



The effectiveness of e-booklet and lectures to increase overweight adolescents' nutritional knowledge

Efektivitas e-booklet dan ceramah untuk meningkatkan pengetahuan gizi remaja overweight

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Abstract

Overweight adolescents' low knowledge of balanced nutrition is a problem that needs attention. If such a problem is left unchecked, overweight adolescents have a higher risk of suffering from various health problems. Efforts are needed to increase overweight adolescents' nutrition knowledge, including through the provision of nutrition education using educational media. The purpose of this study was to analyze differences in knowledge after being given nutrition education using e-booklets and lectures. This study was conducted at SMAN 4 and SMAN 7 Banjarmasin in September 2022. This study was an experimental research with a quasi-experimental design with pre-test – post-test control group. The sample in this study was selected by purposive sampling technique, namely 64 overweight students divided into two groups, namely nutrition education with e-booklets accompanied by lectures and nutrition education with lectures only. The intervention was carried out 4 times in one month and each meeting took 55 minutes. Data on differences between pretest and posttest were analysed by paired T Test and data on differences between education groups were analysed by Independent T Test. Results, there were differences in pretest and posttest nutritional knowledge in groups given nutrition education with e-booklet media and lectures ($p=0,000$) and there are differences in groups given nutrition education with lectures only ($p=0,001$). There was a significant difference effect between the provision of nutrition education in both education groups ($p=0,002$). In conclusion, providing nutrition education with e-booklet media combined with lectures can improve knowledge about balanced nutrition for overweight adolescents more effectively than lectures.

Keywords: Nutrition education, educational media, nutritional status of adolescents

Abstrak

Remaja *overweight* mempunyai pengetahuan yang rendah terkait gizi seimbang, ini merupakan masalah yang penting untuk mendapat perhatian. Remaja yang *overweight* memiliki risiko lebih tinggi terhadap berbagai masalah kesehatan. Oleh karena itu, diperlukan upaya untuk meningkatkan pengetahuan gizi remaja *overweight*, salah satunya dengan memberikan edukasi gizi menggunakan media edukasi. Tujuan penelitian untuk mengukur perbedaan pengetahuan antara sebelum dengan setelah diberikan edukasi gizi menggunakan media *e-booklet* dan ceramah. Penelitian ini dilakukan di SMAN 4 dan SMAN 7 Banjarmasin pada September 2022. Penelitian ini merupakan penelitian eksperimen dengan *desain quasi experiment with pre test – post test control group*. Sampel dipilih dengan teknik *purposive sampling*, yakni siswa *overweight* sebanyak 64 orang yang selanjutnya dibagi dalam dua kelompok, yaitu edukasi gizi dengan *e-booklet* disertai ceramah dan edukasi gizi dengan ceramah saja. Intervensi berupa edukasi gizi dilakukan sebanyak 4 kali pertemuan dalam waktu satu bulan dan setiap pertemuan menghabiskan waktu selama 55 menit. Data perbedaan pretest dan posstest dianalisis dengan

uji paired T Test dan data perbedaan antar kelompok edukasi dianalisis dengan uji Independent T Test. Hasil, terdapat perbedaan hasil pretest dan posttest pengetahuan gizi pada kelompok yang diberikan edukasi gizi dengan media *e-booklet* dan ceramah ($p=0,000$) serta terdapat perbedaan pada kelompok yang diberikan ceramah saja ($p=0,001$). Terdapat perbedaan pengaruh yang signifikan antara pemberian edukasi gizi pada kedua kelompok edukasi ($p=0,002$). Kesimpulan, pemberian edukasi gizi dengan media *e-booklet* yang dikombinasikan dengan ceramah dapat meningkatkan pengetahuan tentang gizi seimbang remaja *overweight* lebih efektif daripada ceramah.

Kata Kunci: Edukasi gizi, media edukasi, status gizi remaja

Introduction

Adolescence is defined as a transitional period from childhood to adulthood included in a vulnerable group (Darmawati & Arumiyati, 2017). In fact, most people with nutritional problems consider themselves healthy (World Health Organization, 2018). One of nutritional problems is being overweight. Being overweight as an adolescent can have long-term health risks (Reinehr, 2018). Overweight in adolescents under 18 years is indicated by a z-score (BMI for Age) $> 1 \text{ SD} - 2 \text{ SD}$, which is a condition of excessive accumulation of body fat.

The global prevalence rate of overweight among adolescents has increased equally among boys and girls, namely in 2016, 19% of boys and 18% of girls were overweight (WHO, 2018). The prevalence of overweight adolescents in Indonesia in 2018 with an age range of 16-18 years was 9,5%, while the prevalence of overweight adolescents in South Kalimantan was 8,9% (Kemenkes RI, 2018). Banjarmasin has a high overweight prevalence of 12,3%. Data from Health Department of Banjarmasin (2021) explains that of all sub-districts in Banjarmasin, West Banjarmasin is the sub-district with the highest percentage of overweight adolescents at 76%.

The cause of overweight adolescents is imbalanced nutrient intake (Kansra et al., 2021). Nowadays, adolescents consume energy-dense foods, consisting mostly of carbohydrates and fats. High energy intake can cause overweight (Narciso et al., 2019). Most adolescents consume food based on excessive food preferences that can lead to unmet or excessive nutritional needs by the body (Moehji, 2017). Other factors causing unmet or excessive nutritional needs include lack of food availability, poverty, bad eating habits and low knowledge about the importance of nutrients for health causing adolescents to accept any available information

without filter (Harjatmo et al., 2017). As a result, adolescents often receive a lot of inaccurate information. Poor diet quality and dietary habits may be associated with poor nutritional knowledge (Saeidlou et al., 2016). Therefore, it is necessary to provide nutrition education to increase adolescents' nutrition knowledge (Khomsan, 2022).

Nutrition education is an important tool for improving nutrition awareness and promoting healthy eating habits (Egg et al., 2020). The provision of nutrition education can increase adolescents' nutrition knowledge (Hamulka et al., 2018). The provision of nutrition education to adolescents is expected to be one of the efforts to overcome the overweight problem because the better the nutrition knowledge of adolescents, the greater the accuracy in making decisions to choose foods containing nutritional elements according to their needs and a balanced menu (Pratiwi & Puspitasari, 2017) and also refers to the process of providing information and instruction on healthy eating habits (Alzaben et al., 2021). The provision of nutrition education can be carried out by several methods and media. Nutrition education using media can facilitate educators to explain to the audiences in order to understand the material presented. A study revealed that the lecture method of nutrition education using booklet media was more effective in increasing adolescents' nutrition knowledge than the lecture method without the media. After receiving nutrition education using lectures and booklets, adolescent girls' knowledge increased from 73,96% to 78,89% (Safitri & Fitrianti, 2016).

The provision of nutrition education using attractive media can facilitate adolescents to understand the materials and overcome boredom (Zaki et al., 2019). In this study, nutrition education was provided using lectures and e-booklets. The method of oral presentation

delivery with slides to present information is called a lecture. Lectures have the advantage of reaching a large number of subjects and presenting more detailed information (Bertalina, 2015).

Along with advances in technology, information and communication, the provision of nutrition education has also developed using a variety of modern media (Van Horn et al., 2019). The selection of media and the proper method of delivering education significantly affect knowledge and behavior (Saykili, 2018; Rahmad et al., 2022). Smartphone usage is common among adolescents (Af, 2016; Al Rahmad et al., 2022). Several developed media, including booklets, which were in printed form are available in a digital form called e-booklets and can be accessed via smartphones (Eka, 2021). E-booklet preparation was adapted to the needs and conditions of adolescents and was combined with images to attract the attention of adolescents and avoid the boredom of adolescents while reading the materials. This was the reason for choosing e-booklets as the educational medium. E-booklet entitled 'Balanced Nutrition for Adolescents' used as a medium for nutrition education is related to the 4 pillars of balanced nutrition, namely consuming a variety of foods, adopting a clean lifestyle, having physical activity and monitoring body weight.

Based on the background, the researcher was interested to find out the effect of nutrition education using lectures combined with e-booklets on the increase in overweight adolescents' nutrition knowledge. The study was conducted at Senior High School 4 and Senior High School 7 Banjarmasin because based on secondary data from Health Department of Banjarmasin (2021), the two schools are located in sub-districts with the highest prevalence of overweight adolescents at 76%.

Methods

The design of this study was quasi-experimental research using a non-equivalent control group design to analyze the effect of nutrition education on the two groups, namely the group given nutrition education using lectures and the group given nutrition education using e-booklets and lectures. The population in this study were students aged 15-17 years in two senior high

schools (Senior High School 4 and Senior High School 7) in West Banjarmasin District, conducted in September of 2022. The number of samples was determined by calculating using the following formula (Murti, 2013).

$$n = \frac{(Z_{1-\alpha/2} + Z_{1-\beta})^2 \cdot (S_1^2 + S_2^2)}{d^2}$$

- n = Sample size of each group
- Z_{1-α/2} = Z statistic for type I error (α) (Z_{1-α/2} = 1,96 if α = 5%)
- Z_{1-β} = Z statistic for type I error (α) (Z_{1-β} = 0,84 if α = 20%)
- S₁ = Standard deviation of group 1 S₂ = Standard deviation of group 2
- d = Effect size, which is the minimum difference between the mean of the control group and the treatment group which is considered meaningful.

Based on research conducted by (Insani, 2019) on the effect of nutrition education interventions, on nutritional knowledge, eating habits and physical activity in adolescents, the following data were obtained:

- a) Mean ± SD knowledge of the treatment group = 75,3 ± 13,1
- b) Mean ± SD knowledge of the control group = 61,3 ± 20,1

Calculation of Lost Follow Up is done by 40%, based on the opinion of (Lolombulan, 2020), to avoid excessive bias. So the calculation of Lost Follow Up 40% of 23 = 9,2 (9), 23 + 9 = 32 people for each treatment group and the total sample in the study consisted of 32 people x 2 (treatment) = 64 people.

The sampling technique in this study was the purposive sampling technique, which is a sampling technique that does not use random sampling. In this technique, the researcher determines the sampling by determining the specific characteristics that are in accordance with the research objectives. According to the formula, it was obtained 64 subjects as samples, divided into 2 groups consisting of 32 overweight students as the control group (Senior High School 4 Banjarmasin) and 32 overweight students as the intervention group (Senior High School 7 Banjarmasin).

Before providing nutrition education, students' weight and height were measured as a benchmark to determine the nutritional status of research subjects, then adolescents

with overweight status, namely adolescents with the results of BMI-for-age (BMI/Age) ≥ 1 SD were used as samples in the study. Measurement of nutrition knowledge data was carried out by interview using the general nutrition knowledge questionnaire (GNKQ). The research subjects answered 30 questions in the form of multiple choice questions related to balanced nutrition knowledge. The score given is 0 if the answer is wrong and 1 if the answer is correct. The number of correct questions is divided by the number of questions and multiplied by 100%. Classification of knowledge of research subjects: good $> 80\%$ correct answers, sufficient 60-80% correct answers and less $< 60\%$ correct answers (Firdausi et al., 2022). Measurements were taken in the first week before the intervention and after the intervention.

The intervention was carried out 4 times a month and each meeting took 55 minutes. The control group was given nutrition education with lectures is the delivery of nutrition education through conventional lectures, which are conducted directly which allows two-way communication. In this study, the delivery of nutrition education through lectures was carried out four times for four weeks and delivered by researchers with powerpoint tools containing balanced nutrition learning materials based on the Regulation of the Minister of Health of the Republic of Indonesia Number 41 of 2014. The duration of the delivery of material from the opening to the closing of the event is 55 minutes. During the nutrition education, the research subjects were allowed to consult.

The intervention group was given nutrition education using e-booklets and lectures, e-booklets and lectures materials were made by the researcher with reference to the Regulation of the Ministry of Health of the Republic of Indonesia Number 41 of 2014 on

Guidelines for Balanced Nutrition in adolescents. The delivery of balanced nutrition messages is presented in the form of an e-booklet that has been made by researchers which will then be sent to research subjects so that it can be accessed offline via a smartphone. The e-booklet contains images, graphics and multimedia that make reading a more enjoyable experience. This education was conducted four times for four weeks with a duration of approximately 55 minutes 15 minutes of lecture, 30 minutes of e-booklet, 10 minutes to open and close the program at each face-to-face meeting and research subjects were allowed consultation during the intervention. Nutrition education has been carried out outside of class hours according to the schedule agreed upon with the homeroom teacher.

Data analysis includes univariate and bivariate analysis. Univariate analysis was used to describe each variable. Meanwhile, bivariate analysis includes paired t-test to determine differences in nutrition knowledge before and after the provision of nutrition education in each group. Independent t-test test were used to determine differences in nutrition knowledge between intervention group and control group. This study has been approved by the Research Ethics Committee of the Faculty of Medicine, Universitas Sebelas Maret Number 108/UN27.06.11/KEP/EC/2022.

Result and Discussion

This study consisted of 2 groups, namely the control group consisting of 32 overweight students who were given nutrition education with lectures is the delivery of nutrition education through conventional lectures and the intervention group consisting of 32 overweight students who were given nutrition education using e-booklets and lectures.

Table 1. Descriptive nutrition knowledge of overweight adolescents

Variable	n	Minimum - Maximum	Mean	Deviation	p-value
Intervention group					
Nutrition knowledge (pretest)	32	13 - 77	56,43	13,57	0,228
Nutrition knowledge (posttest)	32	43 - 93	70,50	13,30	0,437
Control group					
Nutrition knowledge (pretest)	32	23 - 70	51,50	11,53	0,299
Nutrition knowledge (posttest)	32	33 - 87	59,56	14,42	0,353

Prior to the provision of nutrition education, a nutrition knowledge pretest was conducted. Based on Table 1, the result of the pre-test on nutrition knowledge was 56,4 for the intervention group and 51,50 for the control group. The difference in pretest scores between the intervention group and the control group was 14,07. After receiving nutrition education every one week for one month, a nutrition posttest was conducted. Meanwhile the result of the posttest for the intervention group was 70,50 and for the control group was 59,56. The

difference in posttest scores between the intervention group and the control group was 10,94. The Shapiro Wilk normality test was used to determine the distribution of data for each educational group. Pretest and post test data of both education groups were normally distributed because the results of the normality test were $p > 0,05$.

Furthermore, paired t test was conducted to determine whether there was a difference between the pretest and posttest results of nutritional knowledge.

Table 2. Statistical test results of nutrition knowledge

Variable	n	Mean	Deviation	Δ Mean \pm SD	CI : 95% (Lower - Upper)	p-value
Intervention group						
Nutrition knowledge (pretest)	32	56,43	13,57	14,06 \pm 12,06	9,71-18,41	0,000
Nutrition knowledge (posttest)	32	70,50	13,30			
Control group						
Nutrition knowledge (pretest)	32	51,50	11,53	8,06 \pm 12,68	3,48-12,63	0,001
Nutrition knowledge (posttest)	32	59,56	14,42			

Based on table 2, the average nutrition knowledge in the control group given nutrition education using only lectures increased from 51,5 to 59,5. The intervention group given nutrition education using lectures and e-booklets also increased from 56,4 to 70,5. The increase in the intervention group was higher than that in the control group given nutrition

education using lectures. The results of the paired t-test of both groups obtained p-value $< 0,05$, meaning that there was a difference before and after nutrition education was given. Furthermore, independent t-test was conducted to analyze the differences effect of nutrition education between the control group and the intervention group.

Table 3. Differences in the effect of nutrition education

Variable	n	Δ Mean \pm SD	CI : 95% (Lower-Upper)	p-value
Intervention group	32	10,93 \pm 3,46	4,00-17,87	0,002
Control group	32			

Based on table 3, it was obtained p-value was 0,002 ($p < 0,05$), meaning that there was a significant difference in nutrition knowledge between the group given nutrition education using only lectures and the group given nutrition education using lectures and e-booklet. The difference in the mean increase in nutritional knowledge scores showed that the intervention group had better results. This results are in accordance with research by Azinar and Febriana (2019) stating that statistically, the use of e-booklet media is effective in increasing students' knowledge of reproductive health materials. Before the intervention, the students' knowledge is 62,12 and after the intervention, students' knowledge increases to 71,76. The use of e-

booklets during the learning process increases the students' interest and facilitates the students to understand the materials. According to research by (Nikmah et al., 2022), nutrition education using e-booklet media can increase knowledge on anemia in adolescent girls with a p-value of 0,004 ($p < 0,05$). Research by (Kurniasari et al., 2021) revealed that nutrition education using lectures and e-booklets is more effective in increasing the respondents' knowledge of obesity. In addition, the effectiveness of the provision of nutrition education using lectures and e-booklet media can be seen from the statistical results indicating that e-booklets can increase nutrition knowledge by 2,21 times compared to nutrition education using only lectures.



Figure 1. E-booklet Media

Student learning outcomes with the use of e-booklets have better results than those without e-booklets. The use of e-booklet is effective because it can be accessed via smartphones. Students can study independently, anywhere, and anytime by downloading the e-booklet files (Azinar & Fibriana, 2019).

One of the factors that affect a person's nutrition is a lack of knowledge about nutrition (Nuryanto et al., 2014). Nutrition education is needed in an effort to increase the nutrition knowledge of school-age children and is expected to increase nutrition knowledge. In addition, it also forms a positive attitude toward nutritious food which leads to the formation of better eating habits (Nurmasyita et al., 2016). The better a person's nutrition knowledge, the more careful consideration and decision-making to consume food in terms of quantity, type and quality in accordance with the body's needs, so that nutritional problems can be prevented (Maharani, 2018).

E-booklet is easy to use and has an attractive design, in terms of writing, images, and colors. The students will not get bored using the e-booklet because it contains images to help the students understand the nutrition education materials presented (Azinar & Febriana, 2019).

Conclusion

Educational media in the form of e-booklets and lectures had an effect on nutrition knowledge. The knowledge score of overweight adolescents who received nutrition education with e-booklet media and lectures was higher than the group

that received nutrition education with lectures only.

Nutrition education with a combination of ebooklets and lectures can be one of the effective media that can be used in schools or educational institutions to improve the nutritional knowledge of overweight adolescents in hope it can help increase adolescents' awareness of their nutritional needs and prevent overweight.

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