act as educators in providing information about diabetes self-management, and patients (peer group members) can provide support to each other through shared experiences. Online peer group members are also allowed to ask questions about diabetes self-management that have not been understood and share experiences regarding success and failure in conducting diabetes self-management. Another factor that can support increasing self-empowerment through online peer groups is the ease of obtaining information for members because they do not need to come to the primary healthcare center. Follow-up and encouragement from health workers also motivate them to do adequate diabetes self-management.

Although online peer groups significantly improved self-empowerment in patients with diabetes in this study, they still provided relatively small effects. This might be because the follow-up interval was only approximately 3–7 days after the intervention ended, whereas previous similar studies provided a follow-up for at least three months[14,19]. Other studies also conducted self-empowerment follow-ups more than once in 6 months after being given an educational intervention[20]. Besides, several factors can influence a person's self-empowerment level, such as educational experience regarding DM, education level, age, social support, and employment status[21,22]. In this study, there was no further analysis of the factors that affected self-empowerment in patients with DM.

One of the study limitations was that the time of taking pretest and post-test data that could not be done simultaneously because it was adjusted to the respondent's schedule to agree to meet the researcher. The researcher did no further analysis of the respondents' characteristics who might influence one's empowerment level.

CONCLUSION

From this study, it can be concluded that online peer groups can improve self-empowerment significantly in patients with type 2 DM. The effect is classified as a small effect of 28.8%.

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