



THE EFFECT OF VIDEO-BASED EDUCATIONAL INTERVENTION ON PATIENTS' KNOWLEDGE OF DIABETES MELLITUS MANAGEMENT

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ABSTRACT

Diabetes mellitus (DM) requires adequate patient knowledge to support effective self-management and prevent complications. Video-based education provides an audiovisual learning method that may improve patients' understanding of diabetes management. To examine the effect of video-based education on diabetes mellitus management knowledge among patients attending the Cempaka Putih Community Health Center, Central Jakarta. A quantitative quasi-experimental study with a pretest–posttest control group design was conducted from September to October 2025. A total of 68 patients with DM were recruited using purposive sampling and allocated into intervention (n=34) and control (n=34) groups. The intervention group received standardized video-based education on diabetes management, whereas the control group received routine health education. Knowledge was measured using a 20-item questionnaire before and after the intervention. Data were analyzed using paired-samples t-tests, independent-samples t-tests, and multiple linear regression. Baseline knowledge scores were comparable between the intervention (9.68 ± 2.47) and control groups (9.71 ± 3.79). Following the intervention, the mean knowledge score increased significantly to 14.09 ± 1.54 in the intervention group ($p < 0.001$), whereas no significant change was observed in the control group (9.76 ± 3.39 ; $p = 0.737$). The mean knowledge improvement differed significantly between groups (4.41 ± 2.84 vs. 0.06 ± 1.01 ; $p < 0.001$). Age significantly influenced knowledge improvement ($p = 0.001$), while sex, education, and duration of DM were not significant predictors. Video-based education effectively improved diabetes management knowledge and may be integrated into primary healthcare education programs for patients with DM.

Keywords: diabetes mellitus; educational video; health education; knowledge; self-management

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INTRODUCTION

Diabetes mellitus (DM) is a chronic metabolic disease characterized by persistent hyperglycemia resulting from defects in insulin secretion, insulin action, or both. Uncontrolled hyperglycemia may lead to serious microvascular and macrovascular complications, including cardiovascular disease, chronic kidney disease, diabetic retinopathy, and peripheral neuropathy. These complications contribute substantially to increased morbidity, mortality, reduced quality of life, and healthcare expenditures, making diabetes one of the leading global public health challenges (Wicahyani et al., 2021).

The global prevalence of diabetes has increased considerably over the past decades. According to the International Diabetes Federation (IDF), approximately 537 million adults were living with diabetes in 2021, and this figure is projected to rise to 783 million by 2045. Indonesia is among the countries with the largest number of people living with diabetes, ranking sixth worldwide. Furthermore, the 2023 Indonesian Basic Health Research (Riskesdas) reported that the prevalence of physician-diagnosed diabetes was 2.0%, whereas the prevalence based on elevated blood glucose levels reached 10.9%. This discrepancy indicates that many individuals with diabetes remain undiagnosed or are unaware of their condition, emphasizing the need for improved screening, education, and disease management strategies (Sari et al., 2024).

Effective diabetes management aims to achieve optimal glycemic control and prevent disease-related complications through comprehensive self-management. The Indonesian Society of Endocrinology (PERKENI) recommends five essential components of diabetes management: diabetes education, medical nutrition therapy, regular physical activity, self-monitoring of blood glucose, and pharmacological treatment (PERKENI, 2021). Despite these recommendations, many patients continue to experience poor glycemic control because of inadequate knowledge, limited adherence to treatment, and insufficient self-management practices (Manne-Goechler et al., 2019; Suprapti et al., 2023).

Knowledge is a fundamental determinant of successful diabetes self-management. Patients with adequate knowledge are more likely to follow dietary recommendations, maintain regular physical activity, adhere to prescribed medications, and monitor blood glucose appropriately. In contrast, limited knowledge is associated with poor self-care behaviors, lower treatment adherence, and an increased risk of diabetes-related complications (Mogre et al., 2019; Notoatmodjo, 2020). Therefore, improving patients' knowledge is an essential strategy for enhancing diabetes management and achieving better clinical outcomes.

Diabetes Self-Management Education (DSME) has been widely recognized as an effective intervention for improving patients' knowledge and self-management skills (Duku et al., 2024). Recent technological advances have encouraged the use of digital educational media, particularly video-based education. Educational videos provide both visual and auditory learning experiences, are easily accessible, and allow repeated viewing, enabling patients to learn independently at their own pace. Previous studies have demonstrated that video-based education improves patients' knowledge, attitudes, self-care behaviors, and adherence to diabetes treatment more effectively than conventional educational approaches (Wicahyani et al., 2021; Wulandari et al., 2025).

Although the benefits of educational interventions have been widely reported, evidence regarding the effectiveness of video-based education among patients with diabetes attending primary healthcare centers in Indonesia remains limited. Differences in healthcare settings and patient characteristics may influence educational outcomes. Therefore, this study aimed to examine the effect of a video-based educational intervention on patients' knowledge of diabetes mellitus management at the Cempaka Putih Community Health Center, Central Jakarta. The findings are expected to provide evidence supporting the implementation of digital educational media in primary healthcare settings to improve diabetes self-management.

METHOD

This study employed a quantitative approach using a quasi-experimental pretest–posttest control group design. Two groups were included: an intervention group that received a video-based educational program on diabetes mellitus management and a control group that received the standard educational services routinely provided by the community health center. Participants' knowledge was assessed before (pretest) and after (posttest) the intervention to determine the effect of video-based education on diabetes management knowledge (Sugiyono, 2019). The study was conducted at the Cempaka Putih Community Health Center, Central Jakarta, Indonesia, between September and October 2025. The study population comprised all patients diagnosed with diabetes mellitus who attended the health center during the study period. The required sample size was calculated using G*Power version 3.1, assuming a two-group pretest–posttest design with a significance level (α) of 0.05, statistical power ($1-\beta$) of 80%, and a medium effect size (Cohen's $d = 0.50$). The minimum sample size was 34 participants per group, yielding a total of 68 participants. To compensate for potential attrition, 76 participants were recruited. Participants were selected using purposive sampling according to predefined inclusion and exclusion criteria.

Primary data were collected using a structured questionnaire comprising two sections: respondents' demographic characteristics (age, sex, educational level, and duration of diabetes mellitus) and a diabetes management knowledge questionnaire. The validity and reliability of the diabetes

management knowledge questionnaire were established prior to data collection, with all items meeting the validity criteria and the instrument demonstrating acceptable internal consistency (Cronbach's $\alpha > 0.70$). The knowledge questionnaire consisted of 20 true-or-false items, with one point assigned for each correct response and zero points for each incorrect response, resulting in a total score ranging from 0 to 20. Knowledge levels were categorized as good (15–20), moderate (11–14), and poor (<11). Participants in the intervention group received a standardized video-based educational program covering the principles of diabetes management, including healthy diet, physical activity, medication adherence, blood glucose monitoring, and prevention of diabetes-related complications. Participants in the control group received routine diabetes education delivered by healthcare professionals according to the standard practice of the community health center. Secondary data were obtained from textbooks, scientific journals, and other relevant literature.

Data management included editing, coding, data entry, data cleaning, and tabulation. Descriptive statistics were used to summarize participants' demographic characteristics and knowledge scores using frequencies, percentages, means, and standard deviations. The normality of continuous variables was assessed using the Shapiro–Wilk test. Changes in knowledge scores within each group were analyzed using the paired-samples t-test. When the assumption of normality was not satisfied, the Wilcoxon signed-rank test was applied. Differences in knowledge improvement between the intervention and control groups were evaluated using the independent-samples t-test. To determine the independent effect of the video-based educational intervention after controlling for potential confounding variables, including age, sex, educational level, and duration of diabetes mellitus, analysis of covariance (ANCOVA) was performed using posttest knowledge scores as the dependent variable and pretest knowledge scores as a covariate. A two-tailed p-value of <0.05 was considered statistically significant.

RESULT

Table 1.

Characteristics of Respondents Based on Age and Length of Diabetes Mellitus Suffering

Characteristics	Group	N	Min	Max	Mean	Elementary School	t	p-value
Age (in years)	Intervention	34	45	63	53.79	4.99	2,240	0.028
	Control	34	45	59	51.06	5.08		
Length of Suffering from DM (in years)	Intervention	34	1	10	5.47	2.51	-1,659	0.102
	Control	34	3	20	6.65	3.28		

Based on Table 1, the average age of respondents in the intervention group was 53.79 ± 4.99 years, while the control group was 51.06 ± 5.08 years. The results of the independent t-test showed a significant age difference between the two groups ($p = 0.028$), so the age characteristics were not homogeneous. The average duration of DM in the intervention group was 5.47 ± 2.51 years, while in the control group it was 6.65 ± 3.28 years. There was no significant difference in duration of DM ($p = 0.102$), so both groups were homogeneous in disease duration.

Table 2.

Respondent Characteristics Based on Gender and Education

Respondent Characteristics Based on Gender and Education								
Characteristics	Group				Total		c2	p-value
	Intervention		Control					
	f	%	f	%	f	%		
Gender								
Woman	25	54.3	21	45.7	46	67.6	1,075	0.300
Man	9	40.9	13	59.1	22	32.4		
Education								
Junior High School	9	40.9	13	59.1	22	32.4	1,532	0.465
Senior High School	20	57.1	15	42.9	35	51.5		
College	5	45.5	6	54.5	11	16.2		

Table 2, the gender distribution in the intervention and control groups was relatively comparable. The chi-square test results showed no significant difference based on gender ($p = 0.300$), thus the

two groups were considered equivalent. Regarding education, the majority of respondents in both groups had a high school education. A chi-square test also showed no significant difference in education level between the intervention and control groups ($p = 0.465$), indicating that the educational characteristics of both groups were homogeneous.

Table 3.

Patient Knowledge in Managing Diabetes Mellitus Before and After Providing Video-Based Education

Data	Group	N	Min	Max	Mean	Elementary School
Pre-test	Intervention	34	5	16	9.68	2.47
	Control	34	4	16	9.71	3.79
Post test	Intervention	34	10	15	14.09	1.54
	Control	34	4	16	9.76	3.39

Table 3, the average pretest knowledge scores in the intervention group (9.68 ± 2.47) and the control group (9.71 ± 3.79) indicate nearly identical initial knowledge levels. In the posttest, the intervention group experienced an increase in score to 14.09 ± 1.54 , while the control group remained relatively unchanged at 9.76 ± 3.39 . This indicates that video-based education improved patient knowledge better than standard education.

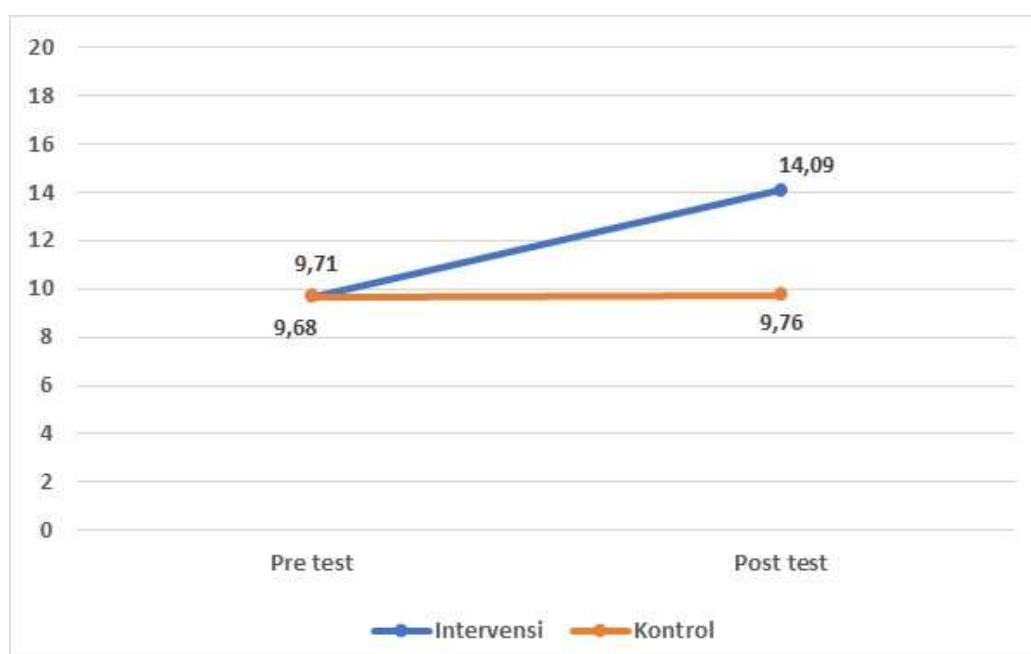


Chart 1. Average Curve of Patient Knowledge in Diabetes Mellitus Management Before and After Providing Video-Based Education to Each Group

Graph 1 shows that the initial knowledge scores of both groups were relatively similar (intervention 9.68; control 9.71). After the intervention, the video group experienced a clear increase from 9.68 to 14.09, while the control group remained virtually unchanged (9.71 to 9.76). This difference in patterns indicates that video-based education is more effective in improving knowledge in DM patients.

Table 4.

Normality Test Results

Data	Group	Shapiro-Wilk	P-value	Skewness	Kurtosis	Information
Pre-test	Intervention	0.951	0.136	0.448	0.770	Normal
	Control	0.873	0.001	-0.292	-0.726	Normal
Post test	Intervention	0.624	0,000	-1,729	2,231	Normal
	Control	0.900	0.005	-0.354	-0.444	Normal

Table 4, the normality test shows that some of the knowledge data in the pre-test and post-test were not completely normal based on the Shapiro–Wilk test ($p < 0.05$). However, the skewness and kurtosis values were still within the ± 2 range, indicating that the data distribution was considered

close to normal. Therefore, parametric analysis can still be used.

Table 5.

Results of Paired t Test Differences in Knowledge Before and After Treatment

Group	Treatment	Mean	Elementary School	MD	t	df	Sig.
Intervention	Pre-test	9.68	2.47	-4.41	-9.06	33	0,000
	Post test	14.09	1.54				
Control	Pre-test	9.71	3.79	-0.06	-0.34	33	0.737
	Post test	9.76	3.39				

Based on Table 5, the paired t-test showed a significant increase in knowledge in the intervention group after video education ($t = -9.06$; $df = 33$; $p = 0.000$). The average score increased from 9.68 ± 2.47 to 14.09 ± 1.54 . In contrast, the control group did not show significant changes ($t = -0.34$; $df = 33$; $p = 0.737$), with a mean score from 9.71 ± 3.79 to 9.76 ± 3.39 .

Table 6.

Results of the Independent t Test of Changes in Knowledge Between the Intervention and Control Groups

Data	Group	Mean	Elementary School	MD	t	df	Sig.
Difference between pre-test and post-test	Intervention	4.41	2.84	4.35	8.42	66	0,000
	Control	0.06	1.01				

Table 6, the independent t-test showed a significant difference in knowledge between the intervention and control groups ($t = 8.42$; $df = 66$; $p = 0.000$). The average change in scores in the intervention group was 4.41 ± 2.84 , while in the control group it was 0.06 ± 1.01 , indicating a significant increase in patient knowledge after video education .

Table 7.

Results of Multiple Linear Regression Test of Dummy Variables of the Effect of Age, Duration of Diabetes Mellitus, Gender and Education on Changes in Knowledge

Variables	B	SE	Beta	t	Sig.	Information
Age	0.233	0.070	0.396	3,328	0.001	Significant
Long-term DM Suffering	0.014	0.120	0.014	0.119	0.906	Not Significant
Gender	-1,096	0.773	-0.170	-1,419	0.161	Not Significant
Education	0.568	0.533	0.127	1,066	0.290	Not Significant

Table 7, multiple linear regression analysis shows that age significantly influences changes in DM patients' knowledge ($B = 0.233$; $t = 3.328$; $p = 0.001$), with the largest contribution compared to other variables ($\beta = 0.396$). Meanwhile, duration of DM, gender, and education level did not have a significant effect ($p > 0.05$). Thus, age is the only variable that influences changes in patient knowledge.

DISCUSSION

The age characteristics of the respondents indicated that most participants were in late adulthood to early old age, a period during which cognitive function and memory gradually decline while the risk of comorbidities increases. These age-related changes may affect patients' ability to receive, process, and understand health education. Age is therefore an important factor influencing patients' responses to educational interventions, including improvements in diabetes-related knowledge. Video-based education facilitates learning by delivering information through both visual and auditory channels, thereby enhancing comprehension and supporting patients' independence in self-care, consistent with Orem's Self-Care Deficit Nursing Theory (SCDNT) (Mousavi et al., 2023).

The distribution of male and female participants was relatively balanced between the intervention and control groups, indicating that sex was unlikely to influence baseline characteristics. Video-based education was effective because it presented information in an engaging audiovisual format that was easy to understand and could be accessed repeatedly. This educational approach is universally applicable and accommodates different learning preferences among both men and women, providing equal opportunities for all participants to improve their knowledge of diabetes mellitus (Mnatzaganian et al., 2024). Most respondents in both groups had completed secondary

education, while a smaller proportion had attained higher education. This distribution suggests that educational level did not differ substantially between the groups at baseline. Although educational attainment influences an individual's ability to understand health information, the method of information delivery also plays an important role. Video-based education effectively presents information through visual and auditory media, facilitating comprehension across different educational backgrounds and helping overcome differences in patients' cognitive abilities and health literacy (Liao et al., 2023).

The duration of diabetes mellitus was relatively comparable between the intervention and control groups, indicating similar experiences of living with a chronic disease. However, a longer duration of illness does not automatically improve self-care abilities without structured educational support, as proposed by Orem's Self-Care Deficit Nursing Theory (Esmailzadeh & Inuwa, 2026). Previous studies have demonstrated that educational interventions based on Orem's theory, including video-based education, effectively improve patients' knowledge and self-care behaviors regardless of disease duration (Jandaghian-Bidgoli & Jamalnia, 2024; Elyeli & Esmailzadeh, 2025). In this study, improvements in patients' knowledge were more strongly associated with the educational intervention than with the duration of diabetes mellitus (Anggraeni et al., 2024).

Video-based education provided to the intervention group is consistent with Orem's Self-Care Deficit Nursing Theory, which emphasizes that self-care agency is largely influenced by patients' knowledge. When patients have insufficient knowledge, they require supportive–educative nursing interventions to enhance their ability to perform self-care independently. Educational videos deliver information through both visual and auditory channels, facilitating understanding among individuals with diverse educational backgrounds and cognitive abilities. Previous studies have shown that video-based education is more effective than conventional educational methods in improving knowledge and self-care behaviors among patients with diabetes mellitus (Mousavi et al., 2023; Rahbar et al., 2024).

In contrast, the control group, which did not receive the video-based intervention, demonstrated only minimal improvement in knowledge, suggesting that living with diabetes alone is insufficient to enhance self-care without structured educational support. In the present study, the mean knowledge score increased from 9.68 to 14.09 following the intervention, indicating an improvement in self-care agency and reflecting patients' enhanced ability to understand and independently manage diabetes mellitus in accordance with Orem's theoretical framework (Hentu et al., 2025; Study et al., n.d.). Before the intervention, most participants demonstrated limited knowledge regarding diabetes management, reflecting the presence of a self-care deficit as described in Orem's theory. This deficit arises when individuals lack the knowledge and skills required to perform appropriate self-care activities (Nasiri et al., 2023). Following the implementation of video-based education, participants in the intervention group exhibited significant improvements in knowledge, suggesting a reduction in self-care deficit. The audiovisual nature of educational videos enables clear, consistent, and repeatable delivery of information, thereby strengthening patients' capacity to manage their condition effectively (Mousavi et al., 2023; Rahbar et al., 2024). Conversely, the control group showed no meaningful improvement, indicating that experience with diabetes alone is insufficient without structured educational intervention (Handayani et al., 2023).

The video-based educational intervention implemented in this study reflects the supportive–educative nursing system described in Orem's Self-Care Deficit Nursing Theory, in which nurses function as educators and facilitators who enhance patients' knowledge and self-management skills. Educational videos provide clear, engaging, and standardized information, enabling patients to better understand and apply diabetes management principles. Previous studies have demonstrated that video-based education significantly improves patients' knowledge and self-care behaviors compared with baseline conditions (Orem, 2001; Surya et al., 2022; Kim et al., 2021; Ratri et al., 2020). These findings support Orem's proposition that supportive–educative interventions enhance

self-care agency while reducing self-care deficits, thereby enabling patients to become more independent in managing their chronic condition (Luh et al., 2025).

Health education theory proposes that behavioral change begins with the acquisition of knowledge, which subsequently shapes attitudes and ultimately influences behavior. The univariate analysis revealed that most participants had low to moderate levels of diabetes management knowledge before the intervention, indicating limited capacity to make informed health-related decisions. Following the implementation of video-based education, knowledge scores in the intervention group increased significantly, whereas no significant improvement was observed in the control group ($p < 0.05$), demonstrating the direct effectiveness of the intervention.

Multivariate analysis further demonstrated that age was significantly associated with improvements in knowledge, whereas sex, educational level, and duration of diabetes were not statistically significant predictors. These findings suggest that video-based education is effective across diverse patient characteristics, supporting the principles of health education theory that appropriately designed educational strategies can enhance knowledge regardless of demographic background. These findings are consistent with previous studies demonstrating that improved knowledge through health education empowers patients, enhances medication adherence, promotes self-care practices, and encourages healthier behaviors among individuals with diabetes mellitus (de Melo Ghisi et al., 2020; Akuiyibo et al., 2022; Barbosa & de Queiroz Oliveira, 2021; Teoh et al., 2023). Therefore, video-based education represents an effective initial strategy for fostering positive attitudes and promoting sustainable self-care behaviors in patients with diabetes mellitus (Keperawatan et al., 2024).

From a cognitive perspective, knowledge is acquired through sensory perception, particularly vision and hearing. The greater the number of senses involved in the learning process, the higher the likelihood that information will be understood and retained. Prior to the intervention, most participants demonstrated low to moderate levels of knowledge, suggesting that previous educational approaches had not been fully effective in facilitating learning (Feeley et al., 2023). Following the video-based educational intervention, knowledge scores in the intervention group increased significantly ($p < 0.05$), whereas no significant changes were observed in the control group. Educational videos simultaneously engage visual and auditory senses, thereby strengthening cognitive processing, improving information absorption, and enhancing knowledge retention (Hoe et al., 2024; Deshpande et al., 2023). From the perspective of Bloom's cognitive domain, these findings indicate that participants progressed from the knowledge level to comprehension and application, enabling them to implement appropriate diabetes self-management practices in their daily lives (Teoh et al., 2023).

The multivariate analysis demonstrated that age significantly influenced changes in knowledge, whereas sex, educational level, and duration of diabetes did not. These findings suggest that educational methods and media constitute more influential external factors in improving patients' knowledge than individual demographic characteristics. Video-based education appears capable of overcoming differences in educational background and cognitive ability while consistently enhancing patients' understanding of diabetes management across diverse populations (Ratri & Hamidah, 2020).

CONCLUSION

The findings of this study demonstrate that video-based education is effective in improving knowledge among patients with diabetes mellitus. The paired-samples t-test revealed a significant increase in knowledge scores in the intervention group ($p < 0.001$), whereas no significant change was observed in the control group ($p = 0.737$). Multiple linear regression analysis further showed that age was a significant predictor of changes in knowledge ($p = 0.001$), while sex, educational level, and duration of diabetes mellitus were not significantly associated with knowledge improvement.

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