



THE INFLUENCE OF INTERACTIVE BOOK AS NUTRITIONAL EDUCATION MEDIA ON KNOWLEDGE, ATTITUDE AND FLUID INTAKE AMONG TEENAGE GIRLS AT AT-TAHIYYAH ISLAMIC BOARDING SCHOOL

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ABSTRACT

One of nutritional problems in teenagers who live in islamic boarding schools is inadequate water consumption which puts them at risk of dehydration. This caused by many demands and draining activities that cause them to forget to drink. Teenage girls are more susceptible to dehydration due to hormonal influences. The limited fluid intake among teenage girls in islamic boarding schools can be attributed to their lack of knowledge about proper hydration. Furthermore, the absence of socialization and nutrition education within these institutions can contribute to inadequate knowledge and incorrect eating and drinking behaviour. The purpose of this study is to analyze the differences on knowledge, attitudes and fluid intake in teenage girls before and after giving the interactive book as a media for nutrition education. This quantitative study with a one group pretest posttest design was conducted at At-Tahiyah Islamic Boarding School. The research population was 54 teenage girls and all of them were used as samples (total sampling). The results showed that there are differences in knowledge, attitudes and fluid intake in teenage girls at At-Tahiyah Islamic Boarding School before and after giving the interactive book as a media for nutrition education with a p value = 0.000. It can concluded that interactive book is a media that can be used as a learning media for teenagers to enhancing their knowledge, attitudes, and fluid intake.

Keywords: Consumption of fluids, dehydration, interactive book.

Introduction

Teenagers is the transition period from childhood to adulthood which is characterized by physical, emotional, and cognitive changes¹. The growth in teenagers cause physical changes and affects the needs and adequacy of nutrients². A balanced intake of nutrients such as energy, protein, vitamins, and minerals also determine their condition in the future³. In addition, teenagers require sufficient fluid intake due to high physical activity, which often lead to a lack of awareness regarding signs of fluid loss in their bodies. Consequently, teenagers are more susceptible to dehydration⁴.

According to findings from The Indonesian Regional Hydration Study (THRIST) in 2010 showed that 46.6% of the Indonesian population is mildly dehydrated, with a higher prevalence among teenagers, specifically at 49.5%. The results of this study align with research that conducted in Bogor where there were 37.3% of teenagers who consumed less than 8 glasses of water/day and 24.1% of teenagers had a fluid intake of less than 90% of their needs⁵.

Dehydration occurs when the body loses more fluids than it takes. Insufficient fluid intake also associated with an increased of chronic disease⁶. Maintaining proper hydration, by consuming an adequate amount of water in accordance with the body's needs, is essential for overall well-being⁷. Based on research by Sudarsono in 2019, it was found that 56% of teenage girls are susceptible to dehydration⁸. This research aligns with research conducted in Bogor, which indicated that 49% of teenage girls and 40% of teenage boys experienced dehydration. Teenage girls are particularly susceptible to dehydration due to hormonal factors, including estrogen and progesterone. Estrogen leads to fluid and salt retention, while progesterone causes an appetite increases⁹.

Islamic boarding schools are one of an educational institution to educate the life of the nation. However, health problems in islamic boarding schools are the problem that require attention¹⁰. Many demands and activities of students can put them at risk of nutritional problems¹¹. The result of Maghfiralet *al* (2020) indicated that majority of teenagers at the Darul Aman Gombara Islamic Boarding School in Makassar had inadequate fluid intake¹². Based on preliminary investigations, health education had never been carried out at At-Tahiyyah Islamic Boarding School, including education that related to fluids. Teenage girls at this boarding school are used to consume less than 2L of water/day and they drink only when they feel thirsty. The extensive range of activities often leads them to overlook the importance of adequate hydration.

Knowledge about fluid consumption in teenager tends to be lacking. Therefore, efforts are needed to increase knowledge, especially about fluids in order for teenagers to avoid negative effects of dehydration that can interfere them in pursued their education. Nutrition education requires media to be interesting and not boring. Therefore, this study uses interactive books as a media of nutrition education.

Interactive book is a collection of written or printed sheets of paper that act on each other or mutually active between communicants and communicators through media that are combined with front and back covers¹³. Interactive books can be used as a media for nutrition education because it can make the learning process more interesting and the material presented becomes easier. In this study, the interactive book used contains games, many interactive sections and uses colors that suit to the respondents, so that it is expected to increase the respondents' interest in learning about fluid. Based on this background description, the researcher wanted to find out more about the effect of the interactive book as a media for nutrition education on knowledge, attitudes and fluid intake in teenage girls at At-Tahiyyah Islamic Boarding School.

Methods

This study was a quantitative study with a one group pretest posttest design conducted at At-Tahiyyah Islamic Boarding School in July 2023. The research respondents consisted of teenage

girls aged between 16 to 18 years old. Due to the small population size at At-Tahiyyah Islamic Boarding School, total sampling was used as the sampling technique with a sample of 54 people. This study was conducted over two periods of time, first day for the pre-test, intervention, and post-test 1, and the second day, conducted one week later for the post-test 2.

The instruments of this research were respondent characteristic forms, knowledge questionnaires comprised 15 true-or-false questions that made based on the information contained in the interactive book related to fluid, attitude questionnaires consists of 15 agree-and-disagree questions. All of the questions in the questionnaire are answerable in guttman scale. This questionnaire validity and reliability test was carried out on 35 teenage girls aged between 16 to 18 years old. The correlation coefficient of all items in the questionnaires is greater than r table (0.325 for 0.05 significance for 35 samples). The reliability test also showed that the Cronbach's alpha of all items is greater than 0.600 (knowledge's α : 0.804; and attitude's α : 0.830). Therefore, all items in the questionnaires are valid and reliable. Furthermore, 2x24 hour food recall forms used to gather information regarding the fluid consumption of the respondents. Hydration status was measured using urine reagent strips.

Data analysis includes univariate and bivariate data. Univariate analysis was carried out to describe descriptively the characteristics of respondents and each of the variables studied. Bivariate analysis was used to test the hypothesis and analyzed statistically using the One Way Anova test, followed by the Duncan test to prove whether there were differences on knowledge and attitudes, also using Paired Sample T-Test to prove the differences on fluid intake before and after giving the interactive book. Ethical clearance for this study has been granted by the Research Ethics Commission of EsaUnggul University under reference number 0923-07.045/DPKE-KEP/FINAL-EA/UEU/VII/2023.

Results

Based on table 1, it can be seen that the age distribution of respondents at At-Tahiyyah Islamic Boarding School at the age of 16 was 38 people (70.4%), 13 people were 17 years old (24%), and 3 people were 18 years old (5.6%). The average age of the respondents in this study was 16 years old with a standard deviation of 0.588. The lowest age of the respondent is 16 years old and the highest is 18 years old. The hydration status of the most respondents was with a BJU of 1.021-1.030 for 23 people (42.6%), followed by a BJU of 1.016-1.020 for 15 people (27.8%), BJU <1.015 for 11 people (20.4%) and BJU >1.030 as many as 5 people (9.2%). The lowest hydration status of the respondent was 1.005 and the highest hydration status of the respondent was 1.035.

Table 1. Characteristics of Participants

Characteristics of Respondents	n = 54			
	n	%	Mean±SD	Min-Max
Age				
16 years old	38	70.4	16.35±0.588	16-18
17 years old	13	24.0		
18 years old	3	5.6		
Hydration Status				
<1.015	11	20.4	1.02091±0.007	1.005-1.035
1.016 – 1.020	15	27.8		
1.021 – 1.030	23	42.6		
>1.030	5	9.2		

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Table 2. Knowledge, Attitudes, and Fluid Intake of Respondents

	Indicator	Mean±SD	Min-Max
Knowledge	Pre-Test (D)	66.28±11.07	40-87
	Post-Test 1 (D)	82.80±7.12	73-93
	Post-Test 2 (D+7)	88.17±7.12	73-100
Attitude	Pre-Test (D)	78.41±14.81	33-100
	Post-Test 1 (D)	89.83±8.24	73-100
	Post-Test 2 (D+7)	93.69±5.90	80-100
Fluid Intake	Pre-Test (D)	1254.91±297.27	593-1990
	Post-Test (D+7)	1581.81±408.08	756-2228

The average knowledge level of teenage girls before receiving the interactive book in the pre-test was 66.28±11.07, which means that the respondents had sufficient level of knowledge. After the pre-test was carried out, the teenage girls were given an intervention with interactive book, then they were given a post-test 1 and the average increased to 82.80±7.12, which means that the level of knowledge of the respondents included in the good category. After 7 days, post-test 2 was carried out and the average increased to 88.17±7.12, which means teenage girls have better knowledge.

The average attitude score of teenage girls before receiving the interactive book in the pre-test was 78.41±14.81, which means that the respondents had an adequate attitude. After the pre-test was carried out, the teenage girls were given an intervention with interactive book, then they were given a post-test 1 and the average increased to 89.83±8.24, which means that the attitude of the respondents included in the good category. After 7 days, post-test 2 was carried out and the average

increased to 93.69 ± 5.90 , which means that teenage girls have better attitude.

The average fluid intake for teenage girls before receiving the interactive book in the pre-test was 1254.91 ± 297.27 and based on the cut off point according to the Ministry of Health (1996) the average fluid intake fell within the ‘severe deficit’ category. After the pre-test, the respondents were given an intervention using interactive book, then one week later a post-test was carried out and the average increased to 1581.81 ± 408.08 , which means that the respondents’ fluid intake remained in the deficit category but had improved to the ‘moderate deficit’ category.

Table 3. The Changes in Knowledge, Attitudes, and Fluid Intake of Respondents Before and After Intervention

Time of Observation	Knowledge	Attitude	Fluid Intake
Pre-Test (H)	66.28 ± 11.07^c	78.41 ± 14.81^b	1254.91 ± 297.27^b
Post-Test 1 (H)	82.80 ± 7.12^b	89.83 ± 8.24^a	1254.91 ± 297.27^b
Post-Test 2 (H+7)	88.17 ± 7.12^a	93.69 ± 5.90^a	1581.81 ± 408.08^a

Note: the numbers that followed by different superscripts indicate significant differences ($p < 0.05$)

Based on the results, the values are $p < 0.05$, so that it was known that there were significant differences in the average score of knowledge, attitudes and fluid intake after being given intervention using interactive book.

Discussion

This research was conducted to determine the improvement in knowledge about fluids among 16-18 year-old teenage girls at At-Tahiyah Islamic Boarding School. Nutrition education is a strategy that supported by the environment and designed through various media, so the respondents can have appropriate food choices and behaviours related to nutrition¹⁴. Researchers use interactive book media. These interactive books contained educational content about fluids. Knowledge assessment comprised 15 true-or-false questions that made based on the information contained in the interactive book. Providing nutritional education media at young age has an advantage because at this time they think more logically and have formal operational thoughts and idealistic which will gradually decline and disappear in adulthood¹⁵.

The knowledge level has improved due to the fact that respondents received information about fluids through the interactive book. The provided media is engaging, making it easier for respondents to accept the message’s content¹⁶. In addition to the information on fluids, the interactive book also includes visuals and interactive elements like crosswords, word searches and question answers that related to fluid. The information they receive and comprehend leads to knowledge changes. This align with research that regarding differences in knowledge, attitudes, and actions of consuming fluids in adolescents at SMPN 220 West Jakarta after socialization with the monopoly game¹⁷.

The increase in knowledge scores during post-test 2 can be attributed to the fact that the

majority of respondents remained actively engaged with the provided media. Books are the media that closest with the respondents, so they can use the book when they have free time by completing the book's exercise. This media has the potential to influence changes in respondents' behaviour as it is grounded in knowledge and experience. Furthermore, interactive books serve as engaging educational tools due to the inclusion of illustrative pictures, aiding teenagers in comprehending the material easily¹⁶.

Attitude can be defined as a tendency to act like or dislike towards an object. Attitudes can act as a support in achieving a goal and are influenced by feelings of support or not support for an object¹⁸. Attitude is a condition that can lead to an action or behaviour¹⁹. The increase in the attitude score was due to the knowledge gained following the intervention using interactive book, thereby helping to increase the awareness and confidence of the respondents²⁰. The increase in attitude scores during post-test 2 occurred because most of the respondents re-read the material and they became increasingly aware of the importance of water in their daily lives. The respondents in this study also expressed a preference for the interactive book they received, which heightened their enthusiasm for learning about fluids. This aligns with a research indicating that interactive book media serves as a tool for cognitive stimulation in adolescents, fostering not only message reception, but also stimulating reader interaction²¹.

Fluid intake refers to the liquid that enters the human body through drinks and food²². In this study, fluid intake data was calculated based on the results of 2x24 hour food recall interviews where fluid intake can be derived from food and drinks. There was an increase in total fluid intake before and after the implementation of interactive book. This shows that respondents were successful in enhancing their fluid intake following the intervention. Each respondent in this study consumed more fluids after being given the intervention. The most commonly consumed type of drink is water. After the intervention was given, almost all respondents consumed more water compared to other drinks.

However, this study also had its limitation. The fluid intake of the respondents in this study increased, but it didn't reach the recommended limit, because the time that used to observe changes in fluid intake in this study only lasted for 7 days.

Conclusion

This study concludes that there were significant differences in the scores of knowledge, attitudes, and fluid intake before and after the intervention using the interactive book. Future research is recommended to provide interventions over a longer period of time and carried out periodically, so that fluid intake can increase to recommended level.

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Conflict of Interest

The authors declare that they have no conflict of interest.

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