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Pengaruh Edukasi Gizi Menggunakan Media Puzzle terhadap Peningkatan Pengetahuan dan Niat Terkait Konsumsi Sayur dan Buah pada Anak Sekolah Dasar Negeri Dupak I Surabaya

The Effect of Nutrition Education Using Puzzle to Increased Knowledge and Intentions Consumption of Vegetables and Fruits in SDN Dupak I Surabaya

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ABSTRAK

Latar Belakang: *Tingkat konsumsi sayur dan buah masyarakat Indonesia pada umumnya masih rendah yaitu sebesar 95,5%. Anak yang mengonsumsi sayur dan buah dalam jumlah sedikit berpotensi menderita gizi buruk. Kelompok umur yang rentan gizi salah satunya adalah anak sekolah.*
Tujuan: *Tujuan dari penelitian ini adalah untuk mengetahui pengaruh edukasi gizi menggunakan media puzzle terhadap peningkatan pengetahuan dan niat terkait konsumsi sayur dan buah pada anak Sekolah Dasar Negeri Dupak 1 Surabaya.*
Metode: *Jenis penelitian ini merupakan quasi eksperimen dengan menggunakan pre-post test design. Sampel penelitian yang digunakan sebesar 44 orang (22 murid kelompok perlakuan dan 22 murid kelompok kontrol), dengan teknik pengambilan sampel simple random sampling. Pengumpulan data pada penelitian ini menggunakan kuesioner pengetahuan, konstruk Theory of Planned Behavior, dan niat. Uji statistik yang digunakan dalam penelitian ini adalah Paired T-test dan Independent T-test.*
Hasil: *Uji Paired T-test menunjukkan bahwa seluruh variabel terdapat perbedaan yang signifikan pada kelompok kontrol dan kelompok perlakuan. Sedangkan uji Independent T-test menunjukan bahwa terdapat perbedaan perubahan sikap (p=0,004) dan norma subjektif (p=0,025) antara kelompok perlakuan dan kelompok kontrol. Pemberian edukasi dengan media puzzle efektif dalam merubah sikap dan norma subyektif responden.*
Kesimpulan: *Dapat disimpulkan bahwa terdapat peningkatan yang signifikan pada variabel pengetahuan, sikap, norma subjektif, persepsi kendali perilaku, dan niat sebelum dan sesudah diberi edukasi gizi terkait sayur dan buah pada kedua kelompok. Pemberian edukasi dengan media puzzle efektif untuk perubahan sikap dan norma subyektif pada responden jika dibandingkan dengan media poster.*

Kata kunci: *Edukasi, Niat, Pengetahuan, Sayur dan buah, Theory of Planned Behavior*

ABSTRACT

Background: The level of vegetable and fruit consumption in Indonesia is generally still low at 95.5%. Children who consume small amounts of vegetables and fruits have the potential to suffer from malnutrition. One of the age groups that are vulnerable to nutrition is school children.
Objectives: The purpose of this study was to determine the effect of nutrition education using puzzle media on increasing knowledge and intentions related to vegetable and fruit consumption in Dupak 1 Surabaya Elementary School children.

Methods: This type of research was a quasi-experiment using pre-post test design. The research sample used was 44 people (22 students in the treatment group and 22 students in the control group) taken randomly with sample random sampling. Data collection in this study used knowledge questionnaires, Theory of Planned Behavior constructs, and intentions. The statistical tests used in this study were Paired T-Test and Independent T-Test.
Results: Paired T-Test analysis revealed that all variables had significant differences in the control group and treatment group. The Independent T-Test analysis showed that there were differences in attitude changes (p=0.004) and subjective norms (p=0.025) between the treatment group and the control group. Providing education using puzzle media was effective in changing attitudes and subjective norms of respondents.
Conclusion: In conclusion, there was a significant increase in the variables of knowledge, attitude, subjective norms, perception of behavioral control, and intention before and after being given nutrition education related to vegetables and fruits in both groups. Providing education with puzzle media was effective in changing attitudes and subjective norms in respondents when compared to poster media.

Keywords: Intention, Knowledge, Education, Theory of Planned Behavior, Vegetable and fruit

INTRODUCTION

One age group that is vulnerable to nutrition is school children. Overnutrition and undernutrition in children will have a negative impact on efforts to realize the ideals of the Indonesian nation. Nutritional problems in children can be influenced by many factors, one of which is the direct cause of malnutrition is the lack of food intake and the high incidence of infectious diseases. Other factors that can influence are parental and individual knowledge, poor sanitation, and wrong parenting.

School children will quickly experience physical, emotional, intelligence and mental growth (Rahmy *et al.*, 2020). By consuming food with good nutrition, it will improve children's achievement and create quality human resources. Healthy eating behavior can be applied with the contents of my plate guidelines, the Ministry of Health introduced the slogan "Isi Piringku" as a daily eating guideline to meet balanced nutrition (Kementerian Kesehatan RI, 2019). The concept of the "Isi Piringku" slogan is that one meal consumed must consist of 50 percent vegetables and fruits, and the remaining 50 percent is protein and carbohydrates (Veronica *et al*., 2019). With the concept of Isi Piringku, it is expected that the intake of carbohydrate consumption can be limited and increase the intake of fiber and vitamins as an effort to reduce the risk of health problems. According to Pranungsari *et al.* (2019) vegetables and fruits are sources of macronutrients that are very beneficial for the human body because they play an important role in the body's metabolic process as a regulating substance, besides that they also have the benefit of reducing the risk of developing chronic diseases.

The level of vegetable and fruit consumption in Indonesia is generally low at 95.5%. The percentage of lack of vegetable and fruit consumption in the age group of 5-9 years is 96.9%. In the age group of 10-14 years, it was 96.8%. While in the age group of 15-19 years it was 72.3% (Riskesdas, 2018). The high percentage of lack of vegetable and fruit consumption in Indonesia can cause nutritional problems (Puasti Ningsih, 2020). Children who have low consumption of vegetables and fruits will potentially suffer from malnutrition (Pranungsari *et al.*, 2019). In addition, lack of consumption of vegetables and fruits can have a negative impact that can cause anemia. Children can also have difficulty defecating and constipation if they consume less vegetables and fruits (Sulistiono and Malinti, 2019). Based on research conducted by Alfani and Nuriannisa (2022), it is stated that adolescent girls who are affected by anemia are caused by a lack of consumption of vitamin C sources such as fruits and vegetables. Children with anemia will lack concentration in receiving lessons and feel tired quickly because the blood is unable to carry oxygen to the brain (Laili and Nisa', 2019).

Nutrition-related knowledge is one of the indirect causes of malnutrition (Rahmy *et al.*, 2020). Nutritional knowledge is the main provision for a person in choosing food. The better a person's nutrition-related knowledge, the better the person's fruit and vegetable consumption behavior. Vice versa, if a person's knowledge related to nutrition is lacking, the lower the person's fruit and vegetable consumption (Rachman *et al*., 2017). Nutrition education is needed to improve the nutritional knowledge of school children, as an effort to form a positive attitude towards vegetable and fruit consumption in order to create good eating habits

(Azhari and Fayasari, 2020). Many media can be used for nutrition education for school children related to vegetables and fruits. To attract elementary school children, creative, educational, and innovative media are needed (Gambir and Nopriantini, 2018). One of them is puzzle media. Puzzle is a type of puzzle game in the form of picture pieces that must be arranged into a complete picture again. The advantages of puzzles are that they can spur the ability to think critically, speed in thinking, and train patience. In addition, puzzles can also sharpen the brain and can foster accuracy in students (Ahmadah, Setiawan and Ardianti, 2020).

Research conducted by Azhari and Fayasari (2020) states that there is an effect of nutrition education on knowledge, attitudes, and behavior before and after the intervention. In line with research conducted by Pranungsari *et al.* (2019) on grades 2 and 3 children of Kempong State Elementary School found that there was an increase in students' knowledge related to fruits and vegetables after health education activities. Siregar and Tinah (2021) in their research stated that there was an increase in students' knowledge before and after education on balanced nutrition guidelines with puzzle media.

In an effort to increase vegetable and fruit consumption in children, an intervention method is needed to generate behavioral intention. Ajzen (1985) explains that behavior has a basic belief approach that can form intentions and further encourage individuals to perform a certain behavior. The main factors that form intentions in individuals are attitude, subjective norm, perceived behavioral control. Research conducted by Miller *et al.*, (2014) found that attitude, subjective norm, perceived behavioral control show a significant relationship to intention. Blanchard *et al.* (2009) also used Theory of Planned Behavior to understand vegetable and fruit consumption behavior.

The results of a preliminary study conducted by researchers on 5th grade students of Dupak 1 Surabaya State Elementary School, found that 41 students or 24.8% had obese nutritional status according to IMT/U. One of the factors causing obesity in children is the lack of consumption of vegetables and fruits (Ledoux et al., 2011). This is in line with the results of research conducted by Yanto et al. (2020), namely there is a significant relationship between the frequency and amount of fruit and vegetable consumption with the incidence of overnutrition in health workers and non-health workers at Perawang Type D Hospital, Siak Regency.

Based on the problem identification that has been described, researchers are interested in providing nutrition education using puzzle media to 5th grade students of SDN Dupak 1 Surabaya regarding vegetable and fruit consumption. The purpose of nutrition education is as an effort to increase knowledge so that the intention to consume vegetables and fruits can arise.

METHODS

This type of research is included in the quasi-experiment design. The design used in this research was a pre-post test design, by looking at changes before and after treatment. The research subjects were divided into two groups, namely the treatment group and the control group. In the treatment group, nutrition education related to vegetables and fruits was carried out using puzzle media. While in the control group nutrition education related to vegetables and fruits using poster media. These puzzles and posters will contain material related to vegetables and fruits. Measurements were taken twice, namely by giving a pre-test before treatment and given a post-test after treatment. This measurement was carried out to determine changes in knowledge and intentions of respondents using a questionnaire. The population in this study were all 5th grade students at SDN Dupak I Surabaya. The sampling method used in this study was simple random sampling. The sample in this study was obtained using the calculation of the Lemeshow formula (1991) so that the results obtained as many as 20 people for each group. To anticipate drop out, the researcher added the number of subjects as much as 10% of the total sample. So that the sample size needed in this study was 22 people for the treatment group and 22 people for the control group. The total research sample was 44 people. Inclusion criteria in this study were 5th grade elementary school students, male or female, willing to be research respondents and able to communicate well. While elementary school students who are sick and absent during the study are included in the research exclusion criteria. This study has passed the ethic No: 693/HRECC.FODM/VI/2023.

The research instruments used in this study were knowledge questionnaires, Theory of Planned Behavior constructs and intentions. The knowledge questionnaire was in the form of multiple choice while the Theory of Planned Behavior construct questionnaire and intention used a 1-4 Likert scale assessment. The intervention was in the form of nutrition education related to vegetables and fruits. Nutrition education was delivered by researchers as educators for 4 sessions with a duration of 35-45 minutes per session.

The data in this study were primary data. The paired t-test was used to see differences before and after nutrition education in the treatment group and control group. Independent t-test was used to see the difference before and after nutrition education, between the treatment group and the control group.

RESULTS AND DISCUSSION

The characteristics of respondents in this study were age, gender and mother's education. Based on the results of the study, it can be seen that the age range of respondents in the treatment group and control group is 10-12 years old. The most common age in both groups was 11 years old (59.1%). The gender of the respondents in this study was mostly female (63.6%) in the control group and (54.5%) in the treatment group. The majority of respondents' mother's last education was high school with a percentage of (68.2%) in the control group and (59.1%) in the treatment group.

Based on the results of this study in Table 2, it shows that before nutrition education was conducted, there was no difference in knowledge (p=0.866), attitude (p=0.577), and intention (p=0.349) in both groups. However, subjective norms (p<0.001) and perceived behavioral control (p<0.001) had significant differences between the treatment and control groups. This means that the treatment group already has a good perception of vegetables and fruits. The good perception may be due to respondents having good subjective norms as well. Subjective norms can be obtained from the support of family, teachers and peers. While after the study in table 2 shows the results there is an increase in attitudes towards vegetables and fruit (p=0.003), an increase in subjective norms related to vegetables and fruit (p=0.003), an increase in subjective norms related to vegetables and fruit (p<0.001), an increase in perceived behavioral control (p<0.001),), and intention to consume vegetables and fruit (p=0.010), but there is no increase in knowledge related to vegetables and fruit (p=0.166).

Educational interventions related to vegetables and fruits with puzzle media are proven to increase positive attitudes, subjective norms, perceived behavioral control and intentions compared to poster media. This is because when nutrition education is carried out using puzzle media, children play an active role during the education process. With puzzle media can also train children's reasoning skills, memory and concentration (Kasri, 2018). So that when given education with puzzle media, children will remember more educational materials related to vegetables and fruits that have been given, which will then increase positive attitudes, subjective norms, perceived behavioral control and know the respondent's intention to consume vegetables and fruits, with the hope that then the respondent will behave in accordance with his intention, namely consumption of vegetables and fruits in accordance with the recommendations.

Table 1. Frequency Distribution of Respondents' Background in Treatment and Control Groups

Respondent background		Group			
		Treatment		Control	
		Total	(%)	Total	(%)
Age	10	7	31.8	8	36.4
	11	13	59.1	13	59.1
	12	2	9.1	1	4.5
Gender	Female	12	54.5	14	63.6
	Male	10	45.5	8	36.4
Mother's last education	Not in school	1	4.5	0	0
	SD	1	4.5	1	4.5
	SMP	3	13.6	7	31.8
	SMA	15	68.2	13	59.1
	College	2	9.1	1	4.5

Table 2: Comparison of Treatment and Control Groups Before and After Intervention

Variables	Group	Pre-test	Post-test	Paired t-test
		Mean ± SD	Mean ± SD	
Knowledge	Treatment	56.45 ± 12.86	80 ± 13.46	<0.001
	Control	57.09 ± 11.97	74.27 ± 13.49	<0.001
	Independent t-test	0.866	0.166	
Attitude	Treatment	12.64 ± 1.65	17.00 ± 2.20	<0.001
	Control	12.91 ± 1.57	15.05 ± 1.81	<0.001
	Independent t-test	0.577	0.003	
Subjective Norms	Treatment	14.55 ± 1.47	17.91 ± 1.48	<0.001
	Control	11.86 ± 1.17	13.95 ± 1.81	<0.001
	Independent t-test	<0.001	<0.001	
Perceived Behavioral Control	Treatment	15.41 ± 1.47	17.55 ± 1.87	<0.001
	Control	12.91 ± 1.57	14.27 ± 1.45	0.001
	Independent t-test	<0.001	<0.001	

Variables	Group	Pre-test	Post-test	Paired t-test
		Mean ± SD	Mean ± SD	
Intention	Treatment	23.73 ± 2.45	25.50 ± 2.34	0.018
	Control	23.05 ± 2.32	24.55 ± 1.77	0.021
	Independent t-test	0.349	0.010	

The attitude that exists in a person will affect the behavior or actions of the person concerned (Syamaun, 2019). Nursalam (2015) states that attitude is the amount of positive feelings towards an object (favorable) or negative (unfavorable) towards an object, person, institution or activity. Attitude is considered the main cause of certain behavioral intentions, in this case, vegetable and fruit consumption. The increase in the average attitude score in the treatment group in this study was formed because respondents have the belief that vegetables and fruits are one of the food ingredients that must be consumed, and also believe that if they comply with the recommendations for consumption of vegetables and fruits can have many benefits for the body. This is in line with the statement of Sakitri and Astuti (2020) which states that individuals who have an evaluation that a behavior will produce positive consequences will tend to comply with the behavior.

Subjective norms refer to the support of family, close people, teachers and role models for vegetable and fruit consumption behavior. Subjective norms are parties who are considered to play a role in a person's behavior and have expectations of that person, and the extent to which the desire to meet these expectations (Ismail & Zain, 2008). Educational interventions using puzzle media have been shown to lead to positive perceptions of social pressure or a number of people who are considered important in advocating for compliance in consuming vegetables and fruits. People who are considered important in research on vegetable and fruit consumption are parents, friends and educators. Family is a reinforcing factor for the formation of children's behavior including children's eating behavior. Peers also influence children's eating behavior. Peer relationships with activities outside the home play a greater role in the lives of school-age children (Friedman, Bowden & Jones, 2003). Educators will increase children's knowledge related to the characteristics of vegetables and fruits, the benefits of vegetable and fruit consumption, vegetable and fruit consumption recommendations and the impact of under-consumption of vegetables and fruits.

Perceived behavioral control is defined as an individual's perception of whether or not it is easy for individuals to consume vegetables and fruits. Perceived behavioral control is assumed to have a motivational influence on intention. Individuals who believe that they do not have the opportunity to behave will not have strong intentions, even though they are positive and supported by referents (people around them) (Fishbein and Ajzen, 2011). The increase in the value of perceived behavioral control in the treatment group is formed from beliefs about factors that support and discard perceptions of factors that hinder the display of an expected behavior. In addition, respondents also have the belief that there are many things that support obedient behavior. The higher the appreciation and belief of respondents regarding the factors that support the perception of behavioral control will move in a more positive direction.

According to Sulaeman *et al.* (2017), intention is the level of certainty about behavior as the main variable that can influence behavior. Intention is also a determining factor whether the behavior in question, in this case vegetable and fruit consumption behavior, will be carried out or not (Azwar, 2010). Educational interventions with Theory of Planned Behavior in this study provide an overview of how to form positive attitudes, subjective norms and perceived behavioral control, so that respondents can create a strong intention to consume vegetables and fruits as recommended. Puzzle media in this study plays a role in maintaining the intention that has been formed. The results of this study are supported by the statement of Peleg *et al.* (2017), which states that the cognitive education model moderated by the Theory of Planned Behavior construct has proven effective in understanding a person's health intentions and behaviors.

Table 3 shows the difference in delta values of all observed variables, namely the level of knowledge, attitudes, subjective norms, perceptions of behavioral control and intentions have increased for respondents in the treatment group and control group. When compared between the treatment group and the control group through the difference in the scores of each observed variable, it can be seen that the variables that have significant differences between the treatment group and the control group are the attitude variable (p=0.004) and subjective norms (p=0.025). This can occur because in the treatment group, the intervention provided is a puzzle. The difference in attitude in this study was due to the fact that the treatment group practiced making fruit salad directly and consumed fruit salad together. With the practice and consumption of fruit salad, respondents will have a positive evaluation, so individuals will tend to be favorable. This is what can cause respondents to have positive traits related to vegetables and fruits.

Table 3. Changes in Scores after the Nutrition Education Intervention

Variables	Treatment	Control	Independent t-test
	Mean ± SD	Mean ± SD	
Δ Knowledge	23.55 ± 16.13	17.18 ± 19.25	0.241
Δ Attitude	4.36 ± 2.68	2.14 ± 2.19	0.004
Δ Subjective Norms	3.36 ± 1.50	2.09 ± 2.09	0.025
Δ Perceived Behavioral Control	2.14 ± 2.12	1.36 ± 1.62	0.182
Δ Intention	2.45 ± 3.13	1.50 ± 2.80	0.293

The difference in subjective norms in this study is partly due to the treatment group conducting education in groups. By grouping respondents will exchange opinions more intensely related to vegetables and fruits. The results of this study are in line with the research of Maleki *et al.* (2016) that there are differences in subjective norms in the treatment group conducted through workshops and peer interaction activities. The concept of peer interaction is interpreted as an interaction between peers to share experiences, values and lifestyles that can influence each other (Kahfi, 2019).

The advantage of vegetable and fruit education research using puzzles is that it has never been done at the school. In addition, by doing this education, respondents do not feel burdened because by using puzzle media students can play while learning. Another advantage of this research is that not only are vegetables and fruits taught, but respondents are also involved in trying types of processed vegetables and fruits such as fruit salads. These activities can make respondents have a positive assessment of vegetable and fruit consumption. The disadvantage of this study is that it was only conducted for 4 sessions, so it is less effective to change the consumption behavior of respondents on an ongoing basis.

CONCLUSION

There were significant changes in the variables of knowledge, attitude, subjective norms, perception of behavioral control before and after being given nutrition education related to vegetables and fruits, both in the treatment group with puzzle media and the control group with poster media. Providing education with puzzle media was effective for changing attitudes and subjective norms in respondents when compared to poster media. To future researchers, it is expected to develop puzzle media related to vegetables and fruits, as well as the need for further researchers to perfect this research. It is also hoped that further research can measure vegetable and fruit consumption patterns in respondents.

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Conflict of Interest and Funding Disclosure

The author declares no conflict of interest in relation to this research study. There are no financial or personal relationships with individuals, organizations, or entities that could potentially bias or influence the research findings. Transparency and impartiality are maintained throughout the research process, ensuring the reliability and credibility of the study's outcomes.

Author Contributions

MAPS: investigation, writing-original draft, article-writing, formal analysis. TM: conceptualization, investigation, methodology, supervision.

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