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THE INFLUENCE OF METABOLIC SYNDROME EDUCATION ON THE KNOWLEDGE LEVEL OF FEMALE STUDENTS USING POSTER, VIDEO, AND WORD SEARCH PUZZLE MEDIA AT SMPIT MENTARI ILMU KARAWANG

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Abstract

In recent years, there have been many changes, one of which is the modern lifestyle. This lifestyle tends to be bad due to a lack of knowledge, which causes high levels of obesity-related diseases and has an impact on the occurrence of metabolic syndrome. The aim of this research is to determine whether or not there is an influence of poster media, educational videos, and random word puzzles on female students at SMPIT Mentari Ilmu Karawang. The type of research carried out was a quasi-experimental design with one group pre and post test to compare knowledge before and after being given a nutrition education media intervention. The sample used was 45 female student subjects. Data analysis using the Shapiro Wilk test, Wilcoxon test, and explanation in narrative form. The results of the research show an increase in nutritional knowledge in the three media from the results of the pre and post tests which were carried out with a p-value <0.05. Thus, this media can be used to facilitate young women in receiving nutritional information to prevent dangerous diseases, especially metabolic syndrome.

Keywords: Nutrition Education, Metabolic Syndrome, Media

Introduction

Metabolic syndrome is a combination of several metabolic risk factors directly related to the occurrence of serious diseases such as stroke, heart disease, and diabetes mellitus (1). Metabolic Syndrome (MS) is also a condition in which a person has high blood pressure, central obesity, and dyslipidemia occurring simultaneously (2). According to the criteria of The National Cholesterol Education Program-Adult Treatment Panel III (NCEP-ATP III), metabolic syndrome is diagnosed if a person has three or more simultaneous risk factors: central obesity with waist circumference >90 cm for men and >80 cm for women, fasting blood glucose level >100 mg/dL, blood pressure ≥ 130/85 mmHg, triglyceride level ≥ 150 mg/dL, and HDL cholesterol level <40 mg/dL for men and <50 mg/dL for women (3).

The prevalence of metabolic syndrome (MS) worldwide ranges between 20-25%, and in Indonesia, 23.34% of the total population experience metabolic syndrome, with 26.2% among males and 21.4% among females. Additionally, the prevalence of metabolic syndrome in Indonesia among individuals aged over 15 years or adolescents is 12.5% (4). This makes MS a significant public health issue and clinical challenge globally, related to lifestyle changes and dietary patterns.

Based on the indicators of the National Medium-Term Development Plan (RPJMN) 2015-2019, 15.4% of individuals are obese (BMI ≥27), including children aged 5-12 years, with 18.8% overweight and 10.8% obese. The Basic Health Research (RISKESDAS) results in 2018 indicate a central obesity prevalence rate in Indonesia of 31%. This figure has increased by 4.4% from 26.6% in

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2013 (5). According to gender, it is noted that the prevalence of obesity is higher among females, at 26.9%, compared to 16.3% among males. Furthermore, several studies also indicate that 80% of adolescents who are obese are likely to continue being obese into adulthood (6).

From the data above, it can be observed that this refers to unhealthy lifestyles such as insufficient physical activity and the consumption of instant foods, which lead to obesity and subsequently to metabolic syndrome. Therefore, efforts and precautions to prevent and reduce metabolic syndrome can begin during adolescence. Early identification can help avoid diseases, especially metabolic syndrome, which increases the risk of serious illnesses like coronary heart disease, stroke, and diabetes mellitus. This can be achieved by providing information to enhance adolescents' knowledge and awareness about the causes, risk factors, impacts, and prevention of metabolic syndrome as early as possible.

One way to prevent metabolic syndrome is by increasing knowledge. Research conducted by Sagita in 2022 indicates that poster media influences knowledge improvement (7). Syafira's 2021 study shows that education through video media can also enhance knowledge (8). According to Oktafiani's research in 2020, there is an effect on students' knowledge improvement using puzzle media after receiving education (9). The objective of this study is to examine the impact of providing metabolic syndrome nutrition education through poster, video, and word search puzzle media on the knowledge level of female students at SMPIT Mentari Ilmu Karawang.

Methods

The type of study conducted was a quasi-experimental design with one group pre- and post-test to compare knowledge before and after the nutritional education media intervention. This research was carried out at SMPIT Mentari Ilmu Karawang, West Java. The total number of subjects was 45, comprising female teenagers from grades 7 and 8. There were 3 types of media used for the intervention: posters, educational videos, and word search puzzles, with each media provided to 15 subjects. Characteristics data of the students were collected through a questionnaire, including their name, age, weight, height, and nutritional status. Knowledge data on nutrition was obtained through a questionnaire on metabolic syndrome education consisting of 15 true or false objective test questions. The questions from this questionnaire covered definitions, criteria of MS, causes, risk factors, impacts, and prevention of metabolic syndrome. The aim is for the responses from these questions to enhance the students' knowledge and awareness regarding metabolic syndrome health issues.

The highest score obtained from the questionnaire is 100. This score is categorized into three levels: scores >80 are categorized as good, scores between 60-80 are categorized as moderate, and scores <60 are categorized as less (10). Determination of the students' nutritional status refers to measuring the Body Mass Index for Age (BMI/A) according to the Ministry of Health Regulation No.2 of 2020 on anthropometric standards for children, using threshold values (z-scores) categorized as: underweight -3 SD to < -2 SD, normal -2 SD to +1 SD, overweight +1 SD to +2 SD, and obesity > +2 SD (11).

The implementation of this research consists of 3 phases: pre-test, nutritional education media intervention, and post-test as follows:

1. In the initial phase, a pre-test questionnaire was administered one day before the intervention to collect data on the students' characteristics and knowledge related to metabolic syndrome.
2. The implementation phase was divided into 3 media interventions. Media 1, posters, were placed on classroom bulletin boards. Media 2, educational videos, were shared via a WhatsApp group for subjects to watch. Media 3, word search puzzles, involved finding words related to metabolic syndrome in a table of scrambled words.

3. The success of the media interventions was evaluated by administering a post-test to participants one week after the intervention to assess their understanding before and after the activities.

Data was processed and analyzed using SPSS 25, employing the Wilcoxon test with p <0.05 to determine the impact of the media on pre-test and post-test results before and after intervention.

Results

This research was conducted in May 2023 at SMPIT Mentari Ilmu Karawang, West Java. The study involved a total of 45 female subjects. The subjects' ages were distributed as follows: 3 subjects aged 12 years (6.67%), 32 subjects aged 13 years (71.1%), and 10 subjects aged 14 years (22.2%). Regarding nutritional status characteristics, 2 subjects were categorized as underweight (4.4%), 31 subjects as normal weight (68.8%), 6 subjects as overweight (13.3%), and 6 subjects as obese (13.3%).

Table 1. Subject Characteristics

Variable	Poster		Video		*Puzzle*	
	n	%	n	%	n	%
Age						
12	0	0	1	6,6	2	13,3
13	5	33,3	14	93,3	13	86,67
14	10	66,67	0	0	0	0
Nutritional Status						
Underweight	0	0	0	0	2	13,3
Normal	12	80	10	66,67	9	60
Overweight	1	6,67	4	26,67	1	6,67
Obesity	2	13,3	1	6,67	3	20

Primary data, 2023

Based on Table 1, in the poster group, 33.3% were aged 13 years and 66.67% were aged 14 years. In the video group, 6.6% were aged 12 years and 93.3% were aged 13 years. Meanwhile, in the word search puzzle group, 13.3% were aged 12 years and 86.67% were aged 13 years. According to the Body Mass Index for Age (BMI/A) criteria under the Ministry of Health Regulation No.2 of 2020 on anthropometric standards for children, subjects in the poster group included 12 individuals (80%) categorized as normal weight, 1 individual (6.67%) as overweight, and 2 individuals (13.3%) as obese. In the video group, there were 10 individuals (66.67%) categorized as normal weight, 4 individuals (26.67%) as overweight, and 1 individual (6.67%) as obese. In the word search puzzle group, there were 2 individuals (13.3%) categorized as underweight, 9 individuals (60%) as normal weight, 1 individual (6.67%) as overweight, and 3 individuals (20%) as obese. From these results, it can be observed that the poster group had more subjects with normal nutritional status compared to the other two groups.

Table 2. Knowledge Before and After in the Poster Media Group

Category	Poster Media			
	Before		After	
	n	%	n	%
Good	12	80	15	100
Moderate	3	20	0	0
Less	0	0	0	0
Total	15	100	15	100

Primary data, 2023

Based on Table 2, it is known that prior to the intervention, the knowledge level of female students at SMPIT Mentari Ilmu Karawang was categorized as good for 12 individuals (80%), moderate for 3 individuals (20%), and none in the less category. After the intervention, it was found that all 15 individuals (100%) achieved a good knowledge level.

Table 3. Knowledge Before and After in the Video Media Group

Category	Video Media			
	Before		After	
	n	%	n	%
Good	6	40	13	86,67
Moderate	8	53,33	2	13,33
Less	1	6,67	0	0
Total	15	100	15	100

Primary data, 2023

According to Table 3, the knowledge level before the intervention in the educational video media group showed 6 individuals (40%) with good results, 8 individuals (53.33%) with moderate results, and 1 individual (6.67%) with less results. After the intervention, 13 individuals (86.67%) achieved good results, and 2 individuals (13.33%) achieved moderate results.

Table 4. Knowledge Before and After in the Word Search Puzzle Media Group

Category	Puzzle Media			
	Before		After	
	n	%	n	%
Good	9	60	15	100
Moderate	5	33,33	0	0
Less	1	6,67	0	0
Total	15	100	15	100

Primary data, 2023

Based on Table 4, the knowledge of subjects in the word search puzzle media group showed 9 individuals (60%) with good results, 5 individuals (33.33%) with moderate results, and 1 individual (6.67%) with less results. After the media intervention, all 15 subjects achieved good results (100%).

From the post-test results above, it can be seen that the poster and word search puzzle media achieved better results compared to educational video media after the intervention. An analysis of the effect of education on the level of students' knowledge before and after intervention using poster, video, and word search puzzle media will be presented in Table 5.

Table 5. The Influence of Metabolic Syndrome Education Media on Students Knowledge

Media	Pre Test			Post Test			p-value
	Min	Maks	Mean ± SD	Min	Maks	Mean ± SD	
Poster	73	93	87,13 ± 6,069	93	100	99,07 ±2,463	0,001
Video	53	93	81,07± 10,714	60	100	92,73 ±11,171	0,001
Puzzle	46	100	83,67±12,877	86	100	95,80±5,158	0,002

Wilcoxon test were conducted using SPSS 25

Normality testing in the study was conducted using the Shapiro-Wilk test. From the results of this test, the pre-test and post-test values for poster, educational video, and word search puzzle media were found to be <0.05, indicating that the data were not normally distributed. Therefore, the non-parametric Wilcoxon test was used to analyze the data. The Wilcoxon test results for the pre-test and post-test conducted showed p-values for each media as follows: poster with a *p-value* of (0.001), educational video with a *p-value* of (0.001), and word search puzzle with a *p-value* of (0.002). This indicates that all media had *p-values* <0.05, indicating the presence of an effect of metabolic syndrome education media intervention provided to each subject after the pre-test.

The findings of this study are consistent with research conducted by Ernalia et al., 2022 (12). Which demonstrated an effect on knowledge levels before and after nutritional intervention through poster media. Additionally, this study aligns with research by Rahayu et al., 2018, which showed an impact on knowledge of metabolic syndrome after education through video media (13). Furthermore, this study is also consistent with research by Rizona et al., 2021, indicating the effectiveness of using puzzle media in enhancing knowledge (14).

Discussion

The Influence of Metabolic Syndrome Poster Media on Students' Knowledge Level

From the research findings, it was found that the subjects' knowledge increased after the poster media intervention. This can be seen from the average scores before and after the intervention, and also from the good category obtained by 15 individuals after the intervention. The knowledge questionnaire was administered 1 day before the media intervention and 7 days after the poster media intervention. The questionnaire was filled out by ticking the answers considered correct in a statement. The posters were applied by placing them on the classroom bulletin board. These posters contained information about metabolic syndrome, its risk factors and causes, criteria for individuals at risk of metabolic syndrome, and preventive measures.

From the questionnaire results filled out by the subjects before the poster media intervention, several incorrect answers were found. However, the average score after the intervention was higher compared to the other 2 media. This suggests that the subjects may have understood better and started implementing healthy lifestyle habits.

Furthermore, poster media has several advantages such as its higher attractiveness that tends to emphasize the message through color and visual appeal (15). The use of attractive colors can capture the attention of students to read the conveyed messages. Moreover, placing the posters on the classroom bulletin board also influences because students can revisit the posters during their free time. The Wilcoxon statistical test results for the pre-test and post-test showed a *p-value* of (0.001), indicating that the hypothesis was accepted, demonstrating the influence of health education through poster media on students' knowledge levels.

Figure.1 Metabolic Syndrome Poster Media

The Influence of Metabolic Syndrome Educational Video Media on Students' Knowledge Level

In the process of providing educational video media, the questionnaire was filled out 1 day before the media intervention and again 7 days after the video media intervention. The questionnaire was filled by ticking the answers considered correct in a statement. The educational video lasts approximately 5 minutes with animation and background music to keep the students engaged while watching. The video explains metabolic syndrome, its risk factors and causes, criteria for individuals at risk of metabolic syndrome, and preventive measures.

From the pre-intervention questionnaire results, some subjects answered incorrectly. This was due to their lack of knowledge about metabolic syndrome and its prevention methods. The Wilcoxon statistical test results for the pre-test and post-test showed a *p-value* of (0.001), indicating that the hypothesis was accepted, demonstrating the influence of health education through video media on students' knowledge levels.

The research also found that subjects' knowledge increased after receiving the educational video compared to before. This means that the messages from the media were effectively conveyed. The messages in the video can stimulate imagination, thinking, and opinions. The advantages of video media include being easier to understand, can be replayed at specific parts, and can be sped up or slowed down at certain durations (12). Additionally, the information presented is more engaging compared to printed or written materials (13). Although the average knowledge score after the intervention from this media was lower compared to the other 2 media, this could be because the video media was not watched together in person but distributed online via WhatsApp groups. This lack of direct monitoring may have led to some subjects not watching the video.

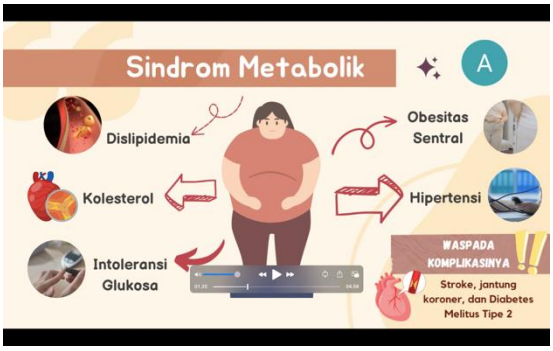

Figure.2 One Slide from Educational Video Media

The Influence of Word Search Puzzle Media on Students' Knowledge Level

From the research results, it was found that the subjects' knowledge increased after the word search puzzle media intervention. This means that the messages from this media were effectively conveyed, while also engaging students in brain training and improving their hand-eye coordination and critical thinking skills. Through this media, students were also aided in analyzing information, making it easier for them to grasp the messages and materials presented (16).

This can be seen from the average scores before and after the intervention. The knowledge questionnaire was administered 1 day before the media intervention and again 7 days after the puzzle media intervention. The questionnaire was filled out by ticking the answers considered correct in a statement.

The media was provided to each respondent and conducted through a game where they had to find several words in a randomized table. Once a word was found, it could be crossed out immediately. The word search activity took approximately 10 minutes. Afterward, the meaning of the words they found and their relevance to metabolic syndrome were explained to the subjects. The words searched in the table were related to the causes, criteria of metabolic syndrome, and its prevention methods.

From the pre-intervention word search puzzle questionnaire results, several incorrect answers were found. This could be due to the subjects' lack of knowledge about metabolic syndrome and its prevention methods. The Wilcoxon statistical test results for the pre-test and post-test showed a *p-value* of (0.002), indicating that the hypothesis was accepted, demonstrating the influence of health education through word search puzzle media on students' knowledge levels.

Figure.3 Word Search Puzzle Media

Conclusion

Health education is crucial in efforts to enhance the understanding of adolescent girls. Preventive actions using nutrition media such as posters, educational videos, and word search puzzles have an impact on increasing students' knowledge. Therefore, these media can be used to facilitate adolescent girls in receiving nutritional information to prevent dangerous diseases, especially metabolic syndrome.

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