Media Gizi Kesmas
p-ISSN 2301-7392, e-ISSN 2745-8598
10.20473/mgk.v14i1.2025.94-103

ORIGINAL ARTICLE **Open Access**

Effect of Education with *Cakram Asupan Makan dan Cairan Atlet* towards Athlete's Knowledge and Attitudes Related to Nutrition at SSB Baturetno

Pengaruh Edukasi Cakram Asupan Makan dan Cairan Atlet terhadap Pengetahuan dan Sikap terkait Gizi pada Atlet di SSB Baturetno

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Submitted: 24-09-2024
Accepted: 25-06-2025
Published: 30-06-2025

Citation:
Dewi, M. T. B. T., Wahyuningsih, S., Afriani, Y., Puspaningtyas, D. E., & Sari, S. P. (2025). Effect of Education with *Cakram Asupan Makan dan Cairan Atlet* towards Athlete's Knowledge and Attitudes Related to Nutrition at SSB Baturetno. *Media Gizi Kesmas*, 14(1), 94-103. https://doi.org/10.20473/mgk.v14i1.2025.94-103

ABSTRACT

Background: Athlete performance in Indonesia is often hindered by inadequate nutrient intake. The nutritional intake of athletes is influenced by their knowledge of nutrition. The knowledge and attitudes of athletes regarding nutritional needs can be enhanced through the educational media of the Cakram Asupan Makan dan Cairan Atlet.
Objective: To determine the effect of education using the *Cakram Asupan Makan dan Cairan Atlet* on athletes' knowledge and attitudes related to nutrition.
Methods: A quasi-experimental study with a one-group pretest-posttest design was used in this research. A total of 33 adolescent athletes aged 13-15 years from SSB Baturetno were selected as respondents using accidental sampling. Data were collected through a validated questionnaire, with interventions conducted twice a week. The Paired Sample T-test was used to analyze the pre-test and post-test I knowledge data, while the Wilcoxon Rank Test was applied for the pre-test and post-test II knowledge, as well as all tests on attitude scores.
Results: The average pre-test knowledge score is 6.61±1.903. The average post-test I knowledge score is 9.18±2.833, and the median post-test II knowledge score is 10 (range 5-14). The median pre-test attitude score is 10 (range 4-14), with median post-test I and II attitude scores being 11 (range 4-14) and 12 (range 6-14), respectively. There was an effect of education on knowledge with $p1<0.001$; $p2<0.001$; $p3=0.06$. There was an effect of education on attitude with $p1=0.014$; $p2<0.001$; $p3=0.369$.
Conclusions: There was an influence of the education using *Cakram Asupan Makan dan Cairan Atlet* on athletes' knowledge and attitudes towards nutrition.

Keywords: Adolescent athletes, CAMCA media, Nutrition Knowledge, Nutrition related attitudes, Sport nutrition education

ABSTRAK

***Latar Belakang**: Performa atlet di Indonesia sering terganggu karena asupan zat gizi yang tidak tepat. Asupan zat gizi atlet dipengaruhi oleh pengetahuan mengenai zat gizi. Pengetahuan dan sikap atlet terkait kebutuhan gizi dapat ditingkatkan melalui edukasi media Cakram Asupan Makan dan Cairan Atlet.*
***Tujuan**: Mengetahui pengaruh edukasi menggunakan Cakram Asupan Makan dan Cairan Atlet terhadap pengetahuan dan sikap atlet terkait gizi.*
***Metode**: Kuasi eksperimental dengan rancangan one group Pretest-Posttest digunakan pada penelitian ini. 33 atlet remaja usia 13-15 tahun di SSB Baturetno menjadi responden penelitian dengan menggunakan insidental sampling.*

Pengumpulan data menggunakan kuesioner yang telah diuji validitasnya, sementara intervensi diberikan dua kali dalam seminggu. Paired sample T-test digunakan untuk menganalisis data pengetahuan pre-test dan post-test I, serta Wilcoxon Rank Test untuk pre-test dengan post-test II pengetahuan, serta seluruh pengujian pada skor sikap.
Hasil: *Rerata skor pre-test pengetahuan adalah 6,61±1,903. Rerata skor post-test I pengetahuan adalah 9,18±2,833, dan median skor post-test II pengetahuan adalah 10 (5-14). Median skor pre-test sikap adalah 10 (4-14), dengan median skor post-test I dan II sikap berturut-turut adalah 11 (4-14) dan 12 (6-14). Ada pengaruh edukasi terhadap pengetahuan dengan p1<0,001; p2<0,001; p3=0,06. Ada pengaruh edukasi terhadap sikap dengan p1=0,014; p2<0,001; p3=0,369.*
Kesimpulan*: Ada pengaruh edukasi Cakram Asupan Makan dan Cairan Atlet terhadap pengetahuan dan sikap terkait gizi pada atlet.*

Kata Kunci*: Atlet remaja, Edukasi gizi olahraga, Media CAMCA, Pengetahuan gizi, Sikap gizi*

INTRODUCTION

Indonesia actively participates in global football competitions to enhance its presence on the international stage. However, the lack of human resource quality hinders the Indonesia national football team from achieving significant accomplishments at the international level (Prawira and Tribunika, 2016). According to Mohamad Kusnaeni, the performance of Indonesian football players tends to decline in the final minutes of a match (Mahares, 2023). Furthermore, as stated on the official website of the Football Association of Indonesia (PSSI), the head coach of the national team acknowledged that one of the main deficiencies among Indonesian national team players is their stamina.

From a nutritional perspective, an appropriate diet has a significant impact on an athlete's performance. However, in practice, most athletes do not adhere to proper dietary patterns. Research indicates that football athletes in Yogyakarta often have inadequate dietary habits. Energy intake was classified as insufficient in 50% of the respondents. Additionally, 87% of respondents had inadequate protein intake, 60% had insufficient fat intake, and 40% had inadequate carbohydrate intake (Afriani and Puspaningtyas, 2019). Furthermore, another study found that only approximately 1.7% of adolescent athletes maintained a high-quality diet in terms of variety, adequacy, moderation, and overall balance (Sahara, Widyastuti and Candra, 2019).

An athlete's dietary intake is influenced by their level of nutrition knowledge (Penggalih *et al.*, 2023). A study has shown that the majority of adolescent athletes have inadequate nutritional knowledge (74.6%) (Simbolon *et al.*, 2023). Research conducted on adolescent football athletes in Brazil revealed that their level of nutritional knowledge was relatively low (54.6%), and their dietary intake was inadequate in several food groups, including carbohydrates, fruits, vegetables, and dairy products (Noronha *et al.*, 2020).

Efforts to enhance nutritional knowledge are implemented through nutrition education. The success of nutrition education is highly influenced by the selection of suitable educational tools or media. Educational media are designed with the understanding that individuals receive information through their sensory perceptions (Sekti and Fayasari, 2019). One crucial aspect to consider in ensuring the success of education initiatives is aligning educational media with the characteristics of the target audience(Harahap and Pradana, 2024).

Cakram Asupan Makan dan Cairan Atlet (CAMCA) is an innovative nutrition cakram specifically designed for athletes as an educational tool for adolescent athletes. Based on preliminary research on the development of educational media for adolescent athletes, CAMCA has been proven to be a highly engaging medium for further improvement and implementation due to its practicality and ease of use (Afriani *et al.*, 2022). However, no previous studies have examined the impact of CAMCA media on athletes' nutritional knowledge and attitudes. SSB Baturetno is one of the football schools in Yogyakarta that has produced athletes with significant achievements in football. However, previous studies indicate that 66% of athletes at SSB Baturetno consume an unvaried diet with improper portion sizes. Additionally, the average level of knowledge among athletes regarding dietary management remains low, with a score of 50.3 (Sari *et al.*, 2020).

Based on the explanation above, this study aims to explore the impact of nutrition education using CAMCA media on the knowledge and attitudes of athletes at SSB Baturetno. The research problem focuses on understanding whether the use of CAMCA media can bring about meaningful changes in athletes' nutritional understanding and behavioral disposition. Given that previous studies

have not yet examined the implementation of CAMCA media specifically in the context of adolescent athletes, particularly within football training institutions like SSB Baturetno, this study seeks to fill that gap. By assessing changes in both knowledge and attitudes, the researchers intend to evaluate the effectiveness of CAMCA-based educational interventions and their potential to influence long-term health behaviors in young athletes.

METHODS

Quasi-experimental one-group pretest-posttest design was used in this study. This study involving 33 adolescent athletes aged 13–15 from SSB Baturetno. The reason the researcher selected adolescent athletes as the study sample is because adolescence is a critical period for establishing positive habits, particularly those related to a healthy lifestyle. In this context, knowledge and attitudes regarding proper nutrition can significantly support their long-term performance as athletes. Furthermore, aside from being in a growth phase that requires optimal nutritional intake, adolescent athletes also need to pay attention to their specific nutritional needs as athletes. The sample in this study was selected using an accidental sampling technique. The independent variable in this study is CAMCA-based education, while the dependent variables are athletes' nutritional knowledge and attitudes.

The CAMCA media used in this study is the "*Cakram Asupan Makan dan Cairan Atlet*". This disk consists of two sides, providing information on energy requirements and the recommended daily food portions for adolescent athletes. The utilization of this disc is relatively straightforward. By first identifying the respondent's age, their estimated energy requirement can be determined. On the reverse side, the disc provides information on the nutritional intake necessary to meet the respondent's energy needs

Athletes' nutritional knowledge and attitudes were measured using a validated knowledge and attitude questionnaire. This questionnaire is a specialized instrument developed by the researcher to align the content of the media with the questions presented. The knowledge and attitudes measured by this questionnaire pertain to energy needs and the appropriate portion sizes of food that should be consumed by adolescent athletes according to their age. The validity test was conducted through expert judgment by two experts in sports nutrition. The average score obtained from the expert judgment validation was 82.5 (≥75), indicating that the questionnaire is suitable for use as a research instrument. There are 15 statements in the knowledge questionnaire and 14 statements in the attitude questionnaire that related to nutrition.

The intervention was conducted by providing education using CAMCA media for twice a week. The first session was used for the initial intervention, where respondents first completed a pre-test for 5 minutes before the education session began. Subsequently, a 10 minutes educational session was conducted, covering adolescent athletes' energy needs and the appropriate food portion sizes, based on the information provided in the CAMCA media. After the education session, respondents were asked to complete post-test I for 5 minutes. The second session was held on the third day after the first intervention. The education session was repeated using the same media and materials, but no post-test was administered in this session. Post-Test II was conducted two days after the second intervention and was administered online via Google Forms, which was distributed by the researcher. The repetition of the post-test aimed to evaluate changes in athletes' nutritional knowledge and attitudes before and after CAMCA-based education over a specific period.

Figure 1. The CAMCA Media Used

Analyzing data was done by SPSS trough paired sample t-test and wilcoxon rank test. Paired Sample T-test for comparing the pre-test and post-test I scores on nutritional knowledge, as both datasets were normally distributed according to the Shapiro-Wilk normality test. The Wilcoxon Rank Test was used to analyze the pre-test and post-test II scores on nutritional knowledge, as well as all attitude score analyses, since these datasets were not normally distributed in the normality test. This research has obtained ethical approval from the Ethics Committee of Universitas Respati Yogyakarta, under approval number 046.3/FIKES/PL/IV/2024, granted on April 26, 2024.

RESULT AND DISCUSSION

Respondent Characteristics

A total of 33 adolescent athletes who participated as respondents in this study were entirely male (100%). In terms of age distribution, the majority were 15 years old (48.5%), followed by 14-year-old athletes (27.3%) and 13-year-old athletes (24.2%). The characteristics of the respondents are presented in Table 1.

Table 1. Respondent Characteristic

Characteristic	Frequency(n)	Percentage (%)
Gender		
Male	33	100
Age		
13 years	8	24.2
14 years	9	27.3
15 years	16	48.5

The Impact of CAMCA on Nutritional Knowledge

The study results indicate an increase in the average nutritional knowledge of athletes before and after the intervention. There was a score increase of 2.57 in post-test I compared to the pre-test, which was conducted before the intervention. After the second intervention, the knowledge score further increased by 1.06 in post-test II. The median score of nutritional knowledge also showed an increase in post-test I and post-test II, with values of 3 and 1, respectively. Statistical analysis revealed a significant difference between the pre-test and post-test I, as well as between the pre-test and post-test II ($p<0.001$). However, no significant difference was found between post-test I and post-Test II ($p = 0.06$). The changes in knowledge scores are presented in Table 2.

Table 2. Changes in Nutrition Knowledge Scores

Nutrition Knowledge	Mean (±SD)	Median (minimum-maximum)	p
Pre-test	6.61 (±1.903)	6 (3-11)	<0.001[ab]
Post-test I	9.18 (±2.833)	9 (4-14)	
Pre-test	6.61 (±1.903)	6 (3-11)	<0.001[ac]
Post-test II	10.24 (±2.634)	10 (5-14)	
Post-test I	9.18 (±2.833)	9 (4-14)	0.06[c]
Post-test II	10.24 (±2.634)	10 (5-14)	

[a]) Significant p<0,05
[b]) Paired Sample T-test
[c]) Wilcoxon Rank Test

Athlete performance is influenced by several factors, including physical condition, sports experience, training programs, and proper nutrition (Peeling *et al.*, 2018). Adequate dietary intake is essential to support both an athlete's performance and overall health. Good nutritional knowledge can influence healthy food choices, which in turn supports athletic performance (Penggalih *et al.*, 2023).

Knowledge can be defined as an individual's awareness or understanding of specific facts, information, skills, or principles. It is acquired through cognitive processes, meaning that an individual must first comprehend a certain field of knowledge before mastering it. Several factors influence knowledge, including age, gender, education level, occupation, interests, information sources, environment, and sociocultural conditions (Darsini, Fahrurrozi and Cahyono, 2019)

Education plays a crucial role in increasing an individual's knowledge. The use of appropriate educational media is one of the key factors in ensuring the effectiveness of educational interventions (Harahap and Pradana, 2024). The knowledge assessed in this study focuses on energy requirements and the portion sizes of food that athletes need to consume, using the CAMCA

educational media. The CAMCA educational tool provides information about the energy needs of adolescent athletes and the recommended daily portions of different food groups. Data on knowledge levels were obtained through questionnaires administered to respondents before and after the CAMCA-based educational intervention.

Table 3. Frequency Distribution of Respondents Based on Their Responses to the Athlete Nutrition Knowledge Questionnaire at SSB Baturetno

No	Indicator	Pretest				Postest I				Postest II			
		Correct		Wrong		Correct		Wrong		Correct		Wrong	
		n	%	n	%	n	%	n	%	n	%	n	%
1	Definition of CAMCA	29	87.9	4	12.1	31	93.9	2	6.1	33	100.0	0	0.0
2	Number of servings of milk	30	90.9	3	9.1	31	93.9	2	6.1	29	87.9	4	12.1
3	Number of staple food portions	6	18.2	27	81.8	25	75.8	8	24.2	25	75.8	8	24.2
4	Number of fruit servings	7	21.2	26	78.8	19	57.6	14	42.4	21	63.6	12	36.4
5	Number of servings of vegetable side dishes	9	27.3	24	72.7	11	33.3	22	66.7	18	54.5	15	45.5
6	Number of servings of sports drink	19	57.6	14	42.4	25	75.8	8	24.2	27	81.8	6	18.2
7	Number of servings of animal side dishes	9	27.3	24	72.7	19	57.6	14	42.4	22	66.7	11	33.3
8	The function of CAMCA	30	90.9	3	9.1	29	87.9	4	12.1	31	93.9	2	6.1
9	The function of CAMCA	3	9.1	30	90.9	4	12.1	29	87.9	4	12.1	29	87.9
10	Athlete energy needs	7	21.2	26	78.8	20	60.6	13	39.4	27	81.8	6	18.2
11	CAMCA components	11	33.3	22	66.7	8	24.2	25	75.8	8	24.2	25	75.8
12	Number of oil portions	12	36.4	21	63.6	16	48.5	17	51.5	14	42.4	19	57.6
13	Number of vegetable servings	12	36.4	21	63.6	19	57.6	14	42.4	24	72.7	9	27.3
14	Information in CAMCA	24	72.7	9	27.3	29	87.9	4	12.1	32	97.0	1	3.0
15	The Function of CAMCA	10	30.3	23	69.7	17	51.5	16	48.5	23	69.7	10	30.3

According to the frequency distribution of respondents' answers from the questionnaire, item number 9 had the greatest number of incorrect responses, even after the second intervention. The statement in question item number 9 was: "*Media CAMCA dapat digunakan untuk mengetahui status gizi atlet".* A significant number of respondents were still misled by this statement. Additionally, there was a decrease in the number of correct answers for question item number 11. The statement in question item number 11 was: "*Salah satu komponen yang ada pada media CAMCA adalah berat badan ideal".* This decline may have been due to respondents' lack of focus during the CAMCA education session, preventing them from fully grasping the information presented. Furthermore, respondents' uncertainty about their answers during the pre-test, leading them to change their responses in the post-test, may have also contributed to the decrease in correct answers in both post-test I and post-test II.

The statistical test results showed a significant increase in post-test I compared to the pre-test in knowledge related to nutrition ($p<0.05$). The average knowledge score of respondents in the pre-test was 6.61, while in post-test I, the average score increased to 9.18. Additionally, the analysis of pre-test and post-test II demonstrated a significant difference ($p<0.05$), with the average knowledge score in post-test II reaching 10.24. The respondents' average nutritional knowledge scores consistently improved compared to the pre-test. The lowest level of knowledge in an individual is recognition, which involves recalling previously acquired information (Darsini, Fahrurrozi and Cahyono, 2019). The CAMCA-based nutrition education helped adolescent athletes become aware of their nutritional needs, leading to an increase in their knowledge. Providing nutrition education related to athletes' dietary requirements is an essential health promotion strategy that contributes to the enhancement of adolescent athletes' knowledge.

The success of educational objectives, particularly in improving knowledge, is highly influenced by the alignment of the media used with the characteristics of the audience (Harahap and Pradana, 2024). The effectiveness of media use in adolescent health education depends on the number of senses involved (Wahyuni and Arisani, 2022). The more senses engaged, the easier it is for adolescents to absorb information or education about nutrition. According to research, delivering nutrition information and education through

creative educational media such as posters, nutrition disks, snakes and ladders games, leaflets, handbooks, and audiovisual materials is more engaging and easier to understand due to the visual presentation and appealing color arrangements (Femyliati and Kurniasari, 2021).

The educational media used in this study is a nutrition disk, specifically the *Cakram Asupan Makan dan Cairan Atlet* (CAMCA). The CAMCA disk consists of two sides, providing information on energy requirements and the recommended daily food portions for adolescent athletes. Nutrition disks fall into the category of static printed media, containing text, images, and photos. When well-designed, these elements increase attractiveness and reading interest, thereby facilitating the process of acquiring new information (Mahmudah and Sari, 2020).

The nutrition disk as an educational medium can enhance students' knowledge, with an increase in knowledge categorized as good, from 87.5% before education to 97.5% after receiving a nutrition education intervention using the breakfast disk (Wahyuningsih and Darni, 2020). The use of disk media can increase interest in the information contained within the disk, making the learning environment more engaging. This interest in learning leads to more effective educational activities in improving adolescents' knowledge (Sulviani, Kurniasari and Elvandari, 2022). The nutrition disk is a new educational medium for adolescents, influencing their engagement in educational activities, which in turn enhances their knowledge (Mahmudah and Sari, 2020).

The comparison between post-test I and post-test II results indicates that there was no significant difference between the two ($p>0.05$), with the average knowledge score in post-test I being 9.18 and in post-test II being 10.24. Although the average knowledge score increased by 1.06 in post-test II, the change was not statistically significant. This may be attributed to the short time gap between post-test I and post-test II, which enabled respondents to retain information efficiently. Additionally, the second intervention, conducted between post-test I and post-test II, likely contributed to a better understanding of the educational material. Long-term knowledge retention is typically measured one week after the second intervention (Nabila *et al.*, 2023). Therefore, the post-test I and post-test II assessments in this study may not fully represent respondents' long-term knowledge retention.

The CAMCA media is an innovative educational tool designed for adolescents. It offers several advantages, including simplicity, practicality, and high appeal for young athletes. The cakram-shaped design of CAMCA allows the information it contains to be adapted to the target age group, ensuring that young athletes do not experience confusion during the educational process. This design fosters engagement and interest, ultimately boosting the effectiveness of education in enhancing adolescents' knowledge.(Mahmudah and Sari, 2020). Therefore, CAMCA education is an effective tool for enhancing young athletes' nutritional knowledge.

The Impact of CAMCA on Athletes' Nutrition-Related Attitudes

The research results indicate a difference in the median score of nutrition-related attitudes before and after the intervention. The median score of nutrition-related attitudes increased sequentially, with a score of 10 in the pre-test, 11 in post-test I, and 12 in post-test II. The Wilcoxon Rank Test results indicate a significant change between the pre-test and post-test I, as well as between the pre-test and post-test II ($p<0.05$). However, no significant difference was found in the nutrition-related attitude scores between post-test I and II. The nutrition-related attitude scores are presented in Table 3.

Table 4. Change in Nutrition-Related Attitude Scores

Nutrition-Related Attitude	Mean (±SD)	Median (minimum-maximum)	p
Pre-test	9.27 (±2.82)	10 (4-14)	0.014[a]
Post-test I	10.91 (±2.799)	11 (4-14)	
Pre-test	9.27 (±2.82)	10 (4-14)	<0.001[a]
Post-test II	11.55 (±1.669)	12 (5-14)	
Post-test I	10.91 (±2.799)	11 (4-14)	0.369[a]
Post-test II	11.55 (±1.669)	12 (5-14)	

[a]) Significant result of Wilcoxon Rank Test ($p<0,05$)

Attitude can be defined as an evaluative response that includes positive or negative judgments about an object. It reflects a person's beliefs, feelings, or behavioral tendencies toward a particular object. Additionally, attitude can be seen as a predisposition or willingness to act, even without the direct execution of a specific motive (Rachmawati, 2019). Attitude is not an overt action or activity but rather a tendency or inclination toward certain behavior (Fuadi, 2016).

In this study, nutrition-related attitudes were assessed using a validated 14-item

questionnaire. The analysis results revealed a positive shift in the average attitude score toward nutrition before and after the educational intervention. The pre-test average attitude score was 9.27, which increased to 10.91 in post-test I and 11.55 in post-test II. While the comparisons between pre-test and both post-tests showed statistically significant improvements ($p=0.014$ and $p<0.001$, respectively), no significant difference was found between post-test I and post-test II ($p=0.396$), indicating that the improvement did not continue significantly after the second intervention.

Various factors can shape a person's attitude, such as personal experience, the impact of influential individuals, culture and traditions, mass media exposure, education, and emotions (Fauziyah, Astuti and Fathonah, 2022). A person's attitude can be influenced by nutrition education. There is evidence of the effect of education using balanced nutrition disk media on adolescent girls' attitudes ($p<0.05$) (Prasetya and Purnasari, 2021). Attitude formation occurs when individuals possess both knowledge and interest. Nutrition knowledge influences a person's attitude toward nutrition (Yuliani and Endriyani, 2018). The better a person's nutrition knowledge, the more positive their attitude toward nutrition will be.

Table 5. Frequency Distribution of Respondents Based on Their Responses to the Athlete Nutrition Attitude Questionnaire at SSB Baturetno

No	Types of statements	Pretest				Postest I				Postest II			
		Positive		Negative		Positive		Negative		Positive		Negative	
		n	%	n	%	n	%	n	%	n	%	n	%
1	In my opinion, consuming main meals 3 times a day is enough to meet my nutritional needs as a football athlete.	4	12.9	29	93.5	15	48.4	18	58.1	17	51.5	16	48.5
2	I believe that not meeting my nutritional needs properly has a direct impact on my performance as a football athlete.	24	77.4	9	29.0	25	80.6	8	25.8	31	93.9	2	6.1
3	In my opinion, consuming only animal protein sources is enough to meet my nutritional needs as a football athlete.	21	67.7	12	38.7	25	80.6	8	25.8	27	81.8	6	18.2
4	I consume foods with balanced nutrition to meet my nutritional needs as a football athlete.	27	87.1	6	19.4	29	93.5	4	12.9	33	100.0	0	0.0
5	I always consume protein-rich foods at every main meal to meet my protein needs as a football athlete.	27	87.1	6	19.4	26	83.9	7	22.6	32	97.0	1	3.0
6	As a football athlete, I am not allowed to consume fried foods.	17	54.8	16	51.6	21	67.7	12	38.7	12	36.4	21	63.6
7	I will eat a lot of fried foods so that my energy needs as an athlete are met.	25	80.6	8	25.8	24	77.4	9	29.0	30	90.9	3	9.1
8	I believe that consuming fruit according to the recommended portions is a good way to meet my daily nutritional needs.	29	93.5	4	12.9	28	90.3	5	16.1	32	97.0	1	3.0
9	I will eat other sources of carbohydrates such as potatoes as a substitute if I don't want to eat rice.	27	87.1	6	19.4	29	93.5	4	12.9	32	97.0	1	3.0

No	Types of statements	Pretest				Postest I				Postest II			
		Positive		Negative		Positive		Negative		Positive		Negative	
		n	%	n	%	n	%	n	%	n	%	n	%
10	As an athlete, I don't think I need to pay attention to nutritional needs because sports activities are enough to keep my body healthy and fit.	19	61.3	14	45.2	26	83.9	7	22.6	30	90.9	3	9.1
11	In my opinion, sports food supplements or sports food do not need to be consumed by athletes because they will only add weight and do not provide significant benefits in improving performance.	14	45.2	19	61.3	19	61.3	14	45.2	25	75.8	8	24.2
12	In my opinion, sports food or sports food supplements can improve my performance as a soccer athlete.	21	67.7	12	38.7	27	87.1	6	19.4	26	78.8	7	21.2
13	In my opinion, consuming junk food or fast food will not have a bad effect on my health as an athlete because I exercise well.	16	51.6	17	54.8	21	67.7	12	38.7	23	69.7	10	30.3
14	As an athlete, I have different nutritional needs than other people who are not athletes.	25	80.6	8	25.8	25	80.6	8	25.8	31	93.9	2	6.1

Based on the distribution of responses to the nutrition-related attitude questionnaire, several questions were still answered with negative attitudes by most respondents, even after the second intervention. A negative attitude toward nutrition can be interpreted as a tendency to disregard the importance of consuming nutritious food and to neglect the principles of nutrition in daily life. Item number 1 had the highest number of negative attitude responses in the pre-test. The statement in item 1 was: "In my opinion, consuming main meals 3 times a day is enough to meet my nutritional needs as a football athlete". This statement was answered with a negative attitude by 29 respondents (93.5%) in the pre-test. In post-test II, the number of respondents with a negative attitude toward this item decreased to 16 (48.5%). This may have occurred due to the respondents' personal experiences, where they felt that eating three meals a day was enough to make them feel full and meet their daily needs as athletes. Personal experience can influence a person's attitude and perspective (Fauziyah, Astuti and Fathonah, 2022).

Item number 6 in the attitude questionnaire had the highest number of negative attitude responses in post-test II, with 21 respondents (63.6%) selecting a negative response. The statement in item number 6 was: "As a football athlete, I am not allowed to consume fried foods". This may have occurred due to a misunderstanding or incomplete comprehension of the information received regarding fried food consumption. This finding indicates that information sources and media can influence a person's attitude. The more sources of information accessible, the better a person's attitude tends to be (Hayati and Nuriya, 2018).

The test results for post-test I and II showed a p-value of 0.396 ($p>0.05$), meaning there was no significant difference between the post-test I and post-test II scores. Although the difference was not statistically significant, there was still an improvement in the average nutrition-related attitude score from post-test I to post-test II. Additionally, the non-significant result may be due to the fact that the athletes' average attitude scores were already quite good, as seen in post-test I, and further improved in post-test II. However, to assess long-term attitude changes, the post-test I and II results cannot be used to represent long-term attitude shifts due to the short time gap between the two post-tests.

The strength of this study lies in the use of educational media that has not been widely applied to adolescent athletes. Based on the results, *Cakram Asuapan Makan dan Cairan Atlet* (CAMCA) media positively influenced athletes' knowledge and attitudes. Therefore, the use of this disc media in educational interventions targeting adolescent athletes has the potential to be further developed. A limitation of this study lies in the timing of its implementation. The short duration of the intervention affected the results of posttest I and posttest II. The short interval between the two posttests may have contributed to the lack of significant changes in knowledge and attitudes. A longer intervention period is needed to better observe the long-term effects of nutrition education on knowledge and attitudes.

CONCLUSION

A significant difference was observed in knowledge and nutrition-related attitudes before and after the intervention utilizing the CAMCA educational media. The CAMCA education had an impact on the knowledge and nutrition-related attitude scores of adolescent athletes at SSB Baturetno, as evidenced by the rise in scores before and after receiving CAMCA education through two interventions over one week. The strength of this study lies in its contribution to updating the field of nutrition science, demonstrating that education using cakram media is effective in improving an individual's knowledge and attitude toward nutrition. However, a limitation of this study is the short time gap between post-test I and post-test II, which resulted in no significant change in knowledge and attitude levels. A longer intervention period is needed to assess the long-term effects of CAMCA education on nutrition-related knowledge and attitudes.

Acknowledgement

We would like to express our deepest gratitude to SSB Baturetno for their invaluable support and assistance in ensuring the smooth implementation of this research. The contribution and cooperation provided by SSB Baturetno have played a crucial role in the success of this study. Additionally, we would like to extend our sincere respect and heartfelt appreciation to all our academic advisors. Their guidance, advice, and support throughout the process of preparing this scientific article have been immensely helpful in the development and refinement of this work.

Conflict of Interest and Funding Disclosure

None

Author Contributions

MTTD: conceptualization, investigation, methodology, project administration, formal analysis, writing- original draft; SW: Research, writing-review and editing; YA: research, media inventor, writing-review and editing; DEP: research, media inventor, writing-review and editing; SPS: research, media inventor, writing- review and editing

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