

DEVELOPMENT OF DIABETES SELF-CARE MANAGEMENT  
USING AUDIO-VISUAL MEDIASRI DEWI MEGAYANTI<sup>1</sup>, SARAH K. WULANDARI<sup>2</sup><sup>1</sup> Undergraduate Nursing Program, ITEKES Bali, Bali, Indonesia

\*Email: megayanti.pande28@gmail.com

## ABSTRACT

**Introduction:** Complications due to diabetes can be prevented if patients are able to independently handle the disease properly. According to several studies, there is a significant relationship between diabetes self-management (DSM) and glycemic control. Diabetes Self Management education (DSME) is the provision of health education by experienced medical personnel about the daily behavior of diabetics such as self-monitoring blood glucose (SMBG), diet, health care, monitoring of medication and physical activity. **Objective:** To understand the education response in DM patients using video. **Methods:** The design of this study used a Research and Development approach with a quasi-experimental research design pretest-posttest with control group. The research began with the making of a DSME educational video which was carried out in three stages: exploration, development and validation stages. After the video was produced, further testing was carried out to determine the effectiveness of the video in increasing knowledge of DM. **Result:** The analysis showed that after the intervention there was an increase in knowledge in the treatment group from 10% to 43.3% while in the control group from 13.3% to 23.3%. Chi square results p value 0.023 ( $p < 0.05$ ), there was a significant difference between the experiment group and the control group after intervention. **Conclusion:** The DSME through audio-visual media can be more effective in increasing knowledge of diabetes. The use of video as a learning medium would help someone get better information because of interesting features, authentic and real language. Audio visual as a learning medium made it easier for nurses in diabetes as educators.

## ABSTRAK

**Latar belakang:** Komplikasi akibat diabetes dapat dicegah jika penderita mampu menangani penyakitnya secara mandiri dengan baik. Menurut beberapa penelitian, ada hubungan yang signifikan antara swa-manajemen diabetes (DSM) dan kontrol glikemik. Edukasi Manajemen Mandiri Diabetes (DSME) adalah pemberian edukasi kesehatan oleh tenaga medis berpengalaman tentang perilaku sehari-hari penderita diabetes seperti swa-monitor glukosa darah (SMGD), pola makan, perawatan kesehatan, pemantauan pengobatan dan aktivitas fisik. **Tujuan:** Mengetahui respon edukasi secara bertahap dengan video pada pasien DM. **Metode:** Desain penelitian ini menggunakan pendekatan Research and Development dengan desain penelitian kuasi eksperimental pretest-posttest with control group. Penelitian diawali dengan pembuatan video edukasi DSME yang dilakukan dalam tiga tahap yaitu tahap eksplorasi, pengembangan dan validasi. Setelah video diproduksi, selanjutnya dilakukan pengujian lebih lanjut untuk mengetahui keefektifan video tersebut dalam meningkatkan pengetahuan tentang DM. **Hasil:** Hasil analisis menunjukkan bahwa setelah dilakukan intervensi terjadi peningkatan pengetahuan pada kelompok perlakuan dari 10% menjadi 43,3% sedangkan pada kelompok kontrol dari 13,3% menjadi 23,3%. Hasil Chi square p value 0,023 ( $p < 0,05$ ), terdapat perbedaan yang signifikan antara kelompok eksperimen dan kelompok kontrol setelah dilakukan intervensi. **Kesimpulan:** DSME melalui media audio visual dapat lebih efektif dalam meningkatkan pengetahuan tentang diabetes. Penggunaan video sebagai media pembelajaran akan membantu seseorang mendapatkan informasi yang lebih baik karena menggunakan fitur-fitur yang menarik, otentik dan bahasa yang nyata. Audio visual sebagai media pembelajaran akan memudahkan perawat diabetes sebagai pendidik.

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**Kata Kunci :** Mandiri, Pendidikan, Diabetes, Pendekatan**Keywords :** Video education, DSME, Diabetes mellitus

**Introduction :**

Diabetes mellitus (DM) is an endocrine and metabolic disease that involves failure to use or produce insulin. The collection of diseases in DM occurs due to high blood glucose levels exceeding normal limits (Shouhip, 2005). World Health Organization (WHO) and the International Diabetes Federation (IDF) data of prevalence of DM is increasing rapidly worldwide and the percentage is getting higher in developing countries. In Indonesia, the number of people suffering from diabetes was 10 million people in 2015 and it is predicted that it will increase to 16.2 million people in 2040. Uncontrolled hyperglycemia in diabetes will lead to disease complications that will worsen the condition of a person diagnosed with diabetes (Diabetes Federation International, 2019). Complicated diseases that arise have an impact on the large cost of care (IDF, 2015) and decrease the quality of life for a person with diabetes. Complications due to diabetes can be prevented if the patient is able to independently manage the disease properly. According to several studies, there is a significant relationship between diabetes self management (DSM) and patient glycemic control. Daily self-care behavior in diabetic patients affects glycemic conditions and has an impact on the prevention of worsening disease complications in diabetes patients (Alrahbi, 2014; Mikhael et al., 2020; Moattari et al., 2012; Musenge et al., 2016).

The results of the preliminary study found that diabetes patients have low knowledge of proper daily self-care, although education is always delivered by health care worker when patients come to control their illness. So far, nurses provide education only limited to information about treatment and patient complaints using leaflets and brochures. They think that just taking medication regularly can help keep sugar levels under control. Good knowledge of diabetes management will have an impact on patient behavior in self-care (Atak et al., 2008). Diabetes self management education (DSME) is the provision of health education by experienced medical personnel about the

daily behavior of diabetes patients to manage DM such as monitoring self-management blood glucose (SMBG), diet, health care, monitoring medication and physical activity. These activities require active patient participation and family support. Adequate DSME will have an impact on controlled glycemic levels and can prevent worsening of complications in diabetes patients (Soelistijo et al., 2015). It is therefore important for health workers to consider effective and efficient methods to improve patient understanding of DSME.

The World Health Organization (1998) states that patients prefer audiovisual media as a learning method that attracts interest. In the audiovisual method, content that is attractive using dynamic objects is easier for a person to accept (Pamungkas et al., 2017). This is because the nervous system is easier to receive information in the form of images so that it is easy to recall and reduce boredom which results in decreased one's attention to educational topics to be delivered (Dewan, 2015). Audiovisual as another form of learning process for patients will make it easier for nurses as educators to achieve treatment targets for Diabetes patients. The limited research on the provision of DSME in the form of video has prompted researchers to develop DSME educational media in the form of videos. This study aims to create a DSME educational media in the form of a video and find out the general characteristics of DM patients such as age, gender, type of work and length of time diagnosed with DM, knowing the level of knowledge of DM patients before and after giving educational videos to the control group.

**Methods:**

This study used a Research and Development approach with a quasi-experimental research design pretest-posttest design with control group design. Research and development is a research method used to produce certain products and also evaluate the effectiveness of these products. The stages in this study consisted of three steps, namely exploration, the Model Development Stage

and the Validation. At the exploration stage, a material requirements analysis was carried out in DSME. This is done by analyzing the potential and problems faced by diabetes patients, nurses, and other medical teams.

Data collection was carried out by conducting interviews with nurses in hospitals/clinics and diabetes patients. Interviews were conducted with the aim of knowing the learning objectives. The exploration phase aims to determine the existing potential and identify the problems faced by diabetes nurses and patients in the education/ counseling process related to diabetes using the previous media. After the requirements analysis data is complete, the next step is the model development stage. The data obtained from the results of the needs analysis and supported by the theory from the results of the literature review will then be made a draft learning media design. The steps taken are (1) preparation of the draft material, script, and video storyboard. The drafting refers to the DSME material. Furthermore, (2) making animated videos using software. At this stage, the dubbing process is also carried out for material that uses conversation. Finally, (3) video editing so that the video becomes more attractive with the right time duration.

The validation stage aims to validate the learning material that has been designed. At this stage, the researcher will ask a number of experts who understand the care of diabetes patients to conduct a study whether the video that will be designed is suitable for implementation in diabetes patients. Validation sheets are prepared in advance and will be filled out by experts. The validation tests carried out were the suitability of the video for the patient (aim and approach), the contents of the book (content), the level of difficulty of the video (level of difficulty), as well as the appearance and layout. In this validation stage, the effectiveness of instructional videos was also tested to increase patient knowledge.

This study used a Convenience sampling with a sample size of 30 which would be grouped into the experiment group and the control group. The sample inclusion criteria in

this study included: aged 45-65 years, able to communicate good verbally, able to read and write and live with family. While the sample exclusion criteria in this study were type 2 DM clients who have physical, mental and cognitive limitations such as blindness, deafness and mental disabilities. The design in this study was a one group pre-test-post-test design. In the experiment group an intervention was carried out in the form of providing DSME counseling with video media. In the control group in the form of counseling with booklet media.

Collecting data using the method of filling out questionnaires and interviews in a time series / longitudinal manner. Data retrieval, namely knowledge before giving the DSME educational video which was carried out for 1 week to respondents who made health visits. At week 2-3 a DSME educational video was given and at week 4 carried out observation and data collection about patient knowledge. The data collection instrument for knowledge variables used the diabetes knowledge test (DKT2) developed and validated (Fitzgerald et al., 2016).

The test results were analyzed by two types of statistical tests to analyze differences in the level of knowledge in diabetes patients. The McNemar SPSS test was used to analyze the difference in level scores and knowledge of the treatment group after being given the DSME educational video. As data collectors in the form of multiple choice questions as many as 15 items, and given before (pre test) and after (post test) using video counseling.

### Results:

In this study, data collection process was carried out in October 2020 at the Dahlia Care Health Clinic, in West Denpasar. The number of samples used was 30 where the sample was divided into 2 groups, one group as the treatment group and the other as control group. The process was carried out after obtaining ethical clearance from the Health Research Ethics Commission of ITEKES Bali and research permission from Yayasan Dharma Mulia Care.

The research results obtained the following data:

**Table 1. Respondent characteristic (N= 30)**

No	Characteristic	Frequency (n=30)	%
1	Age		
	< 55 yo	13	43.3
	>55 yo	17	56.7
	<b>total</b>	<b>30</b>	<b>100</b>
2	Sex		
	Men	18	60
	Women	12	40
	<b>total</b>	<b>30</b>	<b>100</b>
3	Education level		
	Junior High	9	30
	Senior high	16	53.3
	College	5	16.7
	<b>total</b>	<b>30</b>	<b>100</b>
4	Long suffered		100
	< 5 years	17	56.7
	>5 years	13	43.3
	<b>Total</b>	<b>30</b>	<b>100</b>

Based on the results of the study, the majority of respondents aged > 55 years were 56.7% and male, namely 60%. Based on the type of education, the respondents were around 53.3% with a high school education level and 56.7% with a diabetes duration of less than 5 years.

**Table 2. Respondent level of knowledge (N= 30)**

Group	Level of knowledge							
	Pre test				Post test			
	Less		good		Less		good	
	n	%	n	%	n	%	n	%
treatm ent	12	40	3	10	2	6.7	13	43.3
contro l	11	36.7	4	13.3	8	26.7	7	23.3
<b>Total</b>	<b>24</b>	<b>76.7</b>	<b>6</b>	<b>23.3</b>	<b>11</b>	<b>36.7</b>	<b>21</b>	<b>63.3</b>

Before the intervention was carried out in the form of providing DSME educational videos in the treatment group about 40% of respondents had a low level of knowledge and in the control group it was 36.7%. After the intervention, there was an increase in knowledge in the treatment group from 10% to 43.3% while in the control group from 13.3% to 23.3%. There was a change in the

percentage level of poor knowledge in the group before and after treatment, namely before treatment around 76.7% and after treatment decreased to 36.7%, shown in table 2

**Table 3. Result McNemar pretest and post-test in treatment group (n=15)**

Respondents' Knowledge Level After Giving Educational Videos DSME							
Respondents' Knowledge Level before Giving Educational Videos DSME	Less		Good		Total		p
	n	%	n	%	n	%	
Less	2	6.67	10	33.33	12	40	0.002
good	0	0	3	10	3	10	
<b>Total</b>	<b>2</b>	<b>6.67</b>	<b>13</b>	<b>43.33</b>	<b>15</b>	<b>50</b>	

The hypothesis test used was the McNemar test, where the knowledge level assessment was carried out before and after the DSME educational video was given to the treatment group, after which the knowledge level was grouped into poor and good. Respondents are said to be good if the score of the questionnaire is  $\geq 55$  and the level of knowledge is less if the value of the questionnaire is  $\leq 55$ . From the results of the McNemar test above, it can be seen that there is a significant difference in the level of knowledge before and after giving the DSME educational video to diabetes patients,  $p = 0.002$  ( $p < 0.05$ ) which means  $H_0$  is rejected.

**Table 4. Result of Chi-Square posttest in both groups (n=30)**

Knowledge Level After intervention					
Group	Less		Good		p
	n	%	n	%	
intervention	2	18.2	13	68.4	0.023
control	9	81.8	6	31.6	
<b>Total</b>	<b>11</b>	<b>100</b>	<b>19</b>	<b>100</b>	

In this study, to determine the difference between groups (treatment and control) and the level of knowledge (poor and good), the Chi-Square test was used. From the results used were Continuity Correction. The



significant value shows  $p = 0.023$  ( $p < 0.05$ ) so there is a significant difference between the treatment group and the control group after the intervention.

### Discussion:

The statistical results obtained 56.7% of respondents aged  $> 55$  years and 43.3% aged  $< 55$  years. Respondents in this study ranged in age from 34 years to 64 years. The aging process will induce decreased sensitivity and changes in insulin. Aging also causes a decrease in compensatory protein  $\beta$  cells of the pancreas which is insufficient in the face of increased insulin resistance (Bilous, R & Donnelly, 2015).

In this study 60% of the respondents were male and 40% of the respondents were female. However, there are other studies that state the prevalence of DM in women is 3.1% more than in men ( $p < 0.05$ ) (Veghari, 2015). In this study, the average woman aged  $< 55$  years where women showed better insulin sensitivity and metabolic profile than men under normal conditions. Estrogen hormone produced in more women can protect pancreatic  $\beta$  cell apoptosis, stimulate  $\beta$  cell secretion and increase insulin sensitivity (Kautzky-Willer et al., 2016).

The majority of respondents' education level is 56.7% with a high school education level. Other studies suggest that there is a significant positive relationship between health status, knowledge and education level. A person will have a specific level of skills and knowledge based on experience in the educational process. The higher the level of education, the skills and knowledge will be more professional and relevant to general knowledge (Pradono & Sulistyowati, 2014).

The results of data analysis showed that 56.7% of respondents suffered from diabetes for  $< 5$  years. Long suffering from diabetes is associated with the length of time glucose binds to Hb which will cause chronic hyperglycemia. Chronic hyperglycemia conditions can lead to micro and

macrovascular disorders as a factor in causing complications (Zoungas et al., 2014). In this study, on average the respondents had complications of foot ulcers, so that the provision of DSME education would be more beneficial for respondents to prevent worsening of other complications. In this study, DSME education was more effective for diabetes patients as a preventive measure focused on tertiary prevention.

### Diabetes Patient Knowledge Level

In this study, 76.7% of respondents' level of knowledge was less before being given intervention. However, after the DSME education intervention, the level of respondent's lack of knowledge decreased to 36.7%. In this case the majority of respondents in the control group had a good level of knowledge after being given the intervention of 43.3%. The level of individual knowledge relates to the information received so far. Increasing health knowledge will usually have an impact on increasing a person's attitude and behavior in caring for himself (Williams et al., 2014). So far, respondents get information related to diabetes through health workers and brochures. Patients say that sometimes they forget the information that is conveyed and the information obtained is incomplete.

The DSME educational audio-visual media is designed according to self-care information materials that are useful for diabetes patients. The material used in this video refers to the Ministry of Health of the Republic of Indonesia in 2019. This educational video can always be seen by patients at any time either via a USB connection on a TV or cellphone, so patients can easily and quickly gain knowledge when they forget the information required. So it is hoped that the increased knowledge of patients will have an impact on changing behavior to prevent complications due to diabetes. Providing education to DM patients can increase knowledge which will later affect, lifestyle, health responsibility and personal care practices (Moattari et al., 2012).

### The Effect of Providing DSME Educational Videos on the Knowledge Level of Diabetes Patients

In this study, the McNemar test was used to assess the differences in the level of knowledge in diabetic patients before and after video administration in the intervention group. Meanwhile, the chi square test was used to analyse the differences in the level of knowledge in the control and treatment groups after being given the DSME educational video. The level of significance used in this study was  $\alpha < 0.05$ . From the results of the McNemar test, it was found that there was a significant difference in the level of knowledge before and after giving the DSME educational video to diabetes patients,  $p = 0.002$  ( $p < 0.05$ ), there was an increase in knowledge in diabetic patients before and after being given the DSME educational video. Of the 15 (50%) samples in the treatment group there was an increase in the percentage of good knowledge from 10% to 43.3% after being given education. This shows that DSME education through audio-visual media can effectively increase knowledge of diabetes patients.

Other research also states that by providing education through audio-visual media can increase a person's knowledge and attitudes, audio-visual methods can facilitate the delivery and receipt of health information (Daryani et al., 2019). Other research also states that learning using audio-visual media displays interesting features that can make learning less monotonous and boring so that someone can easily understand the information conveyed (Desrianti et al., 2011). In this study, it was found that the majority of respondents had a high school education level so that the provision of information through the DSME educational videos was optimally accepted by the respondents. The DSME educational video contains self-care for diabetes patients such as understanding diabetes, managing nutrition, preventing complications, exercising to leg care. Before this video was given to the respondent, before that the expert judgment

was tested by 3 experts, namely from technology information experts, diabetes professional nurses and diabetes patients.

The results of the analysis based on the Chi-Square test showed that there was a significant difference in the level of knowledge between the control group who did not receive the DSME educational video and the treatment group who received the DSME educational video which was indicated by  $p$  value 0.023 ( $p < 0.05$ ). The results of the same study found that respondents who received learning interventions using the audio media method had better knowledge than respondents who only received learning interventions using audio media only (Sulaiman et al., 2017). Therefore, using video as a learning medium will help someone get better information because of the use of interesting features and authentic and real language.

The limitation in this study is that the variables used to test the effectiveness of the video are only limited to the level of patient knowledge, where the main goal in DSME education is the change in behavior of DM patients in managing their disease so that it is expected to reduce complications due to chronic hyperglycemia. This can be followed up by conducting further research on the effectiveness of developing DSME learning videos on behavior changes in DM patients in everyday life.

The number of samples used in the trial of the development of instructional education media is still very limited so that it has not been able to measure the level of knowledge of DM patients properly, this occurs considering the data collection process during the pandemic which causes patient concern in making visits to health services. It can also be used as a consideration for further research.

### Conclusions:

There is a significant difference in the level of knowledge between the control group who did not receive the DSME educational video and the treatment group who received

the DSME educational video. In the audiovisual method, interesting content using dynamic objects is younger to be accepted by someone. Audiovisual as another form of learning process for patients will make it easier for nurses as educators to achieve the treatment targets for Diabetes patients. Therefore, using video as a learning medium will help someone get better information because of the use of interesting features and authentic and real language.

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