



The Influence Of Animated Videos Through Whatsapp Groups On Teens' Knowledge And Attitudes Toward Type 2 Diabetes Prevention At SMAN 2 In Bengkulu City

Audwita Pinkan Innayah, Wisuda Andeka Marleni* , Ade Febryanti

*** Poltekkes Kemenkes Bengkulu**

Abstract

Type 2 Diabetes Mellitus is one of the non-communicable diseases that is increasingly prevalent among adolescents due to unhealthy lifestyle changes. Limited knowledge and inappropriate attitudes toward the prevention of Type 2 Diabetes Mellitus may increase adolescents' risk of developing the disease. Health education using animated videos delivered through WhatsApp Groups is considered an effective approach to improving adolescents' knowledge and attitudes. This study aimed to determine the effect of animated videos delivered through WhatsApp Groups on adolescents' knowledge and attitudes regarding the prevention of Type 2 Diabetes Mellitus at SMAN 2 Kota Bengkulu. This study used a quantitative pre-experimental design with a one-group pretest-posttest approach. A total of 59 tenth-grade students were selected through simple random sampling from a population of 433 students at SMAN 2 Kota Bengkulu. The intervention consisted of animated videos distributed through a WhatsApp Group twice over one week. Data were collected using knowledge and attitude questionnaires and analyzed using the Wilcoxon Signed Rank Test. The results showed that the mean knowledge score increased from 62.90 before the intervention to 87.68 after the intervention, while the mean attitude score increased from 40.05 to 51.81. The Wilcoxon Signed Rank Test yielded a p-value of <0.001, indicating that animated videos delivered through WhatsApp Groups significantly improved adolescents' knowledge and attitudes regarding the prevention of Type 2 Diabetes Mellitus at SMAN 2 Kota Bengkulu. Schools are encouraged to utilize animated videos through WhatsApp Groups as a sustainable health promotion strategy to improve adolescents' knowledge and foster positive attitudes toward the prevention of Type 2 Diabetes Mellitus.

Keywords: Animated Video, Classroom Discussion, Type 2 Diabetes Mellitus, Knowledge, Attitude.

Corresponding Author: Wisuda Andeka Marleni

Email: andeka@poltekkesbengkulu.ac.id

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1. Introduction

Non-communicable diseases (NCDs) remain a major health issue globally, including in Indonesia. This type of disease includes several categories, namely cardiovascular diseases, cancer, chronic obstructive pulmonary disease, and Diabetes Mellitus (DM) (Wahidin, 2022). Among the various types of non-communicable diseases, diabetes mellitus is currently a significant concern and one of the most commonly found diseases.

Diabetes mellitus is characterized by elevated blood glucose levels resulting from metabolic disorders in the body. This issue may involve a decrease in insulin production by pancreatic beta cells or may be referred to as insulin resistance (Rusdi, 2020). Diabetes mellitus has three types: Type 1 Diabetes Mellitus (DM Type 1), Type 2 Diabetes Mellitus (DM Type 2), and gestational diabetes. The non-communicable disease DM Type 2 is increasingly becoming an epidemic worldwide. What is concerning is the demographic shift in sufferers; previously, this disease was predominantly experienced by the elderly, but now the number of cases among children and adolescents is rising rapidly (Pappachan et al., 2024). Type 2 diabetes mellitus is a condition characterized by the body's insensitivity to insulin and disturbances in the insulin release process, leading to increased blood sugar levels (Maharani & Sholih, 2024).

Globally, according to data from the International Diabetes Federation (IDF), (2021) the prevalence of Type 2 diabetes mellitus among adolescents shows that approximately 14.6 million adolescents worldwide are affected by this disease, with an age-standardized prevalence rate of 1,190.73 per 100,000 population, equivalent to 1.19% of the total adolescent population. Nationally, in Indonesia, data from the Basic Health Research in 2018 indicates that the number of DM Type 2 patients in Indonesia exceeds 12.1 million individuals. Furthermore, according to the Indonesian Health Survey (SKI) in 2023, the prevalence of diabetes mellitus incidence is reported to be 11.7% (Oktavia et al., 2022).

The prevalence of Diabetes Mellitus (DM) in Bengkulu Province is relatively high. Data from the Bengkulu Provincial Health Office in 2023 indicates that there are 23,460 DM patients. The highest number of cases is found in Bengkulu City, with 5,611 cases (24%). According to data from the Bengkulu City Health Office from 2021 to 2023, 5,824 individuals suffer from type 2 DM (Andari et al., 2025). Furthermore, data from the Bengkulu City Health Office in 2024 shows that the number of DM patients reached 2,691 individuals. According to data from the Penurunan Health Center in Bengkulu City in 2025, it was reported that at SMAN 2 Bengkulu City, there are 11 students in grade X with high blood sugar levels, where 10 students have blood sugar levels >140 mg/dL and 1 student has a blood sugar level >250 mg/dL. These findings indicate that the risk of type 2 DM is beginning to emerge at school age, thus requiring early prevention efforts.





The level of teenagers' knowledge about the prevention of type 2 diabetes mellitus is currently still very low, where research results from Anonim et al., (2024) show that the majority of teenagers (62.1%) have poor understanding and none have knowledge in the good category. Many teenagers still have misconceptions, such as 78% thinking diabetes is only due to eating too much sugar and 89% mistakenly believing that this disease can be completely cured. Furthermore, almost all teenagers (92%) do not know how to properly detect this disease. The current attitudes of teenagers towards the prevention of type 2 diabetes mellitus still tend to be less supportive, where the majority of teenagers (56.7%) have a negative attitude. This is reflected in their low awareness of limiting fast food consumption and a lack of motivation to maintain daily physical activity as a preventive effort. Although teenagers generally regard diabetes as a serious disease, they do not yet have the internal awareness to independently control their own lifestyles (Ristiana et al., 2025).

This condition is exacerbated by lifestyle changes due to modernization and globalization, which have triggered a surge in type 2 diabetes cases among teenagers. The trend of consuming fast food that is high in calories but low in fiber has become concerning. On the other hand, the high duration of gadget and computer use creates a sedentary lifestyle that minimizes physical activity. This lack of movement is a primary trigger for obesity, particularly central obesity, which directly leads to insulin resistance, a key factor in the mechanism of type 2 diabetes occurring at a young age (Reistika et al., 2025). Various interrelated risk factors can also influence the occurrence of type 2 diabetes in teenagers. According to a study by Maharani & Sholih (2024), several interrelated risk factors contribute to the increasing incidence of this disease among teenagers, including immutable factors such as gender, age, and family history. Meanwhile, modifiable factors include obesity, lack of physical activity, unhealthy eating patterns, and smoking habits.

A lack of knowledge and attitudes among teenagers regarding the risks of diabetes highlights the need for health education efforts to raise their awareness in preventing this metabolic disease from an early age. One audiovisual medium considered appealing to teenagers is animated videos. This educational medium effectively conveys health messages through a combination of moving images, sound, and an engaging storyline, which can enhance participants' attention and understanding. Additionally, animated videos can simplify complex concepts or processes, making them easier to grasp, thus serving as an effective medium for improving health literacy (Nisak et al., 2021). Furthermore, with the advancement of information technology, health education is no longer limited to face-to-face meetings but can also be conducted online through digital communication media such as WhatsApp. Research by Arisani & Wahyuni (2023) indicates that the use of WhatsApp Groups as a health education medium is effective in enhancing knowledge and shaping the attitudes of teenagers, making it a suitable medium for delivering education on





the prevention of type 2 diabetes mellitus. The effectiveness of this approach has been supported by scientific evidence. A systematic review by Cordeiro et al. (2021), involving 13 studies, shows that WhatsApp-based health education interventions can improve knowledge, adherence to treatment, and various health outcomes across diverse target groups. Therefore, the novelty of this research lies in the use of animated videos conducted online, as well as the measurement of two variables: knowledge and attitudes. This approach is expected not only to improve teenagers' understanding but also to cultivate positive attitudes toward the prevention of type 2 diabetes mellitus, particularly among students at SMAN 2 Kota Bengkulu.

2. Research Method

This type of research is quantitative research with a pre-experimental research design using a one group pretest-posttest design. The population in this study consists of 433 students in the 11th grade (XI) at SMAN 2 Kota Bengkulu. The sample used in this study is Simple Random Sampling. The instrument is in the form of a questionnaire. The knowledge and attitude questionnaire instrument is self-developed by the researcher, which will be tested for validity and reliability. Data collection techniques involve both primary and secondary data. Data analysis will use univariate and bivariate analyses employing the Kolmogorov-Smirnov test.

3. Results And Discussions

a. Result

Table 1 Frequency Distribution of Risk Factors for Type 2 Diabetes Mellitus in Adolescents at SMAN 2 Bengkulu City

Variables	Frequency	Percentage
BMI		
Very Thin	9	15.3%
Thin	10	16.9%
Normal	34	57.6%
<i>Overweight</i>	2	3.4%
Obesity	4	6.8%
Total	59	100%
Does anyone in your family suffer from diabetes?		
No	45	76.3%
Yes	14	23.7%
Total	59	100%
Do you exercise regularly (≥ 30 minutes/day)?		
No	29	49.2%
Yes	30	50.8%
Total	59	100%
Do you smoke?		
No	59	100%
Yes	0	0.0%
Total	59	100%
Do you often eat sweet foods or sweet drinks?		
Seldom	24	40.7%





Variables	Frequency	Percentage
Often	35	59.3%
Total	59	100%
Do you often eat fast food / junk food?		
Seldom	17	28.8%
Often	42	71.2%
Total	59	100%
Do you often feel stressed?		
Seldom	43	72.9%
Often	16	27.1%
Total	59	100%

Table 1 shows the results of the analysis of risk factors for diabetes mellitus in adolescents at SMAN 2 Bengkulu City. Most adolescents have a normal BMI (57.6%). Almost all adolescents do not have family members who suffer from diabetes mellitus (76.3%). Half of the adolescents exercise regularly (≥ 30 minutes/day) (50.8%). All adolescents do not smoke (100%). Most adolescents often eat sweet foods or sweet drinks (59.3%). Most adolescents often eat fast food / junk food (71.2%). Most adolescents rarely feel stressed (72.9%).

Table 2 Average Knowledge of Adolescents Before and After Intervention with Animated Videos via WhatsApp Group About Type 2 Diabetes Mellitus Prevention at SMAN 2 Bengkulu City

Knowledge	n	Mean $\pm$ SD	Min-Max
Before	59	62.90 $\pm$ 18.107	13-87
After	59	87.68 $\pm$ 10.564	60-100

Based on table 2, the results of the univariate analysis showed that the average knowledge before being given intervention through animated video media via WhatsApp group was 62.90 (sufficient category) with a standard deviation of 18.107, the lowest value was 13 and the highest value was 87. Meanwhile, the average knowledge after being given intervention was 87.68 (Good category) with a standard deviation of 10.564, the lowest value was 60 and the highest value was 100.

Table 3 Frequency Distribution of Knowledge Before and After Intervention Using Animated Videos Through WhatsApp Groups for Adolescents at SMAN 2, Bengkulu City

No.	Knowledge questions	Before (%)		After (%)	
		Wrong	Correct	Wrong	Correct
1.	What is the meaning of type 2 diabetes mellitus?	28.8	71.2	13.6	86.4
2.	What blood sugar level can be used as an indicator of diabetes mellitus based on checking blood sugar while and fasting blood sugar?	33.9	66.1	16.9	83.1
3.	What are the common symptoms of type 2 diabetes mellitus?	37.3	62.7	11.9	88.1
4.	What are the modifiable risk factors for type 2 diabetes mellitus?	35.9	64.4	6.8	93.2
5.	What are the non-modifiable risk factors for type 2 diabetes mellitus?	30.5	69.5	8.5	91.5
6.	What is the percentage risk of someone developing type 2 diabetes mellitus if both parents have the same medical history?	52.5	47.5	20.3	79.7





No.	Knowledge questions	Before (%)		After (%)	
		Wrong	Correct	Wrong	Correct
7.	What are the forms of primary prevention for type 2 diabetes mellitus?	42.4	57.6	8.5	91.5
8.	What primary prevention efforts can be taken to prevent type 2 diabetes mellitus?	44.1	55.9	13.8	86.4
9.	Why is maintaining a diet and exercising regularly since adolescence important in the primary prevention of type 2 diabetes mellitus?	37.3	62.7	11.9	88.1
10.	What physical activities are recommended to help maintain normal blood sugar levels in the primary prevention of type 2 diabetes mellitus?	35.6	64.4	6.8	93.2
11.	What is the right way to manage stress to help prevent type 2 diabetes mellitus?	35.6	64.4	1.7	98.3
12.	What is the definition of secondary prevention in type 2 diabetes mellitus?	37.3	62.7	22.0	78.0
13.	What are the secondary prevention measures that type 2 diabetes mellitus sufferers can take to keep their condition stable?	27.1	72.9	8.5	91.5
14.	What is meant by tertiary prevention of type 2 diabetes mellitus?	33.9	66.1	11.9	88.1
15.	How is tertiary prevention carried out for type 2 diabetes mellitus?	44.1	55.9	22.0	78.0

Based on Table 3, it was found that of the 15 question items, the highest increase in knowledge scores was in item 7 regarding "What are the forms of primary prevention of type 2 diabetes mellitus?" Before the intervention using animated video media via WhatsApp group, the percentage of respondents who answered correctly was 57.6% (sufficient category). After the intervention, the percentage increased to 91.5% (good category). Furthermore, the second highest increase in knowledge scores was in item 11 regarding "What is the right way to manage stress to help prevent type 2 diabetes mellitus?" Before the intervention, the percentage of respondents who answered correctly was 64.4% (sufficient category), then increased to 98.3% (good category) after the intervention.

Table 4 Average Attitudes of Adolescents Before and After Intervention with Animated Videos via WhatsApp Group About Type 2 Diabetes Mellitus Prevention at SMAN 2 Bengkulu City

Attitude	n	Mean ± SD	Min-Max
Before	59	40.05±8.251	18-59
After	59	51.81±4.826	42-60

Based on table 4, the results of the univariate analysis show that the average attitude before the intervention through animated video media via WhatsApp group was 40.05 (sufficient category) with a standard deviation of 8.251, the lowest value was 18 and the highest value was 59. Meanwhile, the average attitude after the intervention was 51.81 (good category) with a standard deviation of 4.268, the lowest value was 42 and the highest value was 60.





Table 5 Frequency Distribution of Attitudes Before and After Animated Video Intervention Through WhatsApp Group About the Prevention of Type 2 Diabetes Mellitus in Adolescents at SMAN 2 Bengkulu City

No.	Statement	Before (%)				After (%)			
		SS	S	TS	STS	SS	S	TS	STS
1.	I believe that type 2 diabetes mellitus is a serious disease that needs to be understood early.	40.7	49.2	1.7	8.5	47.5	52.5	0.0	0.0
2.	I feel the need to know the limits of normal blood sugar levels as an effort to prevent type 2 diabetes mellitus.	42.4	52.5	0.0	5.1	52.5	47.5	0.0	0.0
3.	I feel that diabetes symptoms such as frequent thirst, hunger, and urination are not things that need to be paid attention to.	13.6	25.4	39.0	22.0	0.0	8.5	42.4	49.2
4.	I believe that adopting a healthy lifestyle is important to prevent type 2 diabetes mellitus.	42.4	37.3	10.2	10.2	57.6	35.6	3.4	3.4
5.	I feel it is important to be aware of non-modifiable risk factors such as age and family history.	28.8	47.5	15.3	8.5	52.5	44.1	3.4	0.0
6.	I am not too worried about the risk of type 2 diabetes mellitus even though I have a family history of diabetes.	6.8	27.1	37.3	28.8	1.7	8.5	33.9	55.9
7.	I agree that prevention before the disease appears is important.	35.6	45.7	8.5	10.2	59.3	40.7	0.0	0.0
8.	I believe that maintaining a healthy diet, exercising regularly, and controlling your weight are important responsibilities to prevent type 2 diabetes mellitus.	25.4	44.1	27.1	3.4	52.3	42.4	3.4	1.7
9.	I believe that maintaining a healthy diet and exercise from adolescence is important to prevent diabetes.	32.2	40.7	20.3	6.8	54.2	39.0	6.8	0.0
10.	I feel that diabetes prevention is not necessary if you haven't been diagnosed with the disease.	11.9	22.0	44.1	22.0	3.4	1.7	37.3	57.6
11.	I agree that managing rest time and keeping your mind calm can prevent diabetes.	15.3	54.2	25.4	5.1	49.2	44.1	6.8	0.0
12.	I feel that people with diabetes do not need to have regular check-ups at health facilities.	8.5	20.3	49.2	22.0	0.0	3.4	44.1	52.3
13.	I think that monitoring blood sugar levels does not need to be done routinely.	5.1	30.5	44.1	20.3	0.0	6.8	49.2	44.1





No.	Statement	Before (%)				After (%)			
		SS	S	TS	STS	SS	S	TS	STS
14.	I believe that care and rehabilitation are important to improve the quality of life of people with diabetes.	13.6	57.6	20.3	8.5	33.9	57.6	5.1	3.4
15.	I feel that rehabilitation efforts are not necessary to be carried out early in diabetes sufferers.	10.2	16.9	49.2	23.7	1.7	1.7	44.1	52.5

Based on Table 5, of the 15 statement items, the highest increase in the percentage of strongly agree (SS) responses for positive statements was in item 11 regarding "I agree that managing rest time and keeping the mind calm can prevent diabetes." Before the intervention through animated video media via WhatsApp group, the percentage of respondents who answered strongly agree was 15.3%, then increased to 33.9% after the intervention. The next highest increase was in item 8 regarding "I believe that maintaining a healthy diet, exercising regularly, and controlling body weight are important responsibilities to prevent type 2 diabetes mellitus." The percentage of respondents who answered strongly agree increased from 25.4% before the intervention to 52.3% after the intervention.

In negative statements, the highest increase in the percentage of strongly disagree (STS) responses was in item 10 regarding "I feel that diabetes prevention is not necessary if I have not yet had the disease." The percentage of respondents who answered strongly disagree increased from 22.0% before the intervention to 57.6% after the intervention. The next highest increase was in item 12 regarding "I feel that diabetes sufferers do not need to have regular check-ups at health facilities." The percentage of respondents who answered strongly disagree increased from 22.0% before the intervention to 52.3% after the intervention.

Table 6 Normality Test Results

No.	Variables	Kolmogorov-Smirnov			Note:
		Statistics	df	Sig.	
1.	Knowledge				
	Before	0.169	59	0.000	Abnormal
	After	0.212	59	0.000	Abnormal
2.	Attitude				
	Before	0.125	59	0.023	Abnormal
	After	0.160	59	0.001	Abnormal

Based on Table 6, it is known that the results of the normality test of the research data on the variables of knowledge, attitudes and actions both before (pre-test) and after (post-test) the treatment are not normally distributed so that it can be continued with the Wilcoxon Signed Rank Test.





Table 7 Differences in Average Knowledge and Attitudes of Adolescents Before and After Intervention with Animated Videos Through *Whatsapp Group About Type 2 Diabetes Mellitus Prevention at SMAN 2 Bengkulu City*

Variables	n	Mean±SD		ΔMean	P Value
		Before	After		
Knowledge	59	62.90 ±18.107	87.68±10.564	24.78	0.000
Attitude	59	40.05±8.251	51.81±4.826	11.76	0.000

Based on table 7 through the Wilcoxon Signed Rank Test, the difference in the average knowledge and attitudes of adolescents was obtained, with a difference in the average knowledge of 24.78 and a difference in the average attitude of 11.76. The p-value result = $0.000 \leq 0.05$ using a 95% confidence level, so H_0 is rejected, which means there is an influence of animated videos via WhatsApp groups on adolescents' knowledge and attitudes about the Prevention of Type 2 Diabetes Mellitus at SMAN 2 Bengkulu City.

b. Discussions

Based on the research results, it was found that the average knowledge score of adolescents before being given health education interventions using animation videos through WhatsApp groups was 62.90 with a standard deviation of 18.107, with the lowest score being 13 and the highest score being 87. These results indicate that the level of knowledge among adolescents regarding the prevention of type 2 diabetes before the intervention was still lacking.

The analysis of questionnaire responses also showed that many adolescents still did not understand several important materials about type 2 diabetes. Before the intervention, the level of knowledge among adolescents regarding the prevention of Type 2 Diabetes was in the sufficient category. The percentage of the lowest scores was found in question number 6, number 8, and number 15. Question number 6 regarding what percentage of risk a person has of developing type 2 diabetes if both parents have the same medical history, only nearly 47.5% of adolescents answered correctly. For question number 8 about what primary prevention efforts can be made to prevent the occurrence of type 2 diabetes, only a majority of 55.9% of adolescents answered correctly, and finally, for question number 15 about how tertiary prevention is implemented in type 2 diabetes, only a majority of 55.9% of adolescents also answered correctly. This indicates that there are still certain materials regarding the prevention of Type 2 Diabetes that have not been understood by adolescents before being educated.

In this study, the average knowledge of adolescents, which is still not optimal, indicates that some teenagers do not have a good understanding of the prevention of type 2 diabetes mellitus. This may be influenced by low health literacy, which refers to a person's ability to obtain, understand, evaluate, and use health information to make appropriate decisions. Adolescents with low health literacy generally find it more difficult to understand information regarding risk factors, symptoms, and prevention efforts for non-communicable diseases, including type 2 diabetes mellitus. This aligns with the research by Hidayatullaili et al. (2023), which states that health literacy plays an important role in helping adolescents acquire, understand, evaluate, and utilize health





information so that they can make informed decisions to prevent non-communicable diseases.

Based on the research results, it is known that the average attitude of adolescents before receiving health education through animated video media via WhatsApp group is 40.05 with a standard deviation of 8.251, with the lowest score being 18 and the highest score being 59. These results indicate that adolescents' attitudes toward the prevention of type 2 diabetes mellitus before the intervention are still not optimal. This condition indicates that there are still adolescents who do not have a tendency for a positive attitude toward the importance of preventing type 2 diabetes mellitus from a young age.

The analysis of the questionnaire responses also indicates that many teenagers still do not have a positive attitude toward the prevention of type 2 diabetes mellitus. In this study, before interventions using animated videos through WhatsApp groups were provided, there were several attitude statement items that still had low scores. For positive statements, the lowest percentage in the Strongly Agree (SA) category was found in item number 14 at 13.6%, item number 11 at 15.3%, and item number 8 at 25.4%. Meanwhile, for negative statements, the lowest percentage in the Strongly Disagree (SD) category was found in item number 13 at 20.3%, as well as items number 3, number 10, and number 12, each at 22.0%. These results indicate that before the intervention was provided, there were still teenagers who did not have an optimal attitude regarding the prevention of type 2 diabetes mellitus.

According to Kusumawati et al. (2025), attitude is a response or tendency of an individual toward an object that is formed through a learning process. The formation of attitudes is influenced by various factors, such as knowledge, personal experience, the influence of significant others, mass media, educational institutions, and culture. An individual with good knowledge about a health issue generally shows a more positive attitude toward prevention efforts. Conversely, limited knowledge can lead to a less supportive attitude in implementing disease prevention behaviors.

In this study, the suboptimal attitude of teenagers is also reflected in the distribution of questionnaire responses before the intervention was provided. There are still teenagers who agree with some negative statements, such as believing that diabetes prevention is unnecessary until one experiences the disease, as well as considering routine health checks unnecessary for diabetes sufferers. Additionally, there are still teenagers who do not agree with some positive statements, such as the importance of maintaining a healthy diet, exercising regularly, and maintaining an ideal weight as efforts to prevent type 2 diabetes mellitus. These findings indicate that some teenagers do not yet have a supportive attitude or strong belief in the importance of engaging in preventive behaviors for type 2 diabetes mellitus.

The findings of this study align with research by Salsabila & Prastiwi (2026), which shows that before receiving education using audiovisual media, the average attitude of teenagers toward the prevention of diabetes mellitus was still considered suboptimal. This condition indicates that before receiving education, the majority of teenagers did not have a fully supportive attitude toward diabetes mellitus prevention





efforts. The research explains that limited understanding of diabetes mellitus can affect the formation of teenagers' attitudes, thus highlighting the need for health education to raise awareness and foster a more positive attitude toward diabetes mellitus prevention behaviors.

The research results show that the average knowledge of adolescents after receiving health education through animated video media via WhatsApp group is 87.68 with a standard deviation of 10.564. These results indicate that after participating in the educational activities with animated videos through WhatsApp group, the majority of adolescents have acquired good knowledge regarding the prevention of type 2 diabetes mellitus. The analysis of the questionnaire responses shows that most adolescents have understood the important material regarding the prevention of Type 2 Diabetes Mellitus. After the intervention through the screening of animated videos via WhatsApp group, there was an increase in the number of adolescents answering correctly to the questions. Question number 6 showed an increase to 79.7%, while question number 8 increased to 86.4%, and finally, question number 15 increased to 78.0%. This increase indicates that the delivery of information through animated videos provided via WhatsApp group can help adolescents better understand the material regarding the prevention of Type 2 Diabetes Mellitus.

The increase in average knowledge after the intervention shows that animated video media is effective in delivering health information to adolescents. The presentation of material through a combination of moving images, narration, text, and engaging illustrations helps adolescents understand the concepts of type 2 diabetes mellitus, risk factors, symptoms, and prevention efforts. The use of animated videos is capable of attracting adolescents' attention, making the information reception process more optimal. Additionally, after the video screening, an online discussion was held, providing adolescents with the opportunity to ask questions and clarify material that they had not understood. This discussion activity strengthens adolescents' understanding of the material presented, making the information received more meaningful, easier to understand, and easier to remember.

The results of this study align with the research by Sapitri & Kurniasari (2024), which shows that animated video media is effective in increasing adolescents' knowledge about diabetes mellitus. The study indicated a significant increase in knowledge following the education provided through animated video media. According to Sapitri and Kurniasari, the effectiveness of animated videos is supported by the presentation of material that combines visual and audio elements, making health information more engaging, easier to understand, and capable of increasing adolescents' attention and interest in learning.

In addition to the use of animated video media, the increase in knowledge in this study was also supported by the implementation of interventions conducted twice. Repeated education provides adolescents with the opportunity to receive information again, making the material easier to understand and remember. This finding is supported by the research of Retnaningsih & Djanah (2025), which provided health





education twice and showed a significant increase in knowledge, making the education more effective in enhancing adolescents' understanding.

The results of this study are consistent with the research by Yaagoob et al. (2024), which indicates that WhatsApp-based education can improve knowledge about diabetes. The use of WhatsApp through videos, discussions, and information sharing can support the process of knowledge acquisition. In this study, the WhatsApp Group served as a medium to deliver animated videos while also supporting interaction and discussion, which can help improve adolescents' knowledge and attitudes toward the prevention of Type 2 Diabetes Mellitus.

The research results indicate that the average attitude of adolescents after receiving health education through animated video media in the WhatsApp group is 51.81 with a standard deviation of 4.826. The analysis of the questionnaire shows that after the intervention in the form of animated videos via the WhatsApp group, there was an increase in adolescents' attitudes toward a more positive direction. In the positive statements, the percentage of the Strongly Agree (SA) category for item number 14 increased to 33.9%, and for item number 11, it increased to 49.2%. Meanwhile, in the negative statements, the percentage of the Strongly Disagree (SD) category for item number 13 increased to 44.1%, as well as for items number 12 and 15, which became 52.3% each. These results indicate that the intervention using animated videos through the WhatsApp group was able to improve adolescents' attitudes toward the prevention of Type 2 Diabetes Mellitus.

These results show that after participating in health education, adolescents have a more positive attitude toward efforts to prevent Type 2 diabetes mellitus. The increase in the average attitude after the intervention indicates that the health education provided not only enhances adolescents' understanding but also shapes their acceptance and readiness to adopt healthy lifestyle behaviors as a preventive measure against Type 2 diabetes mellitus. This change in attitude is reflected in the increased awareness among adolescents regarding the importance of reducing the consumption of high-sugar foods and drinks, engaging in regular physical activity, maintaining an ideal weight, and adopting a healthy lifestyle from a young age. The increase in average attitudes in this study was influenced by the animated video media provided through the WhatsApp group. The animated videos were able to capture attention and provide a clear depiction of the risks and prevention of Type 2 diabetes mellitus.

This finding is also supported by research from Sarah et al. (2024), which shows that providing health education through animated video media has a positive impact on adolescents' attitudes toward preventing type 2 diabetes mellitus. The results indicate that animated video media produces a higher average attitude compared to print media, and this difference is statistically significant. Therefore, these results further strengthen the notion that animated video media is effective in improving adolescents' attitudes toward the prevention of type 2 diabetes mellitus.

Based on the research findings, it is known that there is an influence of animated video media through WhatsApp groups on adolescents' knowledge and attitudes about preventing type 2 diabetes mellitus at SMAN 2 Bengkulu City. The results show that





the intervention provided is able to improve adolescents' knowledge in preventing type 2 diabetes mellitus while also fostering a more positive attitude toward efforts to prevent type 2 diabetes mellitus among adolescents.

In line with the research by Sulistiawati & Setiawan (2025), which shows that animated video media is effective in enhancing adolescents' knowledge and attitudes related to diabetes mellitus prevention, as it can convey health information in an engaging way through a combination of visuals, text, and narration, making the material easier for adolescents to understand and encouraging active involvement in grasping the health messages conveyed. This supports the implementation of preventive behaviors for type 2 diabetes mellitus in daily life. After the material presentation, an online discussion session provides adolescents with the opportunity to ask questions, express opinions, and clarify material that has not been understood. This active learning process allows adolescents not only to receive information but also to comprehend the meaning and importance of applying preventive behaviors for type 2 diabetes mellitus in their daily lives.

The development of information technology has also driven changes in the implementation of health education, which is no longer limited to face-to-face methods but can also be conducted online through various digital platforms, one of which is WhatsApp. The use of digital media in health education is considered capable of facilitating information delivery due to its flexible nature, easy accessibility, and allows participants to review the material that has been provided. In line with the research by Alsiya et al. (2026), which shows that providing health education through videos delivered via WhatsApp can significantly increase knowledge in individuals with type 2 diabetes mellitus.

Additionally, research by Kosasih et al. (2024) demonstrates that health education conducted through WhatsApp groups, supported by discussion and Q&A sessions among participants, can effectively improve adolescents' knowledge and attitudes. The interaction during the discussion process allows participants to clarify information, exchange experiences, and deepen their understanding of the material provided. Therefore, online learning methods through WhatsApp can serve as an effective alternative for conducting health education when face-to-face education is not feasible.

The media used in this study is animated videos delivered through WhatsApp groups, focusing on the prevention of Type 2 Diabetes Mellitus (DM Type 2), which includes definitions, causes, symptoms, modifiable and non-modifiable risk factors, as well as prevention efforts consisting of primary, secondary, and tertiary prevention. The video has a duration of 4 minutes and 2 seconds and is designed to capture the attention of high school adolescents with appealing visuals and the use of simple and easily understandable language. Adolescents are exposed to the video twice a week as part of the research intervention.

4. Conclusion

A video animation media has been created about the prevention of type 2 diabetes mellitus at SMAN 2 in Bengkulu City. The research results indicate that the risk factors for type 2 diabetes mellitus among adolescents at SMAN 2 in Bengkulu City include a small





portion of adolescents with a family history of diabetes mellitus, those who are overweight and obese, and those who have not engaged in regular physical activity. In addition, the majority of adolescents still have the habit of consuming high-sugar foods and drinks, as well as fast food. Adolescents at SMAN 2 in Bengkulu City had sufficient knowledge and attitudes regarding the prevention of type 2 diabetes mellitus before being provided with intervention through animated videos via WhatsApp group. Adolescents at SMAN 2 in Bengkulu City had good knowledge and attitudes regarding the prevention of type 2 diabetes mellitus after being provided with intervention through animated videos via WhatsApp group. The animated videos shared through the WhatsApp group had an influence in improving the knowledge and attitudes of adolescents at SMAN 2 in Bengkulu City regarding the prevention of type 2 diabetes mellitus.

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