Research Article

The Effectiveness of Audio-Visual-Based Education on Type 2 Diabetes Mellitus in Enhancing Self-Awareness Among Adolescents at Risk: A Quasi-Experimental Study

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Abstract

Aims: Aims of this study to determine the effect of providing audio-visual-based type 2 diabetes mellitus education on self-awareness in adolescents at risk of type 2 diabetes mellitus.

Methods: A two-group quasi-experimental design is used in quantitative research, and G-Power 3.1 is used as a selection method. The 100 students in the study were split into two groups: the intervention group and the control group. The Public Awareness of Diabetes questionnaire was used. To be eligible, people had to be in the low to moderate risk group for DM and have a gadget. The Paired Sample T-test and Wilcoxon's rank were used to analyze the data.

Results: The Paired Sample T-test analysis revealed a significant difference in the intervention group following education on type 2 diabetes mellitus, with a p-value of <0.001 and a t-value of 3.744. Simultaneously, the control group employed Wilcoxon's rank, yielding a p-value of 0.079 and an r-value of 1.756.

Kesimpulan: There was an effect of providing type 2 diabetes mellitus education on self-awareness in adolescents at risk of type 2 diabetes mellitus in the intervention group. However, there was no effect of providing type 2 diabetes mellitus education on self-awareness in adolescents at risk of type 2 diabetes mellitus in the control group. This may be because there are differences in the treatment given to the two groups.

Keywords:
Audio-visual Education, Self-Awareness, Type 2 Diabetes Mellitus

INTRODUCTION

Diabetes mellitus is a chronic metabolic disease characterized by blood glucose levels increasing beyond normal limits. The most common disease that occurs is type 2 diabetes mellitus because the body becomes resistant to insulin. In the last three decades, the prevalence of type 2 diabetes mellitus has increased in all countries. There are around 422 million people in all countries who suffer from diabetes and the majority of sufferers live in low to middle income countries. Every year around 1.5 million deaths are caused by diabetes (1). There are also 10 risk factors for Diabetes Mellitus according to Fridem in 2021, namely age, family history of DM, gender, BMI, daily activities, vegetarian diet, history of hypertension, waist circumference, history of gestational diabetes, and history of hyperglycemia (2).

One of them is an increase in BMI which can also occur in the teenage age group because apart from physical changes with very rapid growth, teenagers also experience changes in behavior such as eating behavior which was previously healthy to become unhealthy. Teenagers tend to follow trends, one of which is by consuming fast food, which if consumed in large quantities and at frequent times will cause excess weight, resulting in a greater risk of obesity and type 2 diabetes mellitus (3).

The development of technology can also reduce physical activity in teenagers (4). Most teenagers tend to prefer spending time playing with cellphones, watching TV and playing online games Mandriyarini in (3). According to PERKENI in (5), a person with less physical activity will experience excess energy in the body, this can increase the risk of type 2 diabetes mellitus due to insulin resistance. When excess glucose stays in the bloodstream for a long time, the blood vessels, nerves, eyes, kidneys and cardiovascular system will experience dysfunction and damage (6). Complications of diabetes mellitus include heart attacks and strokes, foot infections which can cause gangrene and can even result in amputation, end-stage kidney failure and sexual dysfunction. In the next 10-15 years after being diagnosed with diabetes mellitus, diabetes complications will increase (7).

Promotive and preventive health education really needs to be given, especially to teenagers, because health education has principles that mean that people's behavior is in line with health values according to Notoatmodjo. Audio-visual or video media is one of the media that is considered effective in increasing a person's search for knowledge (8). Audio visuals can be useful for teachers and students to stimulate deeper performance, increase motivation, influence beliefs and positive attitudes based on Schneps, M. H, et al in (9).

Previous research regarding the influence of health education through audio-visual media on knowledge of implementing diabetes mellitus foot exercises found that the average knowledge of respondents before and after health education was -6.250 with a standard deviation of 1.483 and a sig (2-tailed) value of 0.000, meaning p value < 0 .05, that is, there is an influence of health foot exercise education using audio-visual media on knowledge of the implementation of foot exercises in diabetes mellitus patients in the working area of the Kumun Public Health Center, Sungai Full City in 2020 (10).

Acording to Yanti in (11) that self-awareness is a condition in which an individual can understand how he feels, both his feelings and his thoughts. So that individuals who are in good self-awareness will be able to control themselves (12). However, these studies were only carried out on patients who already had type 2 diabetes mellitus and only measured their level of knowledge (13). Meanwhile, currently it is still rare to find or even no research regarding the effect of providing type 2 diabetes mellitus education on self-awareness in groups at risk of type 2 diabetes mellitus, especially teenagers. Therefore, researchers are interested in conducting research "The Effect of Providing Audio-Visual Based Type 2 Diabetes Mellitus Education on Self-Awareness in Adolescents at Risk of Type 2 Diabetes Mellitus".

METHODS

Study Design

This research employed a quantitative approach using a quasi-experimental design with a two-group pretest-posttest structure. This design was chosen to evaluate the effect of audio-visual-based education on self-awareness in adolescents at risk for Type 2 Diabetes Mellitus.

Study Population and Sample

The study was conducted in January at MTs Ar-Romah in Bandung City, targeting students as the population. A total of 100

participants were selected as the sample, divided equally into two groups: 50 participants in the intervention group, who received audio-visual-based education on Type 2 Diabetes Mellitus (T2DM), and 50 participants in the control group, who did not receive the intervention but completed the same pretest and posttest assessments. Sampling was carried out using purposive sampling to ensure that participants met the inclusion criteria, which included being adolescents with risk factors for Type 2 Diabetes Mellitus, such as a family history of diabetes or specific lifestyle habits.

Instrument

The primary instrument was a self-awareness questionnaire containing 20 validated and reliable items/statements adapted from Kasana et al., (2019). Validation and reliability testing were completed prior to implementation to ensure accuracy in measuring self-awareness. Items on the questionnaire assessed domains such as knowledge, attitudes, and behaviors related to self-awareness and risk management for Type 2 Diabetes Mellitus.

Data Collection

Before the intervention, both the intervention and control groups completed the self-awareness questionnaire as a pretest to establish baseline data. The intervention group then participated in a structured educational program utilizing audio-visual materials specifically designed to enhance their knowledge and understanding of Type 2 Diabetes Mellitus. Meanwhile, the control group did not receive any intervention. After the intervention, the same questionnaire was administered to both groups as a posttest to evaluate changes in self-awareness. Additionally, demographic data such as age,

gender, and family history of diabetes mellitus were collected to identify potential confounding factors.

Data Analysis

Data analysis was conducted in two stages. First, univariate analysis was performed to calculate descriptive statistics, including mean, standard deviation (SD), and proportions, to summarize demographic variables and self-awareness scores. Second, bivariate analysis was carried out to examine differences between pretest and posttest scores. The normality of data distribution was tested using the Kolmogorov-Smirnov test. If the data were normally distributed, a paired-sample t-test was used for comparisons within each group; if the data were not normally distributed, the Wilcoxon signed-rank test was applied. To evaluate the effectiveness of the intervention while controlling for potential confounders such as age, gender, and family history of diabetes mellitus, an ANCOVA (Analysis of Covariance) was performed.

Ethical Consideration

The research was conducted in accordance with the ethical standards of human participant research. The study was initiated with the acquisition of ethical approval from an institutional ethics review commission. Informed assent was obtained from all participants and their guardians to guarantee that they comprehended the study's objectives and their rights. To guarantee privacy throughout the research process, participant data was anonymized and securely stored to preserve confidentiality. Furthermore, participants were informed that their participation was wholly voluntary and that they had the right to withdraw from the study at any point without incurring any consequences.

RESULTS

Univariate Analysis

Table 1. Demographic Data of Respondents (N=100)

Characteristic	Control (n=50)	Intervention (n=50)	Total (n=100)
Gender			
Male	23 (46%)	26 (52%)	49
Female	27 (54%)	24 (48%)	51
Age			
12-13 years	3 (6%)	34 (68%)	37
14-15 years	47 (94%)	16 (32%)	63
Family History of DM			
Yes	7 (14%)	7 (14%)	14
No	43 (86%)	43 (86%)	86

Based on the table, it shows that the majority of respondents were female and the majority were in the control group, namely 27 (54%) respondents. Ages 14-15 years were mostly found in the control group with 47 (94%) respondents. Respondents who did not have a family history of diabetes mellitus in the control and intervention groups were 43 (86%) respondents respectively.

Table 2. Self-Awareness Scores

Description	Control (n=50)	Intervention (n=50)
Self-Awareness (Before)		
Mean (SD)	57.18 (±12.08)	51.56 (±12.865)
Min-Max	23-75	23-75
Self-Awareness (After)		
Mean (SD)	61.54 (±12.438)	61.12 (±11.708)
Min-Max	30-77	23-78

The self-awareness value after being given intervention in the control group produced a mean (SD) of (12,438) with a min-max of 30-77. The self-awareness score after being given the intervention in the intervention group produced a mean (SD) of 61.12 (11.708) with a min-max of 23-78.

Bivariate Analysis

Table 3. Normality Test Results (Kolmogorov-Smirnov Test)

Group	Statistic	df	Sig.
Control (Pre-test)	0.192	50	<0.001
Intervention (Pre-test)	0.074	50	0.200
Control (Post-test)	0.187	50	<0.001
Intervention (Post-test)	0.104	50	0.200

Based on the table, the sig results in the intervention group were 0.200 > 0.05 which means normal and the sig results in the control group were <0.001 <0.05 which means not normal.

Table 4. Comparison of Self-Awareness Scores Before and After Intervention in the Intervention and Control Groups

Group	Pre-test	Post-test	T/R	p-value
Intervention Group (N=50)	Mean (±SD): 51.56 (12.865)	Mean (±SD): 61.12 (11.708)	-3.744	<0.001 *a
	Min-Max: 23-75	Min-Max: 23-78		
Control Group (N=50)	Mean (±SD): 57.18 (12.086)	Mean (±SD): 61.54 (12.438)	-1.756	0.079 b
	Min-Max: 23-75	Min-Max: 30-77		

*a *paired sample t-test* b *Wilcoxon's rank*

Based on the table in the intervention group before being given audio-visual-based type 2 diabetes mellitus education, the mean value was 51.56 (12,865). Meanwhile, after being given education about type 2 diabetes mellitus, the mean value was 61.12 (11,708). The t value is -3.744 and p 0.001 (p<0.05) which means there is a significant difference between before and after being given education in the intervention group. In the control group, the mean was 57.18 (12,086), whereas after being given education about type 2 diabetes mellitus, the mean value was 61.54 (12,438). The t value is -1.756 and p 0.079 (> 0.05), which means that there is no significant difference between before and after being given education in the control group.

DISCUSSION

Identification of demographic data includes age, gender, and family history of diabetes.

In this study, the results of demographic data based on age showed that more than half of the respondents, namely 63 people from the control and intervention groups, were aged 14-15 years. Ages 14-15 years were mostly found in the control group, namely 47 (94%) respondents. Respondents aged at least 12-13 years in the control group were 3 (6%) respondents. In this study, the results of demographic data based on gender showed that more than half of the respondents were female, namely 51 people from the intervention and control groups. Female gender was mostly

found in the control group, namely 27 (54%) respondents. There were a total of 49 males in the control and intervention groups and the highest number of males was in the intervention group with a total of 26 (52%) respondents. Furthermore, in this study, the results of respondents who had a family history of diabetes mellitus were obtained, with respondents who did not have a family history of diabetes mellitus having results of 7 (14%) respondents and 43 (86%) respondents for each group, namely the control group. and intervention, so that the majority of respondents answered that they did not have a family history of diabetes mellitus, namely 86 respondents (14)

Identify the value of self-awareness in the pre and post education group in the intervention group

The average self-awareness score for the intervention group in this study before the education was provided was 51.56 and increased to 61.12 after the education was provided with a p-value of <0.001, which means there was an increase in self-awareness between before and after the education was provided. This is in line with research by (15) which states that there is a significant difference in self-awareness between before and after being given education. In this study the value of self-awareness before being given the intervention was 26.76 and after the intervention was 31.00. Health education is an activity to improve the knowledge, attitudes, and practices of individuals or

groups in society which aims to maintain and improve the health status of each individual ((16). Likewise, self-awareness and knowledge about diabetes mellitus can be influenced by reading, education or counseling about diabetes mellitus and this is the first way to change behavior for the better (11).

Identify the value of self-awareness pre and post education in the control group

The pre and post self-awareness values in the control group were given education in the form of text in PPT with the same material as in the intervention group which was given audio-visual treatment. The average value of self-awareness before and after providing education in the control group in this study was 57.18 (12,086) n, whereas after being given education on type 2 diabetes mellitus, the mean value was 61.54 (12,438) n and p 0.079 (> 0.05) Thus, there was no significant influence on self-awareness scores between before and after providing education in the control group. This is in line with research by Dewi et al., 2022), that the control group was given the same material as the treatment group, but did not use roleplaying techniques, but rather a group guidance service. As a result, there was an increase in self-awareness in the group given the treatment, namely from low to high category (18). Meanwhile, in the control group there were no significant changes between before and after being given group guidance services. Audio visual learning media is a learning method that is considered an alternative in the learning process because the delivery of teaching materials that utilize this technology is considered more interesting because there is a visualization of the learning material. Audio-visual media itself can produce more interactive learning and bring a pleasant atmosphere compared to text media because basically students prefer interesting learning media (19).

Identify differences in self-awareness scores pre and post education in the intervention group and control group

In this study, it was not possible to identify differences in pre and post self-awareness scores in the intervention and control groups because there was data that was not normally distributed when testing normality with Kolmogorov-Smirnov, namely pre and post data in the control group which produced a sig value <0.001, which is a value < 0.05, which means the data distribution is not normal. Meanwhile, pre and post self-awareness scores in the intervention group were normally distributed (20). In this case, in accordance with CHAPTER 3 the researcher carried out a paired t-test for the intervention group and a Wilcoxon's rank test for the control group, so that data from both groups at pre and post could not be tested using ANCOVA because one of the conditions for carrying out the ANCOVA test is both data must be normally distributed (21).

CONCLUSION

Based on the results of the research, it was found that providing Type 2 Diabetes Mellitus education through an audio-visual intervention had a significant effect on self-awareness in adolescents at risk of Type 2 Diabetes Mellitus in the intervention group. The adolescents who received the intervention demonstrated increased knowledge and understanding of the risk factors and management strategies for Type 2 Diabetes Mellitus, which led to improved self-awareness regarding their health. This indicates that the audio-visual-based educational program was effective in raising awareness about Type 2 Diabetes Mellitus and its prevention. However, in the control group, which did not receive any intervention, no significant change in self-awareness was observed. This suggests that the lack of educational input or intervention in the control group led to no improvements in their self-awareness levels about Type 2 Diabetes Mellitus. The absence of change in the control group may be attributed to the lack of exposure to educational content on Type 2 Diabetes Mellitus, highlighting the importance of

education in influencing health behavior and awareness. The differences in the outcomes between the two groups can be explained by the distinct treatments they received. The intervention group benefited from structured and targeted educational materials that were designed to increase their understanding of diabetes risk factors and preventive measures, while the control group did not receive such targeted education. As a result, the intervention group showed a marked improvement in self-awareness compared to the control group, emphasizing the role of education in managing health risks like Type 2 Diabetes Mellitus, particularly among adolescents at risk.

Conflict of Ineterest
The author declares that there is no conflict of interest regarding the publication of this research. All findings and conclusions presented in this study are the result of the author's independent research.

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