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INCREASING NUTRITIONAL KNOWLEDGE AND FIBER INTAKE OF OVERWEIGHT ADOLESCENTS THROUGH WEB GAME-BASED BALANCED NUTRITION TUMPENG

Peningkatan Pengetahuan Gizi dan Asupan Serat pada Remaja dengan Kelebihan Barat Badan Melalui Game Tumpeng Gizi Seimbang berbasis Web

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ABSTRAK

Prevalensi kegemukan pada remaja berdasarkan data Kementrian Kesehatan Republik Indonesia meningkat dari 2013 sebesar 7,3% menjadi 9,5% pada tahun 2018. Masalah gizi perlu diperhatikan karena hal ini dapat berlanjut hingga dewasa serta menyebabkan terjadinya penyakit tidak menular. Salah satu penyebab kegemukan pada remaja karena asupan makanan yang berlebihan, kurangnya pengetahuan gizi dan kurangnya asupan serat yang bersumber utama dari buah dan sayuran. Pendidikan gizi merupakan langkah untuk menambah pengetahuan dan meningkatkan asupan serat. Penelitian ini bertujuan untuk meningkatkan pengetahuan serta meningkatkan asupan serat remaja. Metode yang digunakan adalah quasi eksperimen pada 84 siswa SMA. Penelitian dilaksanakan bulan Februari-Maret 2022 di empat SMA Surakarta. Penelitian ini menggunakan perlakuan pre-post test. Pengukuran pengetahuan responden menggunakaan Google form kuesioner dan formulir food record 3 x 24 jam. Analisa data menggunakan uji Wilcoxon dan uji Mann whitney. Hasil rata-rata tingkat pengetahuan responden pada kelompok kontrol sebelum diberikan penyuluhan dalam kategori baik sebanyak 11.9% Sesudah diberikan penyuluhan, terjadi peningkatan 40.5% p=0.002.Hasil rata-rata tingkat pengetahuan responden pada kelompok perlakuan sebelum diberikan perlakuan adalah kategori baik 14.3% dan sesudah diberikan perlakuan terjadi peningkatan sebanyak 71,4% dengan p=0.01. Hasil rata-rata asupan serat responden pada kelompok kontrol dan kelompok perlakuan sebelum dan sesudah intervensi adalah kategori kurang dengan persentase 100% yang artinya tidak terdapat perubahan pada masing-masing kelompok dengan p=0,142 (kelompok perlakuan) dan p=0,082 (kelompok kontrol). Dapat disimpulkan bahwa game tumpeng gizi seimbang berbasis web mampu meningkatkan pengetahuan gizi namun tidak merubah asupan serat responden.

Kata kunci: *Pendidikan Gizi, Pengetahuan, Asupan Serat, Obesitas Remaja.*

ABSTRACT

The prevalence of obesity in adolescents based on data from the Ministry of Health of the Republic of Indonesia increased from 2013 at 7.3% to 9.5% in 2018. Nutrition issues must be considered as they can continue to adulthood and lead to non-communicable diseases. One of the causes of obesity in adolescents is over-nutrition, lack of nutritional knowledge, and lack of fiber intake, which is the main source of fruit and vegetables. The research aimed to increase knowledge and adolescent fiber intake. The method used quasi-experimental in 84 high school students. The research was conducted in February-March 2022 at four high schools in Surakarta. This study used pre-post-test treatment. Measure respondent knowledge using Google form questionnaires and food record

forms 3x24 hours. Analyze the data using the Wilcoxon test and the Mann-Whitney test. The average level of knowledge of the respondent in the control group before approving the good category was 11.9%. After approving, there was an increase of 40.5% (p=0.002). The average score of respondents' knowledge level in the pre-treatment group was 14.3%, and after treatment, there was an increase of 71.4% (p=0.01). The average result of the fiber intake of the responders in the controlling group and the pre and post-intervention treatment group was category less with a percentage of 100%, which means there was no change in each group with p=0.142 (treatment group) and 0.082 (control group). The study concluded that a web-based balanced nutritional stump game improves nutritional knowledge but does not alter the respondent's fiber intake.

Keywords: Nutrition education, Knowledge, Fiber Intake, Adolescent Obesity.

INTRODUCTION

Adolescent obesity is a complex condition that follows medical, psychological and social cultural issues [1]. A variety of factors influences the increase in obesity and has an impact on impaired health and decreased quality of life [2]. Obesity in adolescents is a multifactorial diet that consists of dietary intake (macro nutrients, fiber intake, breakfast, fast food consumption, food / sweetened beverage intake), psychological factors, physical activity factors and genetic factors. Dietary patterns and intake are unblanced, such as fast food habits,high calorie but low fiber foods, and insufficient intake of vegetables and fruits[3]. [4]. His eating habit is also known as the Western diet or better known as a Westernized Diet (WD) that tends to be high in saturated fat and high in sugar, but low in unsaturated fats, low in micronutrients and antioxidants that function as a regulator of metabolism and as a defence of the immune system and low fiber intake [5]. Adolescence is a very important time in life, Since an adult will consume the same food consistently. It will become a habit in life [6]. In Indonesia, the prevalence of obesity among teenagers continues to rise year-on-year. Based on Riskesdas data from 2013 indicate that 18.8% (obesity at 10.8% and 8.8%) of teenagers aged 16 to 18 are obese, 7.3% of those aged 16, 18 and 1%.

While Riskesdas data from 2018 indicates that the prevalenceof nutritional status in Indonesian teenagers between the ages of 16 and 18 is 9.5% obese and 4% obese[7], [8] This data shows an increase in nutritional problems among adolescents in Indonesia. Overweight adolescents have a need to be met which is the maximum intake of fiber is 28-30 g/day, and the need for fiber intake can be met by a healthy diet with a balanced nutritional content for the body [9]. Being accustomed eating vegetables and fruits is one way of filling up daily fiber and living healthy according to balanced nutritional guidelines[10]. The guidelines in Indonesia are set out in the Balanced Nutrition Package which recommends the consumption of 2-3 servings/day fruit and 3-5 servings of harvested vegetables/day [11]. Data from the Ministry of Health stated that adolescents with a nutritional status of obesity averaged only 3.8 grams of fiber. It is seen from these figures only meet about 10% of the Recommended Dietary Allowances (RDA) a value that indicates the average requirement of certain nutrients to be met daily for almost everyone with certain characteristics that include age, gender, level of physical activity, and physiological conditions, to live a healthy life. (RDA/AKG) figure for men aged 16-19 years is 37 g, while RDA or AKG fiber for women in the same age range is 29 gram [12]

Balanced nutrition guidelines are aimed at establishing good eating habits through the application of consumption according to the needs of the body both portion and type. Consuming fruits and vegetables as a source of fiber, vitamins and minerals is one of the ways to live a healthy life according to balanced nutritional guidelines[10] The guidelines in Indonesia are made in the form of balanced nutrition stacks with a daily

consumption of 2-3 servings of fruit and vegetables and 3-5 servings per day [13]. For adolescents, nutrition issues need more attention because they can continue to adulthood and lead to other non-communicable diseases such as stroke, heart and type 2 diabetes [14]. But this can be prevented by dietary adjustment, physical activity, and increased knowledge by getting nutritional education as a preventive measure. Previous research noted that the majority of adolescents had low balanced nutritional knowledge (50.8%) and 92.75% did not apply balanced nutrients [15].

Nutrition education is one of the public health interventions that can influence healthy behavior, which can be applied in schools. Nutrition education is important because one of the causes of increasing nutritional problems among adolescents is a lack of understanding of nutrition and balanced nutrition that is not applied in daily eating habits. This can be seen from poor eating behavior influenced by a lack of knowledge about nutritional guidelines[16].

The Ministry of Health has issued a balanced nutrition guideline as a public reference to balanced diet including for adolescents in increasing knowledge to be able to change unbalanced nutritional behaviors [11]. It is also reinforced by previous research that nutrition education in adolescents can enhance knowledge and increase fiber intake [17].

Although there are a lot of nutrition education, there's still very little nutritional education about balanced nutritional stacks as a balance nutritional picture modified by the game's web platform. This needs more attention when looking at nutrition education requirements that must be attractive, tailored to the learning objective, easy to catch, short, clear, and in accordance with the message and delivered politely. It can then be considered that the nutritional education given during this period needs to be modified to attract. Interesting media and can be used for the learning process one of which is gamification or learning in the form of a game. Nutrition education at school is done in the form of games. Nutrition education modified with games is expected to boost creativity as well as enhance adolescent knowledge. It is in line with Ogunsile's research that nutritional education conducted with compassion can improve knowledge, attitudes and healthy eating practices among adolescents [18].

The learning process uses gamification, becoming an alternative to making the learning process more interesting, fun and effective [19] Kahoot is a game-based learning platform that can complement the practice or process of learning with technology capabilities. This game-based platform aims to make learning enjoyable and programmed. It can then be accessed using any digital device with a browser and requires an internet connection. It also makes interaction between educators and students in different learning sessions through competitive learning games [20].

Another advantage of the kahoot is that it can be applied virtually directly to distance learning.Teenagers who are given nutritional education through this web game are then expected to experience an improvement in balanced nutritional knowledge so that they can balance their daily energy and also increase their intake of fiber so as to minimize the risk of health disorders such as non-communicable diseases.

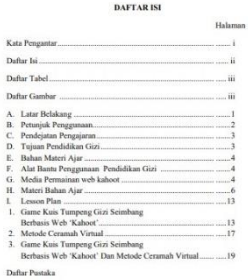
The aim of this research is to see an improvement in nutritional knowledge and fiber intake through web-based games.

METHODS

The research uses a quasi-experimental method with pre-test and post-test with control design. Multistage sampling is used to determine the sample of this research.. The number of samples was determined using the Lameshow formula with the calculation of lost follow-up obtained research subjects consisting of 84 subject in Surakarta City in 2022. The research was conducted in February – March 2022 at In four Surakarta high schools consisting of state high schools and private high schools.subjects

were selected first using the Google form, then an anthropometric measurement was carried out to determine the nutritional status of adolescents corresponding to the criteria, i.e. subjects with a z-score value > 1 SD. The inclusion criteria are in this study included: adolescents aged 16-18 years; overweight based on anthopometric screening results, having a personal smartphone and willing to be respondents. Meanwhile, the exclusion criteria are as follows: Teenagers are not present at nutrition education, do not follow the entire research activity, are suffering from certain diseases that require a disease diet (diabetes, kidney failure, heart disease, cancer and hypertension).

Dependent variableo this research is nutritional knowledge and fiber intake, and the independent variable to this study is the Web-based Kahoot Nutrition Balance Stack Quiz Game. Before being given an intervention such as a web-based balanced nutritional stack quiz, samples are observed first using pre-test and, after obtaining the intervention observed with post post-test using google form. Pre-test and post-test are used to evaluate the nutritional knowledge of respondents. Pre Test and post Test use a google form that contains 23 questions related to knowledge about playing a web-based balanced nutrient stack Quiz. Balanced Nutritional Stack quiz is a submission of balanced nutritious stack material delivered through gamification or game-based learning. Nutrition education material is provided through a balanced nutritional stump quiz game based on the web game kahoot. This education is given in the form of games that contain material about balance nutrition, recommended daily intake (including carbohydrates, animal and vegetable protein chips, vegetables, fruits) and also a clean and healthy lifestyle (washing hands, physical acitivity, as well as , monitoring your weight regularly). Nutrition education is given online, any material as contents of the nutrition-balanced pile quiz game on the web application of the game "kahoot" developed by the researchers.The web-based Kahoot Nutrition Balance Dump quiz is available at www.kahoot.com and can be played easily by matching the answers to previous researchers' questions. The game is played for 1x25 minutes. Before playing, respondents read the material on the google classroom. Balanced Nutrition Stack material is structured in a balanced nutrition stack module modified from the balanced nutrition guidelines of Permenkes No. 41 of 2014. Here's an overview of the modules and web views of the kahoot made by the researchers.



DAFTAR ISI

Figure 1. Module Materi Tumpeng Gizi Seimbang

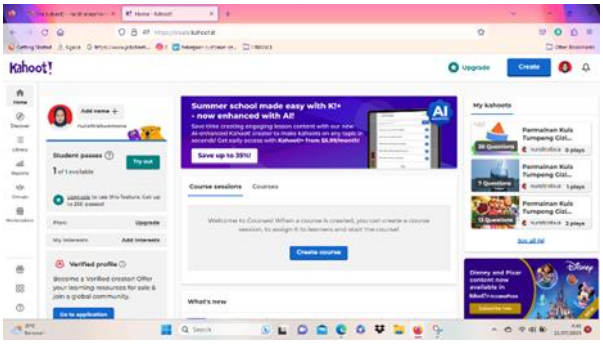


Figure 2. Game Web View

Because this game is superseded by previous learning, it's called learning while playing. This research are the instruments that have already passed the process of validation susch as a nutrition knowledge questionnaire made in the form of a Google form and filled by the nutrition information respondents consisting of 23 questions such as multiple choice questions interpreted according to the knowledge score which is said to be good knowledge if the score is 76-100, sufficient if the score is 56-75% and said to be lacking if <56% [21].

Then, fiber intake intake using food record forms distributed via Google Classroom and monitored via WhatsApp is and then grouped according to gender and categorized into categories do not sufficient with RDA (Recommended Dietary Allowances) More: 110% RDA and less: <80% and compliance with RDA good:80-110% RDA.

The research protocol has been approved by the University of Eleven March Surakarta Ethics Committee through Decree No:07/UN27.06.11/KEP/EC/2022. The data was obtained in this study, and then data normalization was analyzed using SPSS version 16. The result was not normally distributed data (can be seen in Table 2. Data normality test). Data analysis was then tested with the Wilcoxon test and Mann-Whitney Test to the influence of a web-based balanced nutritional pile quiz (Experiment group) and virtual nutritional lectures (Control group) on nutritional knowledge and fiber intake before and after the intervention. And the average difference between the two groups in nutritional knowledge and fiber intake.

RESULT

A. Based on the results of the study, the following results were obtained :

Interpretation of univariate analysis results :

The subjects studied were 84 teenagers who were overweight. Characteristics of the study subject can be seen in Table 1

Table 1. Characteristics of Research Subjects by gender and age

Characteritics	Treatment group		Control group	
	n	%	N	%
Gender				
Male	21	50.0	17	40.5
Female	21	50.0	25	59.5
Age				
16 years	9	21.4	12	28.6
17 years	27	64.3	25	59.5
18 years	6	14.3	5	11.9
n	42	100	42	100

Source: Primary Data (2022)

Table 1 above shows that 50–59% of respondents in both groups were women, and the majority were 17-year-olds (64.3% of the treatment group and 59.5% of the control group).Nutrition and fiber intake variable data homogenity tests that's the Levene Test and normality tests that's the Shapiro Wilk test., homogeneity and normality tests aimed at determining the statistical tests to be used in the research.

Table 2. Results of The Normality Test and Homogenity Test of Knowledge Data and Fiber Intake

Variables	Normality Test Results		Homogenity Test Results
	Treatment group	Control group	
Nutritional knowledge	0,001	0,004	0,280
Fiber intake	0,002	0,003	0,407

Source : Primary Data (2022)
Description : N=84 ; Normal if p-value >0,05. Homogenity if p-value >0,05

Based on the above table 2 shows data, it indicates that the nutritional knowledge data at the initial stage has been homogeneous with a value of p >0,05 and the dispersed data is abnormal because of the p value <0,05, the data on fiber intake is said to be homogenous with a p value >0.05 and the distribution is unnormal with a values of p<0,05, therefore, the statistical tests to be used are the Wilcoxon test and the mann Whitney test.

Table 3. Distribution of Nutrition Knowledge and Fiber Intake Before of Respondents Before and After Intervention at Treatment group and Control Group

Variable	Treatment group				Control Group			
	Pre Intervention		Post Intervention		Pre Intervention		Post Intervention	
	n	%	n	%	n	%	n	%
Knowledge								
-Less	**28**	**66,7**	**3**	**7,1**	29	69,0	7	16,7
-Enough	**8**	**19,0**	**9**	**21,4**	8	19,0	18	42,9
-Good	**6**	**14,3**	**30**	**71,4**	5	11.9	7	40,5
Total	**42**	**100**	**42**	**100**	42	100	42	100
Fiber intake (g)	**Treatment group**				**Control Group**			
	Pre intervention		**Post intervention**		**Pre Intervention**		**Post Intervention**	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Less	**42**	**100**	**42**	**100**	42	**100**	**42**	**100**
Good	**0**	**0**	**0**	**0**	0	**0**	**0**	**0**
More	**0**	**0**	**0**	**0**	0	**0**	**0**	**0**

Source : Primary Data (2022)
Description : N=84

Based on the Table 3, there was an improvement in knowledge in both groups, the web-based balanced nutrition pile quiz before intervention in both categories was 14.3% and after intervention was 71.4%. Whereas in the virtual nutrition lecture group in either category was 11.8% and after treatment was 40.5%. The percentage of fiber intake in the category was 0% before treatment in both the groups and there was no change after treatment in the two groups.

B. Interpretation of research results of Bivariate Analysis

The effectiveness of web games on knowledge can be seen in the following Table 4, and Table 5.

1. **The influence of web games on knowledge**

Table 4. Effectiveness of Treatment Group and Control Group on Respondents Knowledge

Variable	Treatment Group (n = 42)						Intra Group p-value[a]
	Min	Max	Mean	Median	SD	Difference Value	TG
Knowledge							
-Pre Test	45	93	60.62	55.50	11.7	17.76	0.001[a]
-Post Test	50	94	78.38	80.50	9.8		
	Control Group (n=42)						Intra Group p-value[a]
	Min	Max	Mean	Median	SD	Difference Value	CG
Knowledge							
-Pre Test	31	79	56.43	53.00	13.6	15.97	0.002[a]
-Post Test	49	87	72.40	74.00	10.2		

Source : Primary Data (2022)
Description : [a]Wilcoxon TesT ; N=84 ; Significant if p-value<0.05
CG=Control Group (Lecture Method)
TG= Treatment group (Web Game)

Based on the results of the Wilcoxon tests in Table 4, the nutritional knowledge data showed a p=0.001 value in the treatment group and the control group, which stated p<0.05 that there was a difference in the influence of the nutrition knowledge scores before and after in both groups.

The differences in nutrition knowledge between groups can be seen in table 5.

Table 5. Differences in Nutrition Knowledge Between Groups

Variable Knowledge	p-value between groups[b]
Pre Test	0.052[b]
Post Test	0.013[b]

Source : Primary Data (2022)
Description : [b]Mann Whitney
N=84 ; Significant if p-value<0.05

The mann-whitney test results in Table 5 above showed that there were significant differences in nutritional knowledge between a group of web-based game as a treatment group and virtual nutritional lectures as a control group with p-value=0.013.

2. **Effect of Web Game on Fiber Intake**

Table 6. Effectiveness of Web Game on Fiber Intake

Variable Fiber Intake	Treatment Group					Control Group					p-value between group[b]
	Min	Max	Mean ±SD	Median	Intra group p-value[a]	Min	Max	Mean ±SD	Intra group p-value[a]	Median 30.00	
-Pre Intervention	38	69	55.9 ±7.638	19.00	0.142	35	68	57.6 ±9.139	0.082	16.50	0.249
-Post Intervention	40	69	56.4 ±8.106	19.00		44	69	60.0 ±2.662			0.035

Source : Primary Data (2022)

Description :[a]Wilcoxon test, [b]Mann Whitney Test ; N=84; Significant if p-value <0.05

Interpretation of the Table 6. results of the *Wilcoxon* test obtained by the intervention fiber intake data in the treatment group showed a not difference after the intervention indicated by a p-value of 0.142 (significant if *p-value<0*.05). The same result was also shown in the control group with a value of 0.082 (significant if p value<0.05) which indicated that there was a not difference in the fiber intake of respondents before and after receiving a balanced nutrition education. Furthermore, further tests were carried out with *mann Whitney* which showed that there was no difference in carbohydrate intake between groups before being given the intervention indicated by fiber intake p=0.520 (p>0.05). The results of the difference test between groups after getting the intervention showed a not significant difference with a value of p=0.830 (p<0.05).

DISCUSSION

Characteristics Respondent

Respondents in this study were 84 people with female more than male presentations. This is linked to the occurrence of overweight often found in women compared to men. This is related to the influence of hormones on women's bodies that can affect weight. In addition to hormone influence, energy storage in women tends to be stored as fat, and in men more energy is used for protein synthesis[6].

Nutrition Knowledge

After intervention and wilcoxon test to see differences before and after treatment in both groups, it can be seen in Table 4. That a web-game balanced nutrition quiz has an influence on nutrition knowledge shown with a p-value value <0,05 and in a virtual nutrition lecture group p- value <0.05. Although in both groups influenced the nutritional knowledge of respondents. However, this study's results showed a higher increase in knowledge scores in the treatment group compared to the control group. This can be seen in Table 3. That there was an increase in knowledge of 71.4% in the group treatment and 40.5% in the control group. The nutrition knowledge respondents also performed this mann whitney test to see the differences between the two groups with regard to nutritional knowledge. It's in line with research Chagas [22] that nutritional education given by games can improve knowledge about the effects of fruit and vegetable consumption as well as improved self-efficacy in the application of healthy eating practices that in this study respondents were able to reduce sodium intake and prepare healthy foods. The increase in balanced nutritional knowledge occurred in both groups but if seen, web games were more effective in the rapid increase in knowledge because learning modified with web-games became infovative so that learning was more interesting and allowed for active interaction so that the information received was more easily understood. [23]. It is also have the same results by Ezezika's research, which shows that healthy nutrition and dietary patterns as well as improved nutritional knowledge are positively derived from learning methods using digital gaming-based media. [24]. The media of the game website and its use as a medium in the online learning process helps the student to think critically because of the stimulation process so that it affects the intelligence process and the student can apply the inromancy that has been acquired. [25]. In addition to the treatment group, the application of the control group to the study also improved adolescents' knowledge of balanced nutrition, but the significantly obtained scores have not been able to balance the scores in the treatment groups. (can be compared to table 3). The lecture method is a conventional method that is often used but the results obtained are less effective and inefficient. The

ineffectiveness of the lecture method is based on the weakness of the lecturing method, which tends to take place in one direction [26].

Fiber Intake

Individual daily fiber intake comes from vegetables and fruits. According to the "Tumpeng Gizi Seimbang" the minimum amount to be consumed is 5 servings consisting of eating vegetables at least 2 times and fruits at least 3 times.The fiber content is essential as a cholesterol binder so that it does not flow through the blood vessels and can also provide a longer satiation effect so it's not easy to feel hungry. High intake of fiber can also help control weight by not contributing excess energy. [27].The intake of enough fiber is capable of controlling the body weight and low energy density on the fiber so that the feeling of fullness can be enchanced. When the fiber is digested the water wil be atracted and form a gel that can slow down the digestive process so the satiety lasts loger [28]. Respondent fiber intake in this study was included in the category of less or <80% RDA In this research the fiber intake is obtained before and after the intervention, after statistical calculations with the wilcoxon test to see differences in nutritional knowledge before and post-intervention. In table 6 the intake of fiber in both groups showing p-value >0,05 (treatment group = 0.142 and in control group = 0.082). This suggests that there is no difference in the influence on fiber intake before and after intervention in both the treatment and control groups. It is consistent with research [29] that there was no difference in fiber intake before and after intervention in the treatment and control groups. Unchanged fiber intake can be caused by a short study time so that the fibre intake is monitored only for two times, before and after the intervention so that it cannot describe changes in fiber ingestion in the subjects. Besides, external factors also influence the intake of fiber, which is a family and environmental factor that is very much in need of consistent and continuous support between family, teachers and even peers[29]

Results of fiber intake in respondents were also tested statistically Mann-Whitney test. The test was conducted to see the difference in the rate of fiber intake in the treatment group that obtained balanced nutritional material through web games and the control group that received balanced nutrient material through lectures. The results of the mann-whitney test can be seen in Table 68, which shows that there is a difference in the rate of fiber intake in the two groups. Although the wilcoxon test showed no differences in the amount of fibre intake before and after the intervention in each group, the mann-Whitney testing showed a difference in the rate in the treatment group and control group. It shows that there is a difference in the outcome though not too significant. Respondent insufficient fiber intake in each group, also due to recorded fibre intake only for 3 days before the study first week began and 3 days after the study fourth week ended. So the respondent's fiber intake did not describe the respondents' nutritional intake of 37 grams per day (men) and 29 grams a day(female). Low fiber intake is affected by low consumption of fruits and vegetables, and vegetable and fruit intake patterns tend to be the same in both pre- and post-test. This study is consistent with previous studies which suggested that nutrition education given through whatsapp media on adolescent fiber intake did not change after obtaining intervention shown with a value of p=0.798 (p>0.05)[30]. Other studies also show that although students' knowledge and nutritional attitudes are improved but not significant with the consumption of fruit and vegetables as a source of fiber, this is likely to occur because of the less consumptive habits of vegetables and fruits. [31]. Although nutrition education interventions have been given in order to enhance knowledge. The dietary intake of respondents taken using food record methods from the treatment and control groups showed higher categories on post-intervention fiber intake. It is because respondents (teens) tend to have a habit of eating outside meals and snacks and enjoying eating food that is roasted with excess oil. This statement corresponds to the main factors that cause overweight and obesity

are low physical activity, lifestyle changes, as well as the wrong diet including high fat and low fiber diet [4].

CONCLUSION

Nutrition education provided by web-based games can improve nutrition knowledge is also supported by a higher percentage of knowledge in the treatment group compared to the control group. The intake of fiber in respondents was still low so that the nutritional education given had no influence on the adolescent fiber intake before and after the treatment in each group. But at the same time, the tests carried out by the researchers show that given nutritional education can affect the fiber intake if the duration of the study time is long so that an increase in intake can be described.

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