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The Effect of Audiovisual Education on Insulin Therapy Use on Knowledge of Patients with Type 2 Diabetes Mellitus

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ABSTRACT

Background: Type 2 diabetes mellitus is a chronic disease that requires long-term management, including the appropriate use of insulin therapy. Lack of patient knowledge regarding insulin use can lead to therapy errors and increase the risk of complications.

Purpose: This study aimed to determine the effect of audiovisual education on improving the knowledge of patients with type 2 diabetes mellitus regarding insulin therapy use.

Methods: This study used a quantitative quasi-experimental design with a one-group pretest-posttest approach. The sample consisted of 34 patients with type 2 diabetes mellitus undergoing insulin therapy at the Internal Medicine Clinic of Arifin Achmad Regional Hospital, Riau Province. Samples were selected using consecutive sampling. Data were collected using a knowledge questionnaire consisting of 9 Guttman-scale questions and analyzed using univariate and bivariate analysis with the Wilcoxon test.

Results: The mean knowledge score increased from 2.32 (SD = 1.471) in the pre-test to 3.71 (SD = 1.031) in the post-test. The Wilcoxon test showed a p-value of 0.000 ($p < 0.05$), indicating a significant effect of audiovisual education on patient knowledge.

Conclusion: Audiovisual education is effective in improving the knowledge of patients with type 2 diabetes mellitus regarding insulin therapy use.

Keywords:

audiovisual education;
insulin therapy; patient
knowledge; type 2
diabetes mellitus

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Introduction

Type 2 diabetes mellitus (T2DM) is a chronic metabolic disease characterized by hyperglycemia due to insulin resistance and/or impaired insulin secretion (Ahmad et al., 2022). The global prevalence of diabetes continues to increase, posing a significant public health burden. According to international data, millions of individuals worldwide are affected by

diabetes, with type 2 diabetes accounting for the majority of cases (PERKENI, 2024)

Effective diabetes management requires long-term self-care, including dietary regulation, physical activity, blood glucose monitoring, medication adherence, and insulin therapy when indicated (Wahyuni et al., 2023). Insulin therapy is recommended for patients whose blood glucose levels cannot be



adequately controlled by oral antidiabetic drugs (PERKENI, 2024). Proper insulin administration includes correct dosage, injection technique, storage, timing, and recognition of hypoglycemia symptoms (Pratiwi & Handayani, 2022).

However, several studies have reported that patient knowledge regarding insulin therapy remains inadequate. Misconceptions, fear of injections, incorrect storage practices, and improper injection techniques are common problems (Fatmona et al., 2023). A study by (Alydrus & Fauzan, 2022) found that 62% of T2DM patients had insufficient knowledge regarding injection techniques and hypoglycemia management. Insufficient knowledge is associated with poor disease management and may increase the risk of complications (Shiferaw et al., 2021).

Health education plays an essential role in improving patient knowledge and self-management skills (Notoatmodjo, 2021). Audiovisual media, such as educational videos, are considered more effective than verbal explanations alone because they stimulate both visual and auditory senses, facilitating better understanding and retention of information (Putri et al., 2023). Video-based education has been shown to significantly improve patient knowledge, as indicated by increased post-intervention scores, and supports better understanding of diabetes self-management practices (Ratri et al., 2020). Similarly, Research shows that video-based dietary education for patients with type 2 diabetes can increase knowledge by 77.78% and skills by 94.44%, thereby proving effective in

helping patients manage their condition (Dewi & Maria, 2023).

The novelty of this study lies in its focus on audiovisual education specifically targeting insulin therapy use among type 2 diabetes mellitus patients at Arifin Achmad Regional Hospital, Riau Province—a tertiary referral hospital where such an intervention study had not previously been conducted—while also addressing a gap in prior research that has largely explored audiovisual education for general diabetes management rather than insulin-specific knowledge within this clinical setting and patient population. Furthermore, this study is distinguished by the use of a locally developed educational video, validated for content validity and usability using the System Usability Scale (SUS), which integrates dynamic, engaging, and easily accessible visual elements to effectively demonstrate practical procedures such as insulin injection techniques, thereby surpassing static media like leaflets or posters and being specifically tailored to the local context of Riau to reduce treatment errors caused by patients lack of knowledge.

Methods

Research design

A quantitative quasi-experimental design with a one-group pretest-posttest approach was applied in this study. Patient knowledge was assessed both prior to and after the intervention to determine changes resulting from audiovisual-based education.



Setting and samples

The sample for this study was drawn from a population of patients with type 2 diabetes mellitus undergoing treatment at the Internal Medicine Clinic of Arifin Achmad General Hospital in Pekanbaru, with a total population of approximately 275 patients based on the average number of visits over the past three months. From this population, the researchers selected the sample by first establishing inclusion and exclusion criteria to ensure that the selected participants aligned with the study's objectives. Inclusion criteria included Type II DM patients currently on insulin therapy, receiving treatment at the internal medicine clinic, and willing to participate by signing an informed consent form. Meanwhile, exclusion criteria included patients with visual or hearing impairments, those unwilling to participate in the study, those refusing to receive education, and patients with diabetes types other than Type II. After the criteria were determined, the sampling process was conducted directly at the study site by selecting every patient who came to the clinic. Every patient who met the criteria and was willing to participate was immediately included as a study participant. This process was carried out continuously during the data collection period until the required sample size was met, namely 34 participants.

The sampling method used in this study was consecutive sampling, a non-probability sampling technique in which all subjects meeting the study criteria are selected sequentially as they arrive until the desired sample size is reached. In its application to this study, the

researcher did not conduct random selection but instead enrolled all eligible patients in sequence throughout the study period. This method was chosen because it was considered practical and suitable for the research conditions at the healthcare facility, where subjects arrive gradually and unpredictably. Additionally, consecutive sampling allows the researcher to obtain a representative sample of the available population in a relatively short time, making it highly suitable for use in a quasi-experimental study design with a one-group pretest-posttest approach, as in this study.

Intervention (applies to experimental studies)

The intervention consisted of health education delivered through an audiovisual medium (educational video) explaining proper insulin therapy use, including injection techniques, dosage, timing, and storage.

Measurement and data collection;

Patient knowledge was measured using a 9-item questionnaire with a Guttman scale (true/false answers). Data collection was conducted using the pretest-posttest method. Respondents completed the questionnaire before watching the educational video and again after the intervention.

Data analysis;

Data analysis was performed using univariate methods to describe respondent characteristics and levels of knowledge. Furthermore, bivariate analysis was conducted using the Wilcoxon test with a significance level of

0.05 to assess the effect of the intervention.

Confidentiality and anonymity were maintained throughout the study.

Ethical considerations.

Before the implementation of the study, ethical approval was obtained from the Health Research Ethics Committee of the Faculty of Nursing at Universitas Hang Tuah Pekanbaru, with reference number 044/KEPK/UHTP/XII/2025.

All Participants were informed about the purpose of the research and provided informed consent before taking part.

Results

This survey included 34 respondents in total. The majority were female (55.9%), housewives (35.3%) and had completed senior high school (58.8%). The age range was 27-76 years, with a mean of 56.03 years. The average length of diabetes was 6.44 years, and the average duration of insulin use was 4.06 years.

Table 1. Distribution of respondent characteristics by gender, education level, and occupation

No	Variable		f	%
1.	Gender	Female	19	55,9
		Male	15	44,1
2.	Education	Elementary	3	8,8
		Junior High	5	14,7
		Vocational High	2	5,9
		Senior High	20	58,8
		Bachelor	4	11,8
3.	Occupation	Laborer	3	8,8
		Housewife	12	35,3
		Retired	3	8,8
		Farmer	8	23,5
		Civil Servant	1	2,9
		Entrepreneur	7	20,6
	Total		34	100

Table 1 shows that the most common demographic characteristic by gender was female, with 19 respondents (55.9% of the total). The most common demographic characteristic by education level was senior high graduates, with 20

respondents (58.8% of the total). The most common demographic characteristic by occupation was housewife, with 12 respondents (35.3% of the total).

Table 2. Central tendency of age, duration of insulin use, and duration of type 2 diabetes

No.	Variable	Mean	SD	Min-Max	Range
1	Age	56,03	11,661	27-76	49
2	Duration of Insulin Use	4,06	3,706	0-14	14,00
3	Duration of Having Type II Diabetes	6,44	4,768	0-20	20,00

Table 2 shows that the average age of respondents in this study was 56.03 years with a standard deviation of 11.611. The average duration of insulin use was 4.06 with a standard deviation of 3.706, and the average duration of having type II diabetes mellitus was 6.44 with a standard deviation of 4.768. The

characteristics of respondents based on age ranged from 27 to 76 years. Based on the duration of insulin use, it ranged from 1 month to 14 years, and based on the duration of having type II diabetes mellitus, it ranged from 1 month to 20 years.

Table 3. Distribution of pre-test and post-test scores: Knowledge levels of patients with type 2 diabetes mellitus using insulin therapy

No.	Variabel	Mean	Median	SD	Min-Max	Range
1	Pre-test Knowledge	2,32	2,00	1.471	0-5	5
2	Post-test Knowledge	3,71	4,00	1.031	1-5	4

Table 4.3 shows that the median score for the knowledge variable before the intervention (pre-test) was 2.00, with a minimum of 0 and a maximum of 5. After the intervention (post-test), the

median increased to 4.00, with a minimum of 1 and a maximum of 5. This indicates an increase in scores from pre-test to post-test, from 2.00 to 4.00.

Table 4. Results of the Wilcoxon test on the level of knowledge among patients with type 2 diabetes regarding the use of insulin therapy

No.	Knowledge	n	Min-Max	Mean-Std. Deviation	P Value	Confidence Level
1	Pre-test Knowledge Education	34	0-5	2,32-1.471	0,000	99%
2	Post-test Knowledge Education	34	1-5	3,71-1031		

Table 4.4 shows that the mean knowledge score of respondents in the

pre-test of knowledge education was 2.32 with a standard deviation of 1.471,

while the post-test showed an increase to 3.71 with a standard deviation of 1.031. An improvement occurred between the pre-test and post-test, from 2.32 to 3.71. Before being given audiovisual knowledge education, there were 7 respondents with a good level of knowledge, 18 respondents with a sufficient level of knowledge, and 10 respondents with a poor level of knowledge. After being given audiovisual knowledge education, 23 respondents showed an increase in their knowledge level, 9 respondents had a sufficient level of knowledge, and 2 respondents had a poor level of knowledge.

The results of the statistical test obtained a P-value (sig) of <0.000 , so since the $p\text{-value} < 0.05$, it can be concluded that in this study H_a is accepted. This means that there is a significant difference between the pre-test and post-test scores. Therefore, it can be concluded that there is an effect of audiovisual media on improving knowledge in type II diabetes mellitus patients regarding the use of insulin therapy.

Discussion

The results of this study demonstrated a significant improvement in knowledge scores among patients with type 2 diabetes mellitus following audiovisual education on insulin therapy use. The mean score increased from 2.32 (SD = 1.471) in the pre-test to 3.71 (SD = 1.031) in the post-test, with a p-value of 0.000 ($p < 0.05$). Prior to the intervention, most respondents were categorized as having sufficient or poor

knowledge, indicating that despite ongoing insulin use, patients still lacked adequate understanding of proper administration, including injection technique, timing, and storage. According to Notoatmodjo (2021), knowledge is heavily influenced by the method of information delivery, and verbal education alone is often insufficient, particularly for elderly patients or those with moderate education levels.

The demographic profile of this study—predominantly female (55.9%), mean age 56.03 years, senior high school graduates (58.8%), and housewives (35.3%)—further supports the use of audiovisual media, as older adults may experience mild cognitive decline that limits their ability to absorb technically complex information delivered verbally.

Following the intervention, the number of respondents with good knowledge increased substantially, while those with poor knowledge decreased significantly. The decrease in standard deviation from 1.471 to 1.031 reflects a more homogeneous and uniform improvement in understanding across respondents. Audiovisual media enables patients to receive information through a combination of images, sound, and concrete demonstrations, which facilitates better comprehension, consistent with multimedia learning theory (Mayer, 2021). Analysis of individual questionnaire items showed that most respondents answered correctly on basic knowledge items, such as the purpose and timing of insulin use, while items related to technical

aspects—particularly injection technique—were more frequently answered incorrectly. This is consistent with Hendrawati et al. (2022), who noted that errors in insulin use often occur in technical domains due to insufficient practical and demonstrative education. Notably, the mean duration of insulin use was 4.06 years, yet long-term use did not guarantee adequate knowledge, underscoring the need for repeated health education even for experienced users (Lestari et al., 2021).

These findings are supported by several previous studies. Sari et al. (2021) demonstrated that audiovisual health education significantly improved knowledge in type 2 diabetes mellitus patients regarding insulin therapy compared to conventional methods. Wijaya et al. (2022) similarly reported that audiovisual media outperformed printed media in improving patient comprehension due to its realistic demonstrations. Putri et al. (2023) further confirmed that educational videos significantly improved both knowledge and insulin injection skills in type 2 diabetes mellitus patients. Taken together, these findings affirm that audiovisual education is an effective, practical, and accessible approach to improving insulin therapy knowledge across diverse patient demographics.

Implication and limitations

The findings of this study have important implications for clinical nursing practice and health education. The significant improvement in patient knowledge following audiovisual education highlights the value of

incorporating evidence-based educational media into routine diabetes care. Nurses play a central role in patient education, and the use of audiovisual tools can strengthen this function by delivering accurate, consistent, and easily understandable information about insulin therapy. Healthcare institutions are encouraged to integrate audiovisual educational materials into standard care protocols for patients with type 2 diabetes mellitus who are undergoing insulin therapy, particularly during outpatient clinic visits. Regular and repeated educational sessions using audiovisual media can help sustain patient knowledge, correct longstanding misconceptions, and support safe and independent self-management of insulin therapy.

However, this study has several limitations. First, the study employed a one-group pretest-posttest design without a control group, which limits the ability to definitively attribute the observed knowledge improvement solely to the audiovisual intervention, as other confounding factors cannot be fully excluded. Second, data collection was conducted in a single outpatient clinic at one hospital, which may limit the generalizability of the findings to other healthcare settings or patient populations. Third, during the data collection process, the research environment was occasionally noisy, which may have affected respondents' concentration while watching the educational video. Additionally, some respondents were constrained by their appointment queue, which may have limited their full engagement with the

intervention. Future research is recommended to use a randomized controlled design with a larger and more diverse sample, conducted in a quieter and more controlled environment, and to include follow-up assessments to evaluate the long-term retention of knowledge.

Conclusion

The findings of this study have important implications for clinical nursing practice and health education. The significant improvement in patient knowledge following audiovisual education highlights the value of incorporating evidence-based educational media into routine diabetes care. Nurses play a central role in patient education, and the use of audiovisual tools can strengthen this function by delivering accurate, consistent, and easily understandable information about insulin therapy. Healthcare institutions are encouraged to integrate audiovisual educational materials into standard care protocols for patients with type 2 diabetes mellitus who are undergoing insulin therapy, particularly during outpatient clinic visits. Regular and repeated educational sessions using audiovisual media can help sustain patient knowledge, correct longstanding misconceptions, and support safe and independent self-management of insulin therapy.

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Author contribution

The researcher was fully responsible for the study design, the collection of primary data via questionnaires and educational videos at Arifin Achmad General Hospital, univariate and bivariate data analysis using the Wilcoxon test, and the drafting and revision of the thesis manuscript.

Conflict of interest

The researchers state that there are no conflicts of interest related to this study, including financial, personal, or affiliational conflicts that could influence the results or their interpretation.

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