

## Effectiveness of Balanced Nutrition Guidebook Media on Vegetables, Iron and Index Consumption Body Mass in Adolescent Students at Boarding Schools

(Case Study at Nurul Qur'an Islamic Boarding School and Nahdlotusy Syubban Islamic Boarding School, Sayung District, Demak Regency)

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### ABSTRACT

**Background :** Knowledge of food and nutrition is one of the factors that influence nutritional status, so formal and non-formal nutrition education is needed. Efforts to increase knowledge and attitudes regarding balanced nutrition are through the process of nutrition education. Nutrition education carried out must be in accordance with the conditions in Islamic boarding schools which limit students from using electronic media, one of which is by using pocket book media.

**Purpose :** Knowing the effect of nutrition education using pocket books on balanced nutrition guidelines on vegetable and fruit consumption, iron consumption and the BMI index in teenage students at Islamic boarding schools.

**Method :** This research is community nutrition research. This type of quasy experimental research with a research design *pretest – posttest control group design*. The sample consisted of 20 samples from the treatment group and 20 samples from the control group. The data collected are sample identity, knowledge and attitudes. Statistical analysis using test *Wilcoxon* and *Mann whitney*.

**Results :** The average score of vegetable and fruit consumption practices for the two groups has increased. In the treatment group, the increase before and after the intervention was  $59.00 \pm 28.19$ . The control group also experienced an increase between before and after being given the intervention of  $26.70 \pm 24.01$  and  $68.30$ . As for iron consumption in the treatment group, there was an average increase in the difference in Fe consumption before and after the intervention was  $1.27 \pm 1.24$ . The control group also experienced an increase in the average difference in Fe consumption between before and after being given the intervention of  $0.96 \pm 1.79$ . Nutrition education using pocket books on balanced nutrition guidelines had an effect on vegetable and fruit consumption and iron consumption with *p value* = 0,001 ( $p < 0,05$ ).

**Conclusion :** Nutrition education using pocket book media on balanced nutrition guidelines has an effect on consumption of vegetables and fruit, consumption of iron in teenage students at Islamic boarding schools.

**KEYWORDS:** nutrition education, pocket book media, guidelines for balanced nutrition, practice of consumption of vegetables and fruit, consumption of iron and BMI index.

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### INTRODUCTION

Nutrition is one of the factors that determine the level of health and harmony between physical and mental development. Nutritional problems that often occur in adolescents in Indonesia are undernutrition and overnutrition (Kurniawati, Santy and Putri, 2019). Malnutrition in

adolescents can reduce the body's resistance so that it is susceptible to disease, inhibits muscle formation during growth, and lacks intelligence. Adolescents with more nutritional status have clinical manifestations in adulthood so

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they are at high risk of developing cardiovascular disease (Fitriani, Dewanti, Kuswari, Gifari and Wahyuni, 2020).

Adolescent girls are more susceptible to anemia because of their growth period so they need higher nutrients including iron (Sediaoetama, 2011). Riskesdas report data, in 2018 the Indonesian population aged >10 years was included in the category of underconsuming fruits and vegetables (95.5%) (Ministry of Health, 2007). In 2013, Central Java Province showed that the proportion of the population aged >10 years who consumed less fruit and vegetables reached 91% (Ministry of Health 2008 in Hafifi, 2018).

Based on the results of the 2018 Riskesdas, nutritional status assessment was seen from (BMI/U), the national prevalence of wasting in adolescents aged 13-15 years was 8.7%, while the prevalence of obesity was 16% (National Riskesdas Report, 2018). In Central Java in 2018 the nutritional status assessment was based on (BMI/U), the prevalence of wasting in adolescents aged 13-15 years was 8.4%, while the prevalence of obesity was 14.6% (Central Java Riskesdas, 2018). The results of previous studies showed that the nutritional status of students was 52.9% thin, 38.2% normal and 8.8% obese (Khusniyati, Sari and Ro'ifah, 2015).

Under these conditions, attention to nutritional problems needs to be increased by changing people's nutritional behavior towards balanced nutritional behavior (Kemenkes RI, 2014). According to Soekirman (2011), the Ministry of Health of the Republic of Indonesia published guidebooks for balanced nutrition in 2003 and 2005, but the lack of outreach and publication in the field made people less aware of balanced nutrition guidelines.

The low level of adolescent knowledge regarding balanced nutrition can be seen based on research conducted by Mubarakah, Sartono and Teguh Isworo (2014) on the students of the Asy-Syarifah Islamic Boarding School Mranggen Demak showing that the average score of the level of nutrition knowledge is 74.81% in the medium category. . Another study conducted by Fathonah, Setyaningsih and Astuti (2015) on female students at the Roudlotul Muhtadiin Balekambang Jepara Islamic boarding school showed that the average score of nutritional knowledge was 56.7 and was included in the low category.

To increase nutritional knowledge, it is necessary to socialize about balanced nutrition guidelines which explain the description of daily food intake must contain nutrients in the type and amount (portion) according to the needs of each person or age group (Ministry of Health RI, 2014). Efforts that can be made to increase knowledge of balanced nutrition is through the process of nutrition education. Nutrition education provided must use appropriate educational methods and media so that the delivery of material can be easily accepted by the target audience (Astuti, Sari and Felle, 2020).

The use of media such as pocket books in nutrition education activities facilitates the process of material exposure so that the information messages conveyed are clearer in improving learning processes and outcomes (Kurdanti, Khasana and Fatimah, 2019). A pocket book is a medium capable of conveying health messages in the form of a small book that can be used during research (Azadirachta and Sumarmi, 2017). The advantages of pocket books include being durable, easy to use, relatively inexpensive, can be carried anywhere, facilitate understanding and increase learning motivation (Hanif, Ririanty and Nafikadhini, 2019). Based on previous research, nutrition education using pocket books can significantly increase the nutrition knowledge of 5th grade elementary school children (Eliana and Solikhah, 2012). Other research also shows that the use of pocket books can influence students' knowledge and practice in consuming vegetables and fruits (Azadirachta and Sumarmi, 2017).

Preliminary studies were carried out at the Nurul Qur'an Islamic Boarding School Sayung Demak and at the Nahdlotusy Syubban Islamic Boarding School Sayung Demak. The location was chosen because it has the same characteristics in terms of area, environmental conditions, and the pesantren education system. Sampling was carried out randomly on 20 students who were also students at the MTs level at each Islamic boarding school. Preliminary studies were carried out by providing knowledge questionnaires regarding balanced nutrition guidelines. The results of the preliminary study show that the average score of knowledge about balanced nutrition guidelines at the Nahdlotusy Syubban Islamic boarding school is 61.75 and at the Nurul Qur'an Islamic boarding school is 43.25.

This study aims to determine the effectiveness of the Pocket Guide to Balanced Nutrition media on consumption of vegetables, fruits, iron and BMI in young students at the Nurul Qur'an Sayung Demak Islamic Boarding School and at the Nahdlotusy Syubban Sayung Demak Islamic Boarding School.

### METHOD

The type of research used is *Quasy Experimental* by intervening in research subjects who aim to see any changes after the intervention is carried out and using the design *pre test and post test control group design*. The location of this research was carried out at the Nurul Qur'an Islamic Boarding School Sayung Demak and at the Nahdlotusy Syubban Sayung Demak Islamic Boarding School.

The sample of this study were 19 people in the intervention group and 19 people in the control group. Estimates of the size of the research sample are based on calculations using the formula for testing the hypothesis of the average difference in 2 independent groups. The characteristics or criteria determined in sampling for both the intervention group and the control group are as follows:

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1. Inclusion Criteria : 13-15 years old, willing to be a research respondent, present when the research is conducted, and have never received nutrition education.
2. Exclusion Criteria : not present when the research was conducted, resigned as a research subject, and sick.

The data collected included sample identity, knowledge and attitude data regarding the Guidelines for Balanced Nutrition

taken before and after the intervention. Data were analyzed by univariate and bivariate. Univariate analysis is presented in the form of categorical data and numerical data. Meanwhile, bivariate analysis Statistical analysis using test *Wilcoxon* and *Mann whitney*.

## RESULTS AND DISCUSSION

### A. Univariate Analysis Results

#### 1. Current practice *Pre test* and *Post test* in the Treatment Group and Control Group

**Table 1. Frequency Distribution of Practice Scores during the Pre test and Post test in the Treatment Group and the Control Group**

Category Internship	Treatment Group (n = 20)			Control Group (n = 20)		
	N	%	Mean±SD	N	%	Mean±SD
<b>Before</b>						
Well	10	50	68,30±10,25	9	45	69,85±11,47
Less	10	50		11	55	
<b>After</b>						
Well	15	75	77,40±11,94	7	35	70,45±12,53
Less	5	25		13	65	

From the table it can be seen that there was a change in the practice score or an increase in the respondents after being educated with pocket books.

#### 2. Consumption of Vegetables & Fruits Before and After Intervention in the Treatment Group and Control Group

**Table 2. Frequency Distribution of Vegetable & Fruit Consumption Before and After the Intervention in the Treatment Group and the Control Group**

Vegetable & Fruit Consumption Category	Treatment Group (n = 20)			Control Group (n = 20)		
	N	%	Mean±SD	N	%	Mean±SD
<b>Before</b>						
Well	2	10	335,10±64,78	0	0	314,00±35,29
Less	18	90		20	100	
<b>After</b>						
Well	8	40	394,10±69,80	2	10	340,70±42,14
Less	12	60		18	90	

From the table it can be seen that there was a change in the practice score or an increase in the consumption of vegetables & fruit in the respondents after the intervention.

#### 3. Consumption of Fe Before and After Intervention in the Treatment Group and Control Group

**Table 3. Distribution of Fe Consumption Frequency Before and After Intervention in the Treatment Group and the Control Group**

Fe Consumption Category	Treatment Group (n = 20)			Control Group (n = 20)		
	N	%	Mean±SD	N	%	Mean±SD
<b>Before</b>						

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Well	3	15		1	5	
Less	17	85	10,73±2,14	19	95	10,15±1,54
<b>After</b>						
Well	6	30		3	15	
Less	14	70	12,00±2,93	17	85	11,11±2,79

From the table it can be seen that there was a change in the practice score or an increase in Fe consumption in the respondents after the intervention.

**4. BMI Before and After Intervention in the Treatment Group and Control Group**

**Table 4. Distribution of BMI Frequency Before and After Intervention in the Treatment Group and Control Group**

BMI category	Treatment Group (n = 20)			Control Group (n = 20)		
	N	%	Mean±SD	N	%	Mean±SD
<b>Before</b>						
Normal	12	60		13	65	
Which ones	5	25	20,39±3,12	7	35	18,71±1,65
Fat	3	15		0	0	
<b>After</b>						
Normal	15	75		14	70	
Which ones	3	15	20,51±2,81	6	30	18,73±1,39
Fat	2	10		0	0	

From the table it can be seen that there was a change in practice scores or an increase in BMI in respondents after the intervention.

**B. Results of Bivariate Analysis**

**1. The Effectiveness of Nutrition Education on the Practice of Guidelines for Balanced Nutrition in Adolescent Santri** *Pre test* and *Post test* between the Treatment Group and the Control Group

**Table 5. The Effectiveness of Nutrition Education on Practices on Guidelines for Balanced Nutrition in Adolescent Santri between the Treatment Group and the Control Group**

Shoes Internship	Treatment Group (n = 20)		Control Group (n = 20)	
	Mean±SD	<i>p value</i>	Mean±SD	<i>p value</i>
<b>Before</b>	68,30±10,25	0,000*	69,85±11,47	0,163*
<b>After</b>	77,40±11,94		70,45±12,53	
<b>Δ practice</b>	9,10±6,40		0,60±5,96	
<b><i>P value</i> Δ practice</b>				0,000**

Description: \*) Wilcoxon \*\*) Mann Whitney test

Based on table 5, it can be seen that the average practice score of the treatment group before education was 68.30, increasing to 77.40 after being given education using pocket book media. With test results *wilcoxon* in the treatment group showed *p value* = 0.000 (<0.05) which means that nutrition education using pocket books is effective in increasing the practice of balanced nutrition guidelines for teenage students at Islamic boarding schools. Meanwhile, the mean score of the control group practice before education was 69.85, increasing to 70.45 after being given education without pocket books. With test results *wilcoxon* in the control group

showed *p value* = 0.163 (> 0.05), which means that nutrition education by using power point lectures is not effective in improving practice.

The treatment group experienced an average increase in the difference in practice scores before and after the intervention was 9.10 ±6,40. The control group also experienced an increase in the average difference in practice scores between before and after being given the intervention of 0.60±5.96. The results of statistical tests on differences in practice regarding guidelines for balanced nutrition among young students at Islamic boarding schools between the

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treatment group and the control group can be determined by conducting a test *Mann Whitney* because the data is not normally distributed. Test results *Mann Whitney* practice shows that  $p\text{ value} = 0.000 (<0.05)$ , which means that there is a difference in practice scores between the treatment group and the control group.

The results of this study are in accordance with the results of Briawan's research (2016) which found that before the intervention was carried out 50.9% of students had bad knowledge, 82.8% had bad attitudes and 34.0% had bad eating practices. But after the intervention with the media there was an increase in knowledge of 16.2%, attitudes increased by 7.4% and practice increased by 2.7%.

### 2. The Effectiveness of Nutrition Education on Vegetable & Fruit Consumption in Adolescent Santri *Pre test* and *Post test* between the Treatment Group and the Control Group

**Table 6.** The Effectiveness of Nutrition Education on Vegetable & Fruit Consumption in Adolescent Santri Between the Treatment Group and the Control Group

Consumption of Vegetables & Fruits	Treatment Group (n = 20)		Control Group (n = 20)	
	Mean±SD	p value	Mean±SD	p value
Before	335,10±64,78	0,000*	314,00±35,29	0,000*
After	394,10±69,80		340,70±42,14	
Δ consumption of fruit vegetables	59,00±28,19		26,70±24,01	
<b>P value Δ consumption of fruit vegetables</b>				0,001**

Note: \*) Paired Sample T-Test \*\*) Mann Whitney Test

Based on table 6 it can be seen that the average consumption of vegetables and fruit in the treatment group before education was 335.10 increased to 394.10 after being given education using book mediastart. With test results *Paired Sample T-Test* in the treatment group showed  $p\text{ value} = 0.000 (<0.05)$ , which means that nutrition education using pocket books is effective in increasing vegetable and fruit consumption among young students at Islamic boarding schools. Meanwhile, the average consumption of vegetables and fruit in the control group before education was 314.00, which increased to 340.70 after being given education without pocket books. With test results *Paired Sample T-Test* in the control group showed  $p\text{ value} = 0.000 (<0.05)$  which means nutrition education using lectures *power point* effective in increasing consumption of vegetables and fruit.

The treatment group experienced an increase in the average difference in vegetable and fruit consumption before and after the intervention was carried out by 59,00±28,19. The

control group also experienced an increase in the average difference consumption of vegetables and fruit between before and after given the intervention of 26.70±24.01. Statistical test results difference differences consumption of vegetables and fruit in adolescent students at Islamic boarding schools between the treatment group and the control group can be determined by conducting a test *Mann Whitney* because the data is not normally distributed. Test results *Mann Whitney* consumption of vegetables and fruit show that  $p\text{ value} = 0.001 (<0.05)$  which means there is a difference consumption of vegetables and fruit between the treatment group and the control group.

This is in accordance with the results of research by Azadirachta and Sumarni (2018) who concluded from the results of the study that the use of pocket media affects the knowledge and practice of elementary school students in the Tepus I enclosure, Lumajang district.

### 3. The Effectiveness of Nutrition Education on Fe Consumption in Adolescent Santri *Pre test* and *Post test* between the Treatment Group and the Control Group

**Table 7.** The Effectiveness of Nutrition Education on Fe Consumption in Adolescent Santri Between the Treatment Group and the Control Group

Fe consumption	Treatment Group (n = 20)		Control Group (n = 20)	
	Mean±SD	p value	Mean±SD	p value
Before	10,73±2,14	0,001*	10,15±1,54	0,001*
After	12,00±2,93		11,11±2,79	
Δ consumption of Fe	1,27±1,24		0,96±1,79	
<b>P value Δ consumption of Fe</b>				0,165**

Description: \*) Wilcoxon \*\*) Mann Whitney test

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Based on table 7, it can be seen that the average consumption of Fe in the treatment group before education was 10.73, increasing to 12.00 after being given education using book mediastart. With test results *Wilcoxon* in the treatment group showed  $p\ value = 0.001 (<0.05)$ , which means that nutrition education using pocket books is effective in increasing Fe consumption among young students at Islamic boarding schools. Meanwhile, the average consumption of Fe in the control group before education was 10.15, which increased to 11.11 after being given education without pocket books. With test results *Wilcoxon* in the control group showed  $p\ value = 0.001 (<0.05)$  which means nutrition education using lectures *power point* effective in increasing Fe consumption.

The increase in the average difference in Fe consumption in the treatment group before and after the intervention was carried out by  $1,27 \pm 1.24$ . Increase in the

average difference Fe consumption the control group before and after being given the intervention was  $0.96 \pm 1.79$ . Statistical test results difference differences Fe consumption in adolescent students at Islamic boarding schools between the treatment group and the control group can be determined by conducting a test *Mann Whitney* because the data is not normally distributed. Test results *Mann Whitney* Fe consumption show that  $p\ value = 0.165 (> 0.05)$  which means there is no difference Fe consumption between the treatment group and the control group.

The results of the research conducted were in line with Rotua's research (2017) which found that Nutrition education using the media was found to be effective in improving iron intake, protein intake, and statistically significant hemoglobin levels ( $p\ value < 0.005$ ).

#### 4. The Effectiveness of Nutrition Education on BMI in Adolescent Santri *Pre test* and *Post test* between the Treatment Group and the Control Group

**Table 8.** The Effectiveness of Nutrition Education on BMI in Adolescent Santri between the Treatment Group and the Control Group

IMT	Treatment Group (n = 20)		Control Group (n = 20)	
	Mean±SD	<i>p value</i>	Mean±SD	<i>p value</i>
<b>Before</b>	20,39±3,12	0,371*	18,71±1,65	0,807*
<b>After</b>	20,51±2,81		18,73±1,39	
<b>Δ IMT</b>	0,12±0,61		0,02±0,39	
<b><i>P value</i> Δ IMT</b>				0,530**

Information : \*) *Paired Sample T-Test* \*\*) *Independent Samplet T-Test*

Based on table 8 it can be seen that the average BMI in the treatment group before education was 20.39 which increased to 20.51 after being given education using book mediastart. With test results *Paired Sample T-Test* in the treatment group showed  $p\ value = 0.371 (> 0.05)$ , which means that nutrition education using pocket books is not effective in increasing BMI in teenage students at Islamic boarding schools. Meanwhile, the average BMI in the control group before education was 18.71, which increased to 18.73 after being given education without pocket books. With test results *Paired Sample T-Test* in the control group showed  $p\ value = 0.807 (> 0.05)$ , which means that nutrition education using *power point* lectures is not effective in increasing BMI.

The treatment group experienced an increase in the average difference in BMI before and after the intervention by  $0,12 \pm 0.61$ . The control group also experienced an increase in the average difference IMT between before and after given the intervention of  $0.02 \pm 0.39$ . Statistical test results difference differences IMT in adolescent students at Islamic boarding schools between the treatment group and the control group can be determined by conducting a test *Independent*

*Samplet T-Test* because the data is normally distributed. Test results *Independent Samplet T-Test* IMT show that  $p\ value = 0.530 (> 0.05)$  which means there is no difference IMT between the treatment group and the control group.

This result is in line with the research of Kurniasari et al (2021) who found that nutrition education is *mediae-booklet* effective in increasing knowledge by 2.21 (95% CI = 1.388 – 3.039,  $p = 0.000$ ) and attitude by 0.25 (95% CI = 0.091 – 0.408,  $p = 0.003$ ) compared to lecture alone in obese adolescents.

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