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The Effect of Video-Based Diabetes Self-Management Education (DSME) Telenursing on Level of Knowledge in Diabetes Mellitus Patients

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ABSTRACT

Background: Diabetes mellitus remains a major health problem, characterized by high prevalence and complications due to low patient knowledge about self-management. Effective education is needed to enable patients to manage their diabetes independently. The use of innovative educational media, such as telenursing-based videos, is considered to increase the effectiveness of knowledge and skills transfer, thus supporting improved knowledge levels among diabetes patients. Video-based Telenursing Diabetes Self-Management Education (DSME) can facilitate increased knowledge so that the self-care behavior of DM sufferers can increase.

Purpose: The aim of the research was to analyze the effect of video-based telenursing diabetes self-management education (DSME) on the level of knowledge of Diabetes Mellitus patients.

Methods: This research design was quasi-experimental with a pretest posttest approach with control group design. The population is all DM patients. The sampling method was accidental sampling of 60 respondents who were divided into 30 intervention groups and 30 control groups. The video-based DSME telenursing intervention was applied 2 times a week for 2 weeks to the intervention group, while the control group only carried out their usual routine. The instrument used was the DKQ-24 (Diabetes Knowledge Questionnaire) questionnaire. Data analysis used Wilcoxon Signed Rank with a significance value of $\alpha = 0.05$.

Results: The results of the research on the knowledge variable showed that the p value was $0.000 < 0.05$, meaning that there was an influence of video-based DSME telenursing on the level of knowledge of DM patients in the intervention group.

Conclusion: The application of video-based telenursing diabetes self-management education (DSME) affects the level of knowledge of Diabetes Mellitus patients. Nurses are expected to be able to implement video-based DSME telenursing so that patient self-care increases and can prevent complications.

Keywords: diabetes mellitus, diabetes self-management education (DSME), telenursing

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BACKGROUND

Diabetes mellitus (DM) is a metabolic disease with endocrine system disorders that have manifestations such as high blood sugar levels caused by damage to beta cells *pancreas* and abnormalities in insulin secretion rate (Sudirman & Modjo, 2021). Based on the cause, DM is divided into four types, namely DM type I, DM type II, gestational DM and other types of DM (Qurniawati et al., 2020). According to research Li et al (2022) states that diabetes is a complex disease that requires making many decisions every day about eating, physical activity and medications, also requiring patients to be proficient in a number of self-management skills. Low knowledge in self-management of DM sufferers causes various complications (IDF, 2019). The facts in the field of DM patient remission caused by low knowledge have not been handled properly, for this reason, it is necessary to provide millennial education as a new breakthrough to facilitate the understanding of patients and families. *Telenursing* WhatsApp-based DSME has the effect of reducing readmissions, quality of life and *selfcare* DM patients through increased patient knowledge.

One of the main problems in health services for DM sufferers in hospitals in Indonesia is the lack of optimal handling of DM cases and the absence of a culture of optimal patient independence (PERKENI, 2019). This phenomenon also occurred at Surabaya Jemursari Islamic Hospital where from the results of a preliminary study found an increase in the number of DM patients hospitalized, namely in December there were 186 DM patients, in January 119 DM patients and February 192 DM patients. Then the researcher conducted an interview with an inpatient card which stated that it was not optimal to provide educational services to DM patients, such as when the patient wanted to go home only explained the re-control schedule, how to take medication and dosage, but the explanation of the disease, how to control blood sugar, recommended activities and foods that can be consumed and foods to avoid was not explained to the patient so that DM patients who will go home still have Lack of knowledge in preventing complications. This lack of understanding leads to low *self care* DM sufferers, so DM sufferers will have a higher risk of complications and will return to the hospital to get treatment and treatment again.

World Data obtained from *International Diabetes Federation* (IDF) predicts that there will be an increase in the number of DM sufferers from 0.3 million in 2017 to 16.7 million in 2045 and among diabetes mellitus sufferers aged 20-79 years. Where Indonesia occupies the enem position in the world. The highest prevalence of diabetes mellitus in Indonesia is in DKI Jakarta (3.4%), East Kalimantan (3.1%), Yogyakarta (3.1%), North Sulawesi (3%) and the 5th position is East Java (2.6%) (3, 2020). Data obtained from Rumah sakit Islam Jemursari Surabaya shows an increase in cases every year. In 2020 there were 1590 DM patients hospitalized, this increased in 2021 by 1694, in 2022 by 1612 patients and in 2023 from January to June there were 1,000 DM patients hospitalized. For outpatients in 2022, there are 3,863 patients who make visits and in 2023 from January to June there are 3,311 (Medical Record Data of Rumah Sakit Islam Jemursari, 2023).

Diabetes mellitus is the highest disease in Indonesia that causes death after stroke and heart. Death in people with DM is caused due to acute and chronic complications. Acute complications such as hyperglycemia and hypoglycemia, while chronic complications such as stroke, heart disease, neuropathy, retinopathy, and kidney failure. These complications reduce productivity, disability, and premature death, causing huge economic losses for people with diabetes, their families and the country. Based on the increase in the number of DM sufferers and the threat of death due to complications, then *Word Health Organization* (WHO) recommends diabetes program *Self-Management Education* (DSME) that can facilitate the improvement of knowledge so that behavior *self-care* DM sufferers may increase (Tamiru et

al, 2023). Behaviour *self-care* What is expected for people with DM is the ability to carry out follow-up care throughout their lives so as to reduce or prevent complications of the disease (Qurniawati et al., 2020). This is relevant to the application of the conceptual model of nursing that has been developed by Dorothea Orem about *Self Care*. The main focus of this conceptual model is the ability of a person to care for himself independently so as to achieve the ability to maintain his health and well-being. This theory is also a foundation for nurses in independent clients according to their level of dependency instead of putting clients in a dependent position, because according to Orem, *self-care* It is not a process of intuition but a behavior that can be learned.

Education management will gradually become a source of knowledge so as to allow DM sufferers to do self-care. ADA (2020) states the importance of health education for people with DM is to reduce stress, help control blood sugar levels, so as to improve health and monitor the onset of other symptoms. Common symptoms in people with DM always feel weak, easily tired, lack of energy and reduced body resistance during activities, complications can be caused by a decrease in sugar levels with a short span of time (Aree-Ue, S., Roopsawang, I., & Saraboon, Y., 2022).

Along with the development of information technology (IT), the provision of health interventions can be done easily, quickly and practically (Grisot et al., 2019; Mulayani et al., 2019). The majority of these interventions are internet-based and tend to become increasingly practical, such as information and communication technology becoming more user-friendly (Aldehaim et al., 2016). One technology-based intervention is with *a telenursing* strategy. *Telenursing* is a strategy that can improve nursing activities, allowing professionals to use them to guide and monitor patients as needed so as to facilitate access saving time, resources and promoting greater self-care possibilities (Amita, D., & Riyanto, A. 2020).

Telenursing as a disseminator of medical information from one site to another through electronic media to improve disease management involving various applications and services that develop such as video, email, smart phones, wireless devices, and other forms of communication tools (Asmirajanti, M., 2021). Several related studies, say *telenursing* can support the process of treating DM patients at home by facilitating care services using technology through telephone counseling and SMS, mobile-based educational applications and video delivery via text messages so that patients can still benefit from increased health services (Cristin, 2023).

Research (Defilza, N. G., Neherta, M., & Deswita, D., 2021)Application *telenursing* Based *whatsaap* Can improve the knowledge and attitude of patients but has a weakness that patients and families feel bored reading so many and long messages. Then research conducted by Marbun, A. S., Siregar, R., Harefa, K., & Sinabutar, T. Y. F., (2021), *telenursing* DSME-based *Whatsapp* improve quality of life and *self-care* DM patients. This is also in line with research conducted by Rahmavati et al, (2018) which states that telenursing has an effect on increasing the value of family support for people with Type 2 DM in carrying out therapy in the work area of the Indralaya Health Center.

OBJECTIVE

The objective this research to Analyzing the effect of video-based telenursing diabetes self-management education (DSME) on the level of knowledge in people with diabetes mellitus

METHODS

This type of research using *experimental quasy* was carried out with a *pretest and posttest control group design* approach where the samples used were the intervention group and the control group. The study population was diabetes mellitus patients who were treated in

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the inpatient room of Rumah Sakit Islam Jemursari Surabaya. The sample size in this study was determined using a quasi-experimental approach, which generally uses a specific formula, such as that used by Lemeshow et al., or based on statistical calculations for a two-group comparison (pretest-posttest control group design). The sample size for this study consisted of 60 respondents, divided equally into an intervention group of 30 and a control group of 30. Samples are taken if they meet the following criteria: Group selection was conducted using an accidental sampling technique, whereby diabetes mellitus patients who met the inclusion criteria (willing to be respondents, aged 20-60 years, able to read/write, and able to participate in the activity until completion) were selected sequentially based on their arrival or availability. The 60 subjects obtained were then sequentially divided into two groups. The division into intervention and control groups was carried out alternately (e.g., the first patient entered the intervention group, the second to the control group, and so on) to maintain a balance of characteristics in both groups. The intervention group received video-based telenursing DSME education at a certain intensity, while the control group received routine care.

The sample in this study was taken with *a non-random sampling* technique used is *accidental sampling*, where sampling is carried out by taking subjects that happen to exist or are available in accordance with inclusion and exclusion criteria. So that the sample size in this study was 30 intervention groups and 30 control groups. This research was conducted at RSI Surabaya Jemursari. The research period is from February to March 2024. In the intervention group, *Video-based Telenursing Diabetes self-management education (DSME)* was given for 2 weeks with the provision of 1 week 3 meetings. An ongoing process in facilitating the knowledge, skills, and abilities necessary for diabetes self-care. The implementation of the intervention is carried out on patients for 2 weeks and is carried out in stages which include 2 sessions : Session 1: knowledge of DM and diet management and Session 2: foot care and stress management.

The instruments in this study consist of: *Video-based* Diabetes Self-Management Education (DSME) Telenursing SOP Instrument and DKQ-24 (*Diabetes Knowledge Questionnaire)* Instrument is a questionnaire about patient knowledge about diabetes mellitus which is based on Imadatil research (2019). It consists of 24 questions, with true, false and ignorant answer choices. For correct answers are scored (4.16), incorrect and do not know answers are scored (0). How to measure the DKQ-24 questionnaire by summing all question scores from No. 1 – 24 with categories <55 less knowledge, a score of 56 – 75 sufficient knowledge and > 75 good knowledge. Data analysis in this study used the Wilcoxon signed rank test. This research has been ethically qualified by the research ethics health committee of Rumah Sakit Islam Jemursari Surabaya with No. 017/KEPK-RSISJS/II/2024.

RESULTS

1. Demographic Characteristics of Respondents

Characteristics of Respondents	Group 1 (Intervention)		Group 2 (Control)		Total		Homogeneity test
	f	%	f	%	f	%	P value
Age							
Early Adult (20-39 years)	15	50	11	36.7	26	43.3	0,785
Late Adult (40-59 years old)	15	50	19	63.3	34	56.7	
Total	30	100	30	100	60	100	
Gender							
Male	10	33.3	10	33.3	20	33.3	0,659
Female	20	66.7	20	66.7	40	66.7	
Total	30	100	30	100	60	100	

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Characteristics of Respondents	Group 1 (Intervention)		Group 2 (Control)		Total		Homogeneity test
	f	%	f	%	f	%	P value
Education							
High	13	43.3	13	43.3	26	43.3	0.789
Low	17	56.7	17	56.7	34	56.7	
Total	30	100	30	100	60	100	
Work							
Work	7	23.3	14	46.7	21	35	0.982
Not Working	23	76.7	16	53.3	39	65	
Total	30	100	30	100	60	100	
Long Suffering from DM							
1 Year	9	30	12	40	21	35	0.633
2 Years	16	53.3	14	46.7	30	50	
3 Years	5	16.7	4	13.3	9	15	
Total	30	100	30	100	60	100	
DM History							
There is a history	21	70	16	53.3	37	61.7	0.949
No History	9	30	14	46.7	23	38.3	
Total	30	100	30	100	60	100	
Have Received Health Education							
Ever	10	33.3	9	30	19	31.7	0.651
Never	20	66.7	21	70	41	68.3	
Total	30	100	30	100	60	100	

Based on table 1 above, it shows that the characteristics of respondents based on age are more than half of the 34 respondents (56.7%) are in late adulthood. The characteristics of respondents based on gender are that most of the 40 respondents (66.7%) are female. Characteristics based on education level that more than half of the 34 respondents (56.7%) were low educated. The characteristics of respondents by occupation were that most of the 34 respondents (56.7%) were poorly educated. The characteristics of respondents based on the length of DM diagnosis are half 30 respondents (50%) diagnosed with Diabetes Mellitus since 2 years ago. The characteristics of respondents based on Diabetes Mellitus History are that more than half of 37 respondents (61.7%) There is a history Diabetes Mellitus. The characteristic of respondents based on having received health education about Diabetes Mellitus is that more than half (68.3%) have never received health education about Diabetes Mellitus. All demographic variables in both groups showed a homogeneity test significance value above 0.05, thus fulfilling the assumption of homogeneous variance.

2. Knowledge level of DM patients before and after being given *video-based Diabetes Self Management* (DSME) Telenursing intervention

Knowledge	Intervention Group				Control Group			
	For		Post		For		Post	
	f	%	f	%	f	%	f	%
Good	3	10	13	43.3	0	0	1	3.3
Moderate	9	30	17	56.7	14	46.7	12	40
Poor	18	60	0	0	16	53.3	17	56.7

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Total	30	100	30	100	30	100	30	100

Based on table 2 above, it shows that in the pre-test intervention group, more than half of the 18 respondents (60%) had poor knowledge about Diabetes Mellitus and more than half of the 17 respondents (56.7%) in the post-test had moderate knowledge. While in the pre-test control group, more than half of 16 respondents (53.3%) had poor knowledge about Diabetes Mellitus and more than half of 17 respondents (56.7%) had poor knowledge about Diabetes Mellitus.

3. Knowledge Normality Test

Knowledge	**Klomogorov-Smirnov**					
	Pre Tes			**Post Tes**		
	Statistic	**df**	**Sig**	**Statistic**	**df**	**Sig**
Intervention	0.179	30	0,010	0.232	30	0.000
Control	0.201	30	0,010	0.160	30	0.018

Based on table 3 above, it shows that the significant value of *klomogorov-Smirnov* knowledge of the pre-test intervention group was 0.010 and post-test 0.000. In the pre 0.010 and post 0.0018 control groups where < 0.05, meaning that the data is not normally distributed, decision making is carried out with the *Wilcoxon Signed Ranks Test.*

4. The Effect of *Video-Based Diabetes Self Management Education* (DSME) Telenursing on the Level of Knowledge of Diabetes Mellitus Patients

Knowledge	**Intervention Group**					**Control Group**				
	Min	Max	Mean	SD	*P value*	Min	Max	Mean	SD	*P value*
Pre Tes	38	88	54.87	14.486	0.000	38	79	54.30	12.636	0.754
Post Tes	63	88	76.10	4.286		38	88	55.70	14.563	

Based on table 5 shows the results of data obtained using the *Wilcoxon Signed Ranks Test* test on the variables of pretest and posttest knowledge of the intervention group p value 0.000 < 0.05, meaning that pretest and posttest in the intervention group there is an effect of knowledge on the intervention group of video-based DSME administration. Meanwhile, the results of the data obtained by using the *Wilcoxon Signed Ranks Test* in the pre-test and post-test of the control group showed that the p value of 0.754 > 0.05 which means that there is no effect of the level of knowledge on the pre-test and post-test of the control group.

DISCUSSION

Study This get results that There is differences in groups pre -test intervention more from half 18 respondents (60%) have knowledge not enough Good about DM and more from half of 17 respondents (56.7%) in the post test own knowledge Moderate. Meanwhile in the pre- test group control more from half 16 respondents (53.3%) have knowledge not enough Good about DM and more from half 17 respondents (56.7%) have knowledge not enough Good about DM.

Research result Lengga, V. M., Mulyati, T., & Mariam, S. R. (2023) entitled influence level knowledge Diabetes Mellitus patients in the Work Area Public health center Cibiru Bandung City before and after administration of DSME (p value = 0.000). In research by Eben & Astrid, (2018) obtained results that there is difference level knowledge (p=0.000) and attitude (p=0.000) before and after given DSME education.

According to Notoatmodjo Soekidjo (2019) knowledge is the result of knowing, knowledge is obtained after someone senses a certain object. Sensing through sight, hearing, smell, taste and touch. Many factors influence the level of knowledge such as age, education, and experience. The next factor is experience or length of time suffering from DM. Enhancement knowledge of respondents group intervention because use of video audiovisual media that can be give information, explains the process, teaches something Skills. With there is a stimulus to sense hearing and vision in a way at the same time that makes it respondents with easy catch as well as understand information , so presentation information about DM more maximum.

From the results analysis characteristics respondents were obtained that most (50%) respondents in the group intervention are at the stage age mature beginning Where cognitive Still Good in remember information obtained \, while in the group control part large (63.3%) respondents are at the stage age mature end Where ability cognitive start decrease. Factor other knowledge is education Where more from half (56.7%) of respondents in the group intervention and control own low education level, so influence knowledge respondents and views from experience part big respondents in the group control and intervention more from 2 years suffering from DM. experience suffering from DM without realized become learning for respondents and families for increase behavior *self-care*.

On the part House Jemursari Islamic Hospital Surabaya explained that For giving education For Diabetes patients only provided *leaflets* so that method it works patient or reading family so that matter the not enough effective because *leaflets* attached to the wall only as display just. That matter because Lots patient or family consider *leaflets* regarding this DM No important because no distributed by the nurse. Besides that, from facet amount nurse, total There are few nurses on duty per shift compared to from amount incoming patients so that for explanation *leaflets* to patient limited, so less DM patients get information regarding DM. For counseling in a way specifically, no There is but giving information or education There is carried out by students the nurse does it research and only done once without repeated so that Information obtained by DM patients is lacking so that No will changed behavior patient because information obtained once and no applied to habits every day, so Lots existing DM patients stated go home will returned to care because they forget related information that has been obtained.

Based on analysis tests *Wilcoxon Signed Ranks Test* on variables knowledge group pretest and posttest intervention obtained p value 0.000 <0.05, meaning there is a significant influence of knowledge. Meanwhile, in the group control obtained Based on results analysis *Wilcoxon Signed Ranks Test* on pre test and post control group test shows that the p value is 0.754 > 0.05, which means that there is no influence knowledge on pre test and post group test control l.

This matter in line with research conducted by Widyanata , (2018) state that health *education videos project* given by the nurse can increase readiness family in nurse DM patients . A number of studies related, mentioned *telenursing* can support the care process DM patients at home with facilitate service maintenance use technology through telephone counseling and SMS, applications education based *mobile* and sending videos via message text so that patient still can obtain benefit from service health increasing (Cristin, 2023).

Other similar studies show that Skills management self, change glucose and lipids, events complications acute and complications chronic, cost medical group experiment in a way significantly Better than the group control (p value=0.01). This result show that DSME/S is effective can increase Skills management self DM patients , reduce cost medical , and improving quality life patient (Yuni et al., 2020) . Other similar research also mentions that There is significant improvement in a way statistics in knowledge patient (p<0.001), self-efficacy (p<0.001), and management self (p<.001), after done education sustainable health. Analysis Multivariate show that score knowledge and positive self-efficacy can predict mark management self (Balcha Hailu et al., 2021) . Oluchina, (2022) in his research state that intervention education based on the self-care model provided in a way sustainable is an effective program that can increase knowledge and behavior self-care.

Effect profitable from DSME on the results clinical, emotional, and behavioral DM were also obtained from another similar research. The more many multifaceted programs combine intervention behavioral / psychosocial, as well training knowledge and skills more effective rather than educational programs didactics that focus on a single strategy. Furthermore if DSME and DSMS are combined so will each other complete and provide benefit period good short, deep matter this is one of them is knowledge (Tamiru, Dugassa, Amsalu, Bidira, Bacha, et al., 2023).

Diabetes mellitus is disease chronic complex that requires maintenance medical, educational management independent as well as ongoing support for prevent happen complications. So that can be assumed that education health is one of step For increase knowledge and skills diabetes management independent so that spared from DM complications, one of them through Video- based *Tellenursing* DSME. Therefore That recommended to party House Sick can give policy about giving Video- based *diabetes self - managing education* (DSME) *tellenursing* for increase knowledge patient about DM and self-care management in DM patients so capable increase satisfaction patients and quality waiter House Sick.

CONCLUSION

The application of *video-based diabetes self-management education* (DSME) telenursing affects the level of knowledge of Diabetes Mellitus patients. Nurses are expected to be able to implement *this video-based* DSME telenursing, so that patient *self-care* increases so as to prevent complications.

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CONFLICTS OF INTEREST

The research results have been mutually agreed upon so that there is no conflict of interest in this research.

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