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The Influence of Animated Video Education on Knowledge Levels and Behavior Prevention of Diabetes Mellitus in School Children

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Abstract

Background: Diabetes mellitus among children continues to increase due to lifestyle changes and low levels of health literacy. Innovative educational media are needed to improve knowledge and to shape preventive behaviors from an early age.
Purpose: To evaluate the effect of digital animated video–based education on the level of knowledge and diabetes mellitus prevention behaviors among elementary school students at MI Raudhatul Muta'alimin
Methods: This quantitative study employed a pre-experimental one-group pretest–posttest design involving 54 students. The intervention consisted of digital animated video education. Data were analyzed using the Wilcoxon Signed Rank Test.
Results: The mean knowledge score increased from 4.61 to 10.30 with a p-value= 0.000 ($p < 0.05$). The behavior score increased from 21.07 to 26.17 with a p-value = 0.000 ($p<0.05$).
Conclusions: Digital animated video–based education is effective in improving knowledge and preventive behaviors related to diabetes mellitus among elementary school children.

Keywords: Diabetes Mellitus, Digital Animated Video, Knowledge, Behavior, Elementary School Children

Introduction

Diabetes mellitus (DM) is a global health problem with a steadily increasing incidence. Also known as "The Silent Killer," it is a chronic, non-communicable disease. Diabetes mellitus is no longer a disease found exclusively in adults; cases are now increasing in adolescents and even children, due to lifestyle changes and a lack of awareness about maintaining health from an early age (Indonesian Ministry of Health, 2023).

In 2022, the World Health Organization stated that diabetes mellitus (DM) is the most common disease worldwide and is ranked fourth among degenerative disease research priorities across all countries. In Southeast Asia, the number of diabetes sufferers reached 106.9 million in 2024 and is projected to increase to 184.5 million by 2050, an increase of approximately 73%. Approximately 42.7% of diabetes sufferers are undiagnosed, leaving them without proper treatment and at risk of life-threatening complications (IDF, 2024). This makes Indonesia the nation and country with the highest number of diabetes sufferers in ASEAN, and also ranks 34th out of 204 countries globally (Nanayakkara et al., 2021). In 2022, Indonesia ranked highest

as the country with the highest number of type 1 diabetes sufferers in Southeast Asia, reaching 41.8 thousand (Etlidawati et al., 2024).

According to IDF data (2024), the number of diabetes sufferers in Indonesia reached 20,426.4 thousand, or approximately 20.4 million people. The age-adjusted prevalence of diabetes was 11.3%, higher than the Southeast Asian average (10.8%). This indicates that more than 1 in 9 adults in Indonesia live with diabetes, and this number is likely to continue to increase due to changes in lifestyle, diet, lack of physical activity, and genetic factors (IDF, 2024). At the regional level, Banten province is the province with the highest increase in DM in 2018, the prevalence of DM in Banten province is 2.43%. Cilegon, one of the cities in Banten, has a prevalence of DM of 2.56%. According to the Riskesdas Report of Banten Province (Ministry of Health of the Republic of Indonesia, 2019), shows the prevalence of DM based on medical diagnosis by doctors in the population of all age ranges in 2018 in the Regency or City, the highest in the South Tangerang region with a prevalence of 2.88%. This shows that out of every 100 residents of South Tangerang, about three people have been diagnosed with diabetes mellitus by medical personnel and the lowest area with DM prevalence is Lebak with a prevalence of 0.69%.

The results of the 2018 Basic Health Research (Riskesdas) showed that the prevalence rate of diabetes mellitus in South Tangerang City based on blood tests in residents aged >15 years showed an increase from 6.9% in 2013 to 8.5% in 2018. This figure is greater than the data on diabetes mellitus sufferers diagnosed by doctors, which is 3.4%, so that many diabetes mellitus sufferers are not yet known (Dinkes, 2022).

Another increasingly concerning phenomenon is the increase in cases in children. The World Health Organization states that childhood diabetes, particularly type 1 diabetes, is one of the most common chronic diseases in young people, and the number of cases continues to increase annually. The WHO estimates that more than 300,000 children and adolescents in the European region are living with diabetes, and similar trends are observed in other regions due to the rise in obesity, unhealthy diets, and sedentary lifestyles (WHO, 2023).

The International Diabetes Federation, through its IDF Diabetes Atlas and Type 1 Diabetes Index, reports that by 2022, approximately 1.5–1.8 million children and adolescents aged <20 years will be living with type 1 diabetes worldwide. This figure is projected to continue to increase annually due to increasing risk factors and increased case detection (International Diabetes Federation (IDF), 2022). In Indonesia, the number of DM cases in children has also increased significantly over the past two decades. Ministry of Health data, based on the Indonesian Pediatrician Association (IDAI, 2023), reports that there are approximately 1,645 children

with diabetes, or approximately 2 cases per 100,000 children, a several-fold increase compared to the early 2000s (Ministry of Health, 2023).

This phenomenon also indicates that most children diagnosed with diabetes present with emergency conditions such as diabetic ketoacidosis (DKA), indicating delayed diagnosis (Pulungan et al., 2021). The prevalence of children diagnosed with type 1 diabetes increased sevenfold in 10 years, from 3.88 per 100,000 children in 2000 to 28.19 per 100,000 children in 2010, and in 2025, 1,948 children in Indonesia were treated for type 1 diabetes, an increase compared to 1,249 children in 2017–2019. Diabetes or hyperglycemia is a chronic metabolic disease characterized by increased blood sugar levels over time (WHO, 2021). The main causes are unhealthy lifestyle changes, environment, age, diet, lack of physical activity, family history, stress, and obesity (Jauhanita., 2024).

Based on the results of a preliminary study conducted on September 22, 2025 at MI Raudhatul Muta'alimin, researchers interviewed 10 students to determine their understanding of diabetes mellitus prevention. The results of the interview showed that 3 out of 10 children had a family history of diabetes mellitus, 2 out of 10 children had risk factors for diabetes (obesity), 10 children never controlled their food besides they also liked to buy food or drinks high in sugar, and 2 out of 10 children did not know how to prevent diabetes mellitus. In addition, teachers said that health education activities in schools still rarely use interactive digital media, so students tend to get bored quickly when receiving general health material. Therefore, researchers are interested in providing interventions in diabetes prevention efforts, researchers are interested in conducting research on "The Effect of Animated Video Education on the Level of Knowledge and Behavior of Diabetes Mellitus Prevention in Children at MI Raudhatul Muta'alimin South Tangerang".

Materials and Methods

This research is quantitative with a pre-experimental design, using a one-group pretest-posttest design. The study was conducted at MI Raudhatul Muta'alimin in Lengkong Wetan, South Tangerang. The study is scheduled for December 2025-January 2026. The population in this study was 113 elementary school students at MI Raudhatul Muta'alimin. Therefore, the sample size for this study was 54 respondents.

Data analysis used univariate analysis to describe respondent characteristics, including age, gender, knowledge level, and behavior before and after receiving digital animated video-based education (descriptive). Bivariate analysis used the t-test if the data were normally distributed and the Wilcoxon Signed-Rank Test if the data were not normally distributed.

Results

1. Univariate Analysis

Univariate analysis was conducted to describe the frequency distribution of each variable studied, including respondent characteristics and the level of knowledge and behavior of students in preventing diabetes mellitus before and after being given digital animation video-based education.

Table 1. Respondent Freq. Characteristics Based on Age

Age (Years)	Freq (n=54 Respondents)	Percentage (%)
9	11	20%
10	15	28%
11	19	35%
12	9	17%
Total	**54**	**100%**

Based on the analysis results, the frequency distribution of respondents by age of 54 respondents was obtained. The results showed that 11 respondents (20%) were 9 years old, 15 respondents (28%) were 10 years old, 19 respondents (35%) were 11 years old, and 9 respondents (17%) were 12 years old. The majority of respondents were 11 years old.

Based on the above description, it can be concluded that children aged 9–12 years are a highly potential age group for receiving health education, as they are at an optimal stage of cognitive development in understanding new information. This indicates that age is a factor supporting the success of animated video-based educational interventions in increasing knowledge and behaviors related to diabetes mellitus prevention in elementary school children.

Table 2. Respondent Freq. Characteristics Based on Gender

Gender	Freq (n=54 Respondents)	Percentage (%)
Male	29	54%
Female	25	46%
Total	**54**	**100%**

Based on the analysis results, the frequency distribution of respondents by gender shows that of the 54 respondents, the majority were male (29 respondents (54%), while the majority were female (25 respondents (46%).

Based on the above description, it can be concluded that gender is not a major differentiating factor in the success of animated video-based health education for elementary school children. Both boys and girls

have the same potential to improve their knowledge and behaviors regarding diabetes mellitus prevention when provided with educational media appropriate to their developmental stage.

Table 3. Level of Knowledge Before Health Education (Pre-Test)

Knowledge (Pre Test)	Freq (n=54 Respondents)	Percentage (%)
Less	46	85,2%
Enough	6	11,1%
Good	2	3,7%
Total	**54**	**100%**

Based on the analysis of knowledge levels before receiving health education using animated videos, it was found that the majority of respondents were in the low knowledge category, namely 46 respondents (85.2%). Based on this description, it can be concluded that the increase in children's knowledge levels in this study was influenced not only by the provision of educational materials, but also by the use of media appropriate to the cognitive developmental characteristics of elementary school children. Animated videos were deemed capable of conveying health messages in an engaging, easy-to-understand manner, and were more effective than conventional methods.

Tabel 4. Behavior Level Before Health Education (Pre-Test)

Behavior (Pre Test)	Freq (n=54 Respondents)	Percentage (%)
Less	24	44, 5 %
Enough	18	33,3 %
Good	12	22, 2 %
Total	**54**	**100%**

Based on the analysis results, it was found that before receiving health education using animated videos, nearly half of the respondents (24 respondents or 44.5%) were in the poor behavior category. This indicates that before receiving health education, the majority of respondents had not yet demonstrated optimal diabetes mellitus prevention behaviors.

Based on this description, it can be concluded that this condition indicates that students still have limitations in implementing healthy lifestyle behaviors before receiving educational intervention. Therefore, providing health education is considered important as an effort to increase understanding, awareness, and foster better healthy behaviors in students.

Table 5. Level of Knowledge After Health Education (Post-Test)

Knowledge (Post Test)	Freq (n=54 Respondents)	Percentage (%)
Less	6	11,1%
Enough	5	9,3%
Good	43	79,6%
Total	**54**	**100%**

Based on the analysis results, the majority of respondents, 43 respondents (79.6%), fell into the good knowledge category.

Based on this description, it can be concluded that animated video-based education significantly increased knowledge levels regarding diabetes mellitus prevention among elementary school children at MI Raudhatul Muta'alimin. The results showed a significant increase in respondents' knowledge levels after the educational intervention, as reflected in the increase in the average knowledge score and the predominance of good knowledge in the post-test results.

Table 6. Behavior Level Before Health Education (Post-Test)

Behavior (Post Test)	Freq (n=54 Respondents)	Percentage (%)
Less	6	85,2%
Enough	18	33,3%
Good	30	55,6%
Total	**54**	**100%**

Based on the analysis of behavior after receiving health education using digital animated video media, the majority of respondents (30 respondents) were in the good category.

Based on this description, it can be concluded that animated video media is an effective educational medium for improving health behaviors in elementary school children, making it suitable for use as a health promotion and education strategy in schools.

2. Bivariate Analysis

Bivariate analysis was used to determine the effect of knowledge and behavior before and after being given education in preventing diabetes mellitus using animated videos and using the Wilcoxon Test on the variables of knowledge and behavior levels.

Table 7. Wilcoxon Signed Ranks Test Analysis of Knowledge Level in Preventing Diabetes Mellitus in South Tangerang (n = 54).

Variables	Mean	St.D	Negatif Ranks	Positif Ranks	Ties	P-Value
Pre-Test Knowledge	4,61	1,774	2	50	2	0,000
Post-Test Knowledge	10,30	2,116				

Based on the analysis of health education using animated videos on children's knowledge levels about diabetes mellitus prevention, statistical tests using the Wilcoxon Signed Rank Test yielded a p-value of 0.000 (<α = 0.05). Therefore, Ha is accepted and H0 is rejected, indicating that health education using animated videos significantly improves children's knowledge levels about diabetes mellitus prevention at MI Raudhatul Muta'alimin.

Based on the above description, it can be concluded that animated videos, as an educational tool, provide engaging, clear, and easily understood content for elementary school children. The interactive visual design, consisting of images and animations, systematic presentation of information, and a short video length, can help respondents understand the material presented regarding diabetes mellitus prevention. Furthermore, the combination of audio and visual elements in animated videos enhances their appeal, maintains respondents' attention, and strengthens their understanding of the health information presented. Therefore, this medium is effective in increasing children's knowledge and awareness about diabetes mellitus prevention.

Table 8. Wilcoxon Signed Ranks Test Analysis of Behavior in Preventing Diabetes Mellitus in South Tangerang (n = 54).

Variables	Mean	St.D	Negatif Ranks	Positif Ranks	Ties	P-Value
Pre-Test Behavior	21,07	2,346	4	46	4	0,000
Post-Test Behavior	26,17	2,919				

Based on the analysis of health education using animated video media on diabetes mellitus prevention behavior in children, statistical tests using the Wilcoxon Signed Rank Test obtained a p-value of 0.000 (<α = 0.05). Thus, Ha was accepted, indicating that there was an effect of health education based on digital animated video media on diabetes mellitus prevention behavior in elementary school children at MI Raudhatul Muta'alimin.

Based on the results of the research discussion regarding the effect of animated video education on the level of knowledge and behavior in diabetes mellitus prevention in children at MI Raudhatul Muta'alimin, South Tangerang, it can be concluded that providing health education using animated video media can increase the level of knowledge and behavior in diabetes mellitus prevention in elementary school children. Therefore, digital animated video media can be used as an alternative, effective health education medium to increase knowledge and behavior in diabetes mellitus prevention in elementary school-aged children.

Conclusions

Based on the results of research on the Influence of Animated Video-Based Health Education on the Level of Knowledge and Behavior in Preventing Diabetes Mellitus in Children at MI Raudhatul Muta'alimin, it can be concluded that:

1. The characteristics of elementary school respondents at MI Raudhatul Muta'alimin were identified based on age, showing that the majority of respondents were 11 years old (19 respondents (35%), and based on gender, the majority of respondents were male (29 respondents (54%).
2. The level of knowledge of respondents before receiving health education (pre-test) using digital animation video media was identified, showing that the majority of respondents had a knowledge level in the poor category (46 respondents (85.2%).
3. The behavior of respondents before receiving health education (pre-test) was identified, indicating that diabetes mellitus prevention behavior in elementary school children was still suboptimal, with the majority of respondents (24 respondents (44.5%) in the poor category.
4. The level of knowledge of respondents after receiving health education (post-test) using digital animation video media was identified, indicating that the majority of respondents experienced an increase in their knowledge, with 43 respondents (79.6%) in the good category.
5. The behavior of respondents after receiving health education (post-test) was identified, indicating an increase in diabetes mellitus prevention behavior, with the majority of respondents (30 respondents) in the good category.
6. The analysis revealed an effect of digital animation video-based health education on the level of knowledge regarding diabetes mellitus prevention in children at MI Raudhatul Muta'alimin, South Tangerang. The Wilcoxon Signed Rank Test obtained a p-value of 0.000 (<0.05) for the knowledge variable, indicating that Ha was accepted.

7. It was analyzed that there was an influence of digital animation video-based health education on diabetes mellitus prevention behavior in children at MI Raudhatul Muta'alimin, South Tangerang. The results of the analysis using the Wilcoxon Signed Rank Test obtained a p-value = 0.000 (<0.05) on the behavior variable, which means Ha is accepted.

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