

The Effect of an Educational Video on Physical Activity for Diabetes Prevention among Obese High School Students in Yogyakarta

Pengaruh Video Edukasi Terhadap Aktivitas Fisik Untuk Pencegahan Diabetes Melitus Pada Siswa SMA Yang Obesitas Di Yogyakarta

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Abstract: The association of obesity with type 2 diabetes mellitus (T2DM) in adolescent has increased globally over past 2 decades. Thus, it must be prevented and overcome with particular management. The aim of the study was to analyze the impact of video education on physical activity for prevention of T2DM among obese high school students in Mergangsan district, Yogyakarta. This was quasi-experimental study with one group pre and post test design. Educational videos about introduction to physical activity education were made and given to students. A total of 47 obese adolescents were recruited and tested for physical activity using the Physical Activity Questionnaire for Adolescents questionnaire. (PAQ-A). The data was processed and analyzed using the Wilcoxon test with SPSS version 23.0. The results of the study were obtained prior to video education, physical activity in students with obesity was classified as mild (66%). After the video education was given, the physical activity of the majority was moderate (78.7%). There was an association between video education media and physical activity for the prevention of diabetes mellitus in students ($p < 0.001$). The school is expected to continue to provide health advice to students, especially on obesity students to prevent T2DM in adolescent, and the use of educational media with video will be more effective.

Key word: Educational Video, Physical Activity, High School Students, Obesity, Diabetes Mellitus

1. INTRODUCTION

Diabetes mellitus is a disease that can be experienced by a person because of the function of the pancreas that is unable to produce insulin, or when the system in the body fails to function insulin properly (1). Increased prevalence of diabetes mellitus is influenced by an unhealthy lifestyle, factors derived from the genes of the elderly, low physical activity, obesity, ageing, stress experienced by a person, excessive consumption of sweet foods, lack of eating foods rich in fiber, too much eating food that contains salt, alcohol and also smoking (2).

Globally, the prevalence of diabetes mellitus according to the International Diabetes Federation (IDF) by 2021 is approximately 537 million people worldwide living with diabetes, by 2030 it is estimated to rise to 783 million (3). Meanwhile, based on the results of Indonesia Basic Health Research in 2018, the data available is to indicate that in Indonesia in the year 2013 the prevalence of diabetes mellitus as much as 6.9% and experienced an increase in 2018 prevalence diabetic mellitus by 8.5% (4). According to data in Yogyakarta, the prevalence of diabetes in the population aged ≥ 15 years is

the region with the highest prevalence as 4.79% (5). Meanwhile, according to the Health Profile of the City of Yogyakarta in 2020 the prevalence of diabetes mellitus is 2.66% or as many as 11.046 patients with DM out of a total of 414.055 inhabitant (6).

Physical activity is very closely linked to the incidence of type 2 diabetes mellitus (7,8). Physical activity is one of the most important risk factors in T2DM, as a person who regularly does physical activity can lower the risk of T2DM. A person who does less physical activity has a three times greater risk of developing T2DM than someone who is regularly doing physical activity (9). Another study found that based on gender 76.2% of most samples were female compared to male obese. Obesity at 50%, and abnormal blood sugar levels at 66.7% are at risk of T2DM. Students who are obese have a 6.6-fold chance of increasing their blood glucose levels (10).

Efforts to prevent an increase in DM cases can be made by taking precautions following new habits that emerge in society, or to prevent growing generations from imitating or engaging in lifestyle habits which can put them at risk of various diseases. One of them is the basic level of prevention, especially among young people and adolescents (11). One of the media that can be used in education is video media. Video is one of the kinds of audio-visual learning media that functions to stimulate the senses of hearing and vision. By broadcasting video learning, educators not only take advantage of the learning facilities available, but through video education students can learn through events that seem to be experienced by themselves, so that the memories of the material delivered via video education will be easily remembered (12). The aim of this study is to analyze at the impact of providing educational video to improve knowledge in the prevention of diabetes mellitus in adolescent among high school students with obesity in Mergangsan district, Yogyakarta City.

2. METHODS

This was quasi-experimental quantitative research with one group pre and post-test design. The research was conducted at the High School in Mergangsan District, Yogyakarta in September-December 2022. A total of 511 students had screened from six schools. Anthropometric assessment was tested by enumerator (the final year of nutrition students) and research team. After anthropometric screening, we collected a total of 47 students with obesity status. We did purposive sampling using inclusion criteria such as active students in selected schools, aged 15-18 years, had nutritional status of obesity with BMI $>+2$ SD, and students were willing to become respondents by signing approval form. The exclusion criteria of the study were students who had not completed the data collection process. Submission of ethical clearance to the Alma Ata University ethics committee and has obtained the approval of the ethics commission with the letter number (Number: KE/AA/IX/10927/EC/2022). Students sign informed consent in advance prior to data collection. All data on the subjects is classified.

Students were given a pre-test to find out the initial results of physical activity status and then they were given video education interventions three times in three weeks. After that, students were given post-tests to see if the final results of the intervention were related to whether there was any influence after watching the educational video that had been given. Educational videos are made with animation using free access applications such as Powtoon-based learning media that have proven to be easier and more exciting to improve student learning performance (13). The video used has a

duration of three minutes with material such as understanding physical activity, types, benefits of physical activity and its relationship with T2DM.

The structured questionnaire used contains a number of questions and statements with the aim of knowing the characteristics of respondents. The contents of this questionnaire include your name, class, degree, age, date of birth, gender, and mobile phone number. In addition, this physical activity questionnaire is an instrument performed on the purpose of the previous day in a way remembering the activities performed. In this questionnaire, the response scale question exists on eight questions and one question to identify students who have experienced activity that could not be done in the previous week, but this is not used in any measurement of scores on summary activity. The scale used as the answer assessment in the questionnaire is the likert scale. The score of each question has been determined according to the Physical Activity Questionnaire for Adolescents (PAQ-A). To calculate the final score of PAQ-a, take an average of eight questions where the score of 1-2.3 is categorized as mild physical activity, the score is 2.4-3,7 in the category of moderate physical activity and the point of 3.8-5 is categorised as heavy physical activity (14,15). Students' anthropometric data of weight and height was collected. A weighing weights uses a type of digital scale with units (kg), the smallest unit 0.0 kg and the largest unit 150 kg. The scale brand is Onemed which is produced by PT. Intisor Hasilsempurna Surabaya. The level of accuracy of the weighing is 0.1 kg. The instrument for measuring the height of the body (cm) uses the type Microtoise Staturemeter with units (cm), the smallest unit 0 cm and the largest unit 200 cm. The body height measuring brand is GEA MEDICAL manufactured by Changzou Wujin Weiging Apparatus Factory, China (16-18).

Preliminary studies have been conducted to test the validity and reliability of research instruments. A total of 33 students were obtained and given a questionnaire to fill out. In this study the results of the questionnaire used already showed results > 0.344 so eight points in the PAQ-A questionnaires are valid for use in the research. The reliability test is performed using a question that has been declared valid in the validity test and will determine its rehabilitation using the SPSS program. This measurement of rehabilitation can be said to be reliable if the result of the alpha cornbach test >0,06. This questionnaire has been tested and the result is a rehabilitation of 0.752 for more than 0.06. Data analysis was done with SPSS software version 23. Numeric data is presented with mean (SD) and/or median (Interquartile Ratio (IQR)), while categorical data is represented with n (%). Bivariate analysis is the analysis used to show the relationship of one independent variable with one dependent variable. Since the data can be categorized and orderly scaled, the data is then analyzed using the Wilcoxon test and if the p value is <0,05, then the test results are concluded to be statistically significant.

3. RESULTS

Table 1. Frequency distribution of high school student's characteristics (N=47)

Variables	n	%
Age		
15 years old	13	27.7
16 years old	13	27.7
17 years old	7	14.8
18 years old	14	29.7
Gender		
Male	30	63.8

Variables	n	%
Female	17	36.2
Total	47	100

Table 1 shows that high school and small and medium-sized students in Mergangsan district who were majority respondents were class 10 with a total of 24 (51.1%) of the total of 47 students. Most students were 17 years of age, 15 (31.9%) of them. The gender of the majority of students was male, 30 (63.8%) of the students.

Table 2. Frequency distribution of physical activity among obese high school students prior to video education (N=47)

Status of Physical Activity	n	%
Mild	31	66
Moderate	16	34
Total	47	100

Based on table 2 of physical activity in high school students who were obese in Mergangsan district before video education was obtained, the majority of students had mild physical activity, which is as much as 31 (66%) students, while those with moderate physical activity were as many as 16 (34%) students.

Table 3. Frequency distribution of physical activity among obese high school students after video education (N=47)

Status of Physical Activity	n	%
Mild	10	21.3
Moderate	37	78.7
Total	47	100

According to table 3 of physical activity in obese students in Mergangsan district after video education was obtained the majority of students had moderate physical activity is as many as 37 (78.7%) students.

Table 4. The association of video education with physical activity status among obesity students

	Mean	SD	Physical Activity Status				P Value
			Mild		Moderate		
			n	%	n	%	
Pretest score	1.34	0.47	31	66.0	16	34.0	<0.001
Posttest score	1.78	0.41	10	21.3	37	78.7	

Based on Table 4, known physical activity prior to video education has a mean value of 1.34(0.47). According to the classification, 31 students (66%) had mild physical activity and 16 students (34%) had moderate physical activity. Physical activity after video education had a score of 1.78 (0.41). Based on the classification, 10 students (21.3%) had light physical activity, and as many as 37 students (78.7%) had moderately active physical activities. After the video education was given, as many as 26 students experienced an increase from mild physical activity to moderate physical activity. The Wilcoxon signed rank test resulted in a p value <0,001, where the p value showed that there was an influence of video education on physical activity for the prevention of diabetes.

4. DISCUSSION

The results of the study showed that the students in Mergangsan district who were majority respondents were 30 male students and 17 female students where the results, men 2x more than women. This can be influenced by the total number of students in the district that were the most male students that met 369 students, whereas in the student girls there were 240 students. The results of this study are in line with Riskeddas province of Yogyakarta Special Territory 2018 data that indicates that the highest prevalence of obesity in adolescents aged 16-18 years occurred in men (8.98%), compared with adolescents (3.26%). The results are in accordance with the Zamzani study that the gender characteristics of obese students in males (7.3%) more than in females (5.2%) (19).

Based on the results of the study it was found that physical activity in high school and SMK students who were obese in Mergangsan district before video education was obtained the majority of students had mild physical activity is as much as 31 students (66%). Physical activity is a series of body movements produced by muscles that release energy. Different physical activities use the energy of the body differently. Physical activity helps boost blood circulation and burn calories. Because physical activity burns incoming energy, excessive calorie intake and lack of physical activity causes the body to become obese. Physical activity can lower the risk of high blood pressure, coronary artery disease, stroke, and diabetes (20).

A smart video about what obesity is, the causes or factors of obesities, and the prevention of Obesity that a teenage girl can do. The video aims to give an indirect understanding or knowledge, without obliging a schoolgirl to do obese prevention (21). Physical activity can decrease blood glucose levels, where energy intake by changing the metabolic processes of glucosa in the blood. The physical activity performed can increase the use of blood glucosis to be processed into energy as well as reduce the accumulation of fat in fat tissue, thus preventing the occurrence of obesity and T2DM sufferers (22).

Physical activity is a body movement that can increase energy consumption and burning. When a person performs physical activity, the fat storage contained in the blood is broken down and free fatty acids are released into the bloodstream and sent to the tissues that need it as a source of energy (23). The results of the spearman rank correlation test in the Rijanti study showed that there was a relationship between physical exercise and blood glucose levels of T2DM patients in the Ulin Banjarmasin clinic ($p = 0,008$) (24). The results of the Nurhidayati study showed that respondents with low physical activity and hyperglycaemia were 11 (7.1%), while respondents who had low physical activities and no hyperglycemia were 144 (92.2%), respondents that had sufficient activity and hyperthyceemia were 2 (6.9%), and respondents whose physical activity was sufficient and non-hyperglycemia were 29 (93.1%). Based on the results of the statistical quadrate between the physical activity variables with the significance of the hyperglycaemia variable value- $p=0,969$ ($>0,05$), which means that there is no relationship between physical activity and hyperglykemia in the teacher in the residence of the Yogyakarta Special Region (25).

Education is an attempt to influence others, both in groups and individuals, so that they can do what is expected of an educator or a tutor (26). One of the educational media is video, a series of moving images accompanied by voices that form a unity that is sculpted into a story stream. Video contains messages to help one a set learning goal. Video saved to tape or disk media through storage process. The use of video media in learning has several purposes among others in the psychomotor realm, video is the right medium in providing examples of skills related to movement and appearance as well as care (27,28). The results of this study show that giving video education can improve physical exercise in students who are

obese. Physical activity is intended to anticipate the onset of diabetes mellitus in adolescents. As the theory explains that physical activity can cause energy burning, the more teenagers perform more energy-consuming activities. Physical activity can affect obesity. You won't get obese because you're getting more and more active, especially 30 minutes a day (29). Physical activity in adolescents has been shown to be significantly linked to the Body Mass Index (BMI), which means that adolescents whose physical activity is mild have a 3.3 times higher risk of obesity than adolescents who are physically active. Teenagers who do regular physical activity tend to have an ideal and healthy weight (30). Physical activity can reduce the level of glucose in the blood, where energy intake by changing the blood glucose metabolism processes. Physical activities performed can increase the use of the glucose in blood to be processed into energy as well as reduce the accumulation of fat in the adipose network, thus preventing the occurrence of obesity and suffering from T2DM (22).

The results of this study are consistent with a previous study conducted by Siregar and Koerniawati (2022) that there was an increase in the average knowledge score after given education from 7.48 to 14.09, besides there was a significant difference between the knowledge score before and after the test (p value = 0,000). It shows that online methods using zoom meetings are the right choice for the implementation of nutrition education in the community in the time of the Covid-19 pandemic (31). Another study that supports this study is Delia Dinda Syafira's study (2021) that although at first the attitude of belonging was sufficient, it only increased from 31 to 37 in the category of Good, even increasing from 27 to 31 in the Category of Good. Based on the analysis test performed obtained a significance value for knowledge of 0.020 and for attitude of 0,000 i.e. < 0.05 It can be concluded that the provision of video education has a significant influence on the improvement of knowledge and attitude (21). Video education can be one of the solutions to prevent obesity and T2DM in adolescent. In addition, body image among high school students is the perception of body shape satisfaction. Often occurs among adolescents, usually due to the influence of social media use. Moreover, the number of use of social media among teenagers and the perception of negative body image increased significantly, so that it can be used for nutrition intervention through social media sites (32).

5. CONCLUSION

Based on the results and discussions on this study it can be concluded that before giving video education, physical activity in high school and SMK students who are obese in the Mergangsan district was considered to be mild. After giving educational video, Physical activity in the high school students and SMC students who have obesity in Mergangsan district were mostly moderate. There is an influence of video education on physical activity for diabetes prevention on high school students with obesity in Mergangsan district, Yogyakarta.

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