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Research Article
Impact of Breakfast Counselling and 6 Days of Breakfast on the Nutritional Status and Knowledge of Middle School Students in Berastagi, Indonesia

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Abstract

Background and Objective: Adolescent malnutrition will determine a person's nutritional status in adulthood. Factors that determine whether a person will develop obesity or malnutrition will persist well into adulthood. Breakfast is a full meal that is consumed in the morning. It is recommended to consume meals that are low in fat content and have a sufficient amount of carbohydrates and protein. This study aimed to evaluate the impact of consuming a full breakfast for 6 days on the nutritional status and knowledge of breakfast among junior high school students. **Materials and Methods:** We recruited a total of 68 students from the 7th, 8th and 9th grades at Al Washliyah 42 Junior High School in Berastagi, North Sumatera, Indonesia. These students were given breakfast for 6 days in a row with counselling on the importance of breakfast via the "Breakfast Ambassador" programme. Breakfast was served by the school catering service and supervised by five ambassadors. Participants were asked to complete a questionnaire before and after the study. Nutritional status and knowledge of breakfast and a balanced diet were also assessed. **Results:** Approximately 63.2% of students had good nutritional status. The students' knowledge of breakfast prior to the start of the study was considered sufficient (20.3%). We found an association between the knowledge on the importance of breakfast and breakfast habits but no association was observed between nutritional status and having breakfast. **Conclusion:** Breakfast habits are not associated with nutritional status. Knowledge of the importance of breakfast is associated with breakfast habits.

Key words: Breakfast, knowledge, malnutrition, nutritional status, obesity

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Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Breakfast is essential for the human body, as it acts as a source of energy that will be used for daily activities. The required amount of energy will be utilized for increasing energy in the morning, elevating concentration and preventing malnutrition in the long term, especially in the form of becoming underweight. However, some adolescents skip breakfast for several reasons, such as not feeling hungry, not having enough time to eat breakfast and lacking knowledge of the importance of breakfast[1-3].

By skipping breakfast, adolescents become vulnerable to several nutritional issues, including an elevated risk of obesity. Previous studies reported that skipping breakfast frequently leads to adolescent obesity due to overeating during lunch or eating more throughout the day because the person did not eat anything in the morning[1,4,5].

The habit of not having breakfast often causes several changes in the body's metabolism. Research shows that the habit of skipping breakfast has a relationship with diet, insulin and glucose levels; specifically, these three factors become increased in people with the habit of not eating breakfast[6,7].

The habit of eating breakfast should be instilled in children from an early age, because eating breakfast improves the nutritional status of children. Parents who do not eat breakfast can be a factor for children who do not eat breakfast since this lifestyle habit is often inherited. Knowledge of nutrition is the main factor that determines breakfast habits. Of course, if parents do not have good nutritional knowledge of the importance of breakfast, then most likely the child also does not understand the importance of breakfast.

This research poses the hypothesis that regular breakfast consumption will improve the nutritional status of children and that there are several factors related to breakfast habits. There is limited information about breakfast habits, especially in the mountainous areas of North Sumatera, Indonesia. For this reason, the factors that play a role in the breakfast habits of school children will be investigated so that these factors can be used to prevent malnutrition in children.

MATERIALS AND METHODS

This experimental trial was conducted in Al Washliyah 42 Junior High School in Berastagi, North Sumatera, Indonesia. This area is a mountainous area in North Sumatera (latitude 3°11'40.85"N and longitude 98°30'32.00"E). The main source of livelihood for residents who live in this area is agriculture, most of which includes citrus fruit, passion fruit and vegetables. This research also serves as community service in the area.

Sampling was carried out using a stratified random sampling technique of 68 respondents aged between 10 and 15 years from the 7-9th grades of the school. Participants were given 6 days of breakfast and counselling on the importance of breakfast by the "Breakfast Ambassador". The community service activity began with administering a location survey, coordinating and planning with the school and assigning and training breakfast ambassadors.

Data collection were carried out from July 22-29th, 2019 using a questionnaire that was developed by researchers based on existing literature. The questionnaire consisted of 4 questions regarding students' breakfast habits that included aspects of the breakfast menu, frequency of breakfast, breakfast time and breakfast environment. A questionnaire about the knowledge and importance of breakfast and The General Guidelines on Balanced Nutrition (PedomanUmumGiziSeimbang/PUGS) used the following range of scores for each respondent's correct answer: 2-5 (Poor), 6-10 (Fair) and 11-15 (Good).

Breakfast ambassadors were 7th and 8th grade students who were chosen to monitor the nutritional status of students, disseminate information on the importance of breakfast, monitor the breakfast activity of students and conduct a presentation in the form of a mini-seminar to all students. The breakfast ambassadors were selected from 7th and 8th grade students for sustainability purposes. It was expected that these ambassadors will continue performing their duties well after they moved on to the next grade level.

The breakfast menu was chosen by a clinical nutrition specialist and the school catering service. The menu was adjusted to the calorie requirements of each student and meal variation was arranged by adjusting the balanced composition of 50-60% carbohydrates, 10-15% protein and 20-25% fat.

Nutritional status was assessed at the beginning of the study and included measuring body height, body weight and body mass index (BMI) according to the Center for Disease Control (CDC)/World Health Organization (WHO) growth chart. The questionnaire on breakfast habits and the general guidelines fora balanced diet were given to the participants before and after the intervention to evaluate the impact of this community service. The report of this activity was conveyed to the Community Service Institution, Universitas Sumatera Utara. Data analysis was performed using SPSS (version 11.5) statistical software program, using the mean±standard deviation for normally distributed values and chi-square test. Differences of $p<0.05$ were considered statistically significant.

RESULTS

A total of 68 students with a mean age of 13.8±0.9 years, with the youngest age being 11 years and the oldest age being 17 years participated in this study. The wide age range of the participants was because students were recruited from three different grades. However, all participants were still in their growth period with similar nutritional requirements and assessment.

Based on anthropometric measurements, the mean body weight was 44.9±11.7 kg and the mean body height was 154±5.6 cm, with a mean BMI of 18.8±4.1 kg/m^2. Based on the BMI measurements, the participants' mean percentile was 37.9±33.8 with a minimum percentile of 0.1 and a maximum percentile of 99.4, whereas the Z-score had a minimum of -3.5 and a maximum of 2.5.

More than half of all students had a normal body weight and approximately 10% were overweight and obese. This assessment was made based on a growth chart with the following categorization: underweight, normal weight, overweight and obese. Although, the majority of the participants had a normal body weight, approximately 30% of the total participants were underweight (Table 1).

Table 2 shows the breakfast habits observed in this study. More students (64.7%) regularly had breakfast before the intervention compared to those who did not have breakfast. After the intervention, there was an increase in breakfast habits. This study showed that the most common breakfast habit among the students was having breakfast a minimum of 1-3 times a week. The majority of subjects even had breakfast at home before going to school (Table 2). Approximately 88.2% (60 students) consumed rice, 7.4% (5 students) consumed bread, 2.9% (2 students) consumed noodles and 1.5% (1 student) consumed cereal. More female students than male students skipped breakfast. However, there was no significant association between gender and breakfast habits (44.1% vs 26.5%; p = 0.10).

Table 3 shows that there was no association between nutritional status before and after the intervention due to a minimum change in nutritional status during the 6 days of intervention. These findings also indicated that participants with regular breakfast habits were mostly underweight and normal weight. Malnutrition in these students might be caused by several other factors, including total food intake or physical activity.

Table 1: Distribution and frequency of subjects' characteristics

Characteristics	Total No.	Percentage
Grade		
7th	23	33.8
8th	32	47.1
9th	13	19.1
Age		
11 years old	2	2.9
12 years old	0	0.0
13 years old	21	30.9
14 years old	32	47.1
15 years old	11	16.2
16 years old	1	1.5
17 years old	1	1.5
Gender		
Male	34	50.0
Female	34	50.0
BMI category		
Underweight	18	26.5
Normal weight	43	63.2
Overweight	4	5.9
Obese	3	4.4

Table 2: Awareness of the importance of breakfast

Parameters	Before total No.	Percentage	After total No.	Percentage
Breakfast habit				
Yes	44	64.7	68	100
No	24	35.3	0	0
Breakfast frequency				
1-3 days/week	24	35.3	0	0
4-6 days/week	17	25.0	0	0
Everyday	27	39.7	68	100
Breakfast time				
05.00 a.m.	4	5.9	0	0
06.00 a.m.	25	36.8	0	0
07.00 a.m.	33	48.5	0	0
08.00 a.m.	0	0.0	68	100
09.00 a.m.	6	8.8	0	0
Breakfast location				
Home	63	92.6	0	0
School	4	5.9	68	100
Food stall	0	0.0	0	0
On the way	1	1.5	0	0

Table 3: Association between regular breakfast habits and nutritional status

	Nutritional status						
	Underweight		Normal weight		Overweight		
Having regular breakfast	No.	Percentage	No.	Percentage	No.	Percentage	p-value
Obese							
Yes	14	20.6	26	38.2	4	5.9	0.39
No	4	5.9	17	25.0	3	4.4	

Table 4: Association between regular breakfast habits and knowledge of the importance of breakfast

	Knowledge of breakfast				
	Good		Fair		
Regular breakfast habit	No.	Percentage	No.	Percentage	p-value
Yes	31	45.6	13	19.1	0.01
No	23	33.8	1	1.5	

Table 5: Association between regular breakfast habits and knowledge of PUGS

	Knowledge of PUGS				
	Fair		Poor		
Regular breakfast habit	No.	Percentage	No.	Percentage	p-value
Yes	11	16.2	33	48.5	0.47
No	5	7.4	19	27.9	

Table 6: Knowledge on the importance of breakfast

Parameters	Before total No.	Percentage	After total No.	Percentage
Importance of breakfast				
Good	54	79.4	68	100
Fair	14	20.6	0	0
Poor	0	0.0	0	0
PUGS				
Good	0	0.0	68	100
Fair	16	23.5	0	0
Poor	52	76.5	0	0

This study showed that there was a significant association between regular breakfast habits and knowledge of the importance of breakfast ($p = 0.01$), which highlights the fact that increased knowledge is significantly associated with changes in action. For the students participating in this study, knowledge of the importance of breakfast, its effect on study concentration and the importance of carbohydrates as a source of energy increased their awareness of regularly eating breakfast (Table 4). Interestingly, although their knowledge was good when assessed, 33.8% of the students did not implement the intervention on a daily basis. This might be because the students have limited time before going to school, their families could not prepare breakfast or not have breakfast due to being on diet for weight loss purposes and the students may have stomach aches after having breakfast.

Knowledge of The General Guidelines on Balanced Nutrition (*PedomanUmumGiziSeimbang*, PUGS) does not equate to knowledge of the importance of breakfast in this study. The majority of students had fair and poor knowledge of PUGS and we found no significant association between PUGS and knowledge of the importance of breakfast (Table 5). Knowledge of PUGS was not common for students compared to knowledge on the importance of breakfast. However, the students seemed to have a better understanding of PUGS after the intervention.

Using open-ended questions, this study also evaluated the students' knowledge of the importance of breakfast. Their knowledge was then categorized into poor, fair and good before the intervention. However, we found that the majority of participants were already aware of the importance of breakfast (Table 6). We also evaluated their knowledge regarding the types of nutrients required for energy. Some of the participants also had knowledge of the impact of eating breakfast on their learning achievement.

Evaluation of the students' knowledge of the balanced diet guidelines also showed that they were somewhat knowledgeable about the role of nutritional intake required for growth. We found that the majority of the students had

poor knowledge before the intervention (76.5%), which was improved after the intervention was administered by the breakfast ambassadors (Table 6). Education on the importance of breakfast and PUGS increased students' awareness of the importance of breakfast. The 6-day-long education programme conducted by the breakfast ambassadors and subsequent knowledge re-assessment revealed that the students' knowledge, including their knowledge of the importance of breakfast and PUGS, were indeed improved ($p = 0.01$).

DISCUSSION

This research was carried out in the mountains with natural conditions that support the growth of children and the Berastagi area is a producer of fruits and vegetables in North Sumatera. Children growing up in this area show good nutritional status but poor nutritional status is still found. Nutritional requirements are needed for growth, which can be obtained from appropriate diet and nutrition. Balanced nutrition is obtained from the right composition of breakfast, lunch and dinner.

The relationship between breakfast habits and the rates of overweight or obesity have been proven by previous studies but there are different results from one study to another[8,9]. Other studies have found that adolescents require sufficient nutritional intake for growth; however, during teenage years, required energy is derived from macronutrients such as carbohydrates, protein and fat and micronutrients such as vitamins D, C, folic acid, iron and calcium. Previous studies have reported the importance of breakfast habits among adolescents[10,11]. Several studies have analysed the incidence of obesity among adolescents who skipped breakfast; however, the results were variable. These studies failed to show an association between skipping breakfast and a high prevalence of obesity, in contrast to some previous studies[2,11,12]. Nevertheless, these studies generated a movement to assess nutritional requirements from the food source during breakfast or lunch.

Breakfast is an essential habit for adolescents since it affects body weight, cardio-metabolic risk factors and cognitive ability. This study did not analyse the detailed impact of breakfast due to limited time (6 days) and therefore could not assess any changes in nutritional status. Several components have been shown to influence nutritional status, such as daily nutritional intake and physical activity[13-15].

The study also found that the culture of most people in this area was a habit of having breakfast at home, so there was still plenty of time to be able to have breakfast at home[16]. At the time this study was carried out, the type of food followed the food intake guidelines adopted in Indonesia. In this research, information on the balanced diet pyramid should be given to all students in order for it to be implemented in the daily life of students and their nuclear families. According to The General Guidelines on Balanced Nutrition (PedomanUmumGiziSeimbang/PUGS), information on the balanced diet pyramid needs to be developed and disseminated to all students since most of the students still adhere to the old Indonesian nutrition paradigm of "4 sehat 5 sempurna," where a meal is considered healthy when it consists of 4 components (carbohydrates, protein and fat) and adding milk makes it 5 and perfect.

In this study, the ability to understand the importance of breakfast has been mastered by most teenagers; only the understanding of The General Guidelines on Balanced Nutrition is still not fully comprehended. Understanding the importance of eating a variety of foods, eating according to the needs of the body, eating carbohydrate as the source of half of one's energy needs and choosing foods that are moderate in fat and low in saturated fat are still not understood by adolescents according to this study. Other points included in The General Guidelines on Balanced Nutrition are using iodized salt, eating food rich in iron, exclusively breastfeeding infants for six months, improving breakfast habits, drinking clean water, exercising regularly, avoiding alcoholic beverages, eating food that is safe and finally reading food labels. These points are still lacking in the adolescents who participated in this study.

This study is in accordance with previous studies which have reported that breakfast habits were more often found in traditional families, bearing in mind that the location of this study was a mountainous area and was still very regional[14,17,18]. In addition, regular breakfast habits are more common in young adolescents than in older adolescents and this is also consistent with previous studies which found that older adolescents had poorer breakfast habits[5,18-20].

Breakfast habits are also more common in boys than in girls and the amount of food consumed at breakfast is greater for boys than for girls. The type of drink also has an impact on nutrition; adolescent girls are more likely to consume low-calorie drinks, such as tea and coffee, compared with boys, who prefer milk[14]. In this study ,we did not see a different distribution between boys and girls but it was seen that during the study, the amount of food was given homogeneously with a slight difference in calories because there were differences in the calorie requirements between adolescent boys and girls.

This study does not deeply examine the relationship between breakfast habits and children's intelligence at school. Previous research mentioned the relationship between breakfast habits and intelligence[6,21-24]. It has been reported that breakfast, which is consumed in the morning, can increase the concentration of children while studying at school. Moreover, children who do not eat breakfast are the first to lose focus and are slow to absorb lessons while learning in class. In addition, children who have breakfast at home will have the ability to solve problems better, are more creative and are active[4,25-27].

A good breakfast is food that contains balanced nutrition, is a balanced menu and can provide enough energy to perform activities in the morning. In addition to menu factors, environmental factors are also important for improving children's breakfast habits[7,22,28]. The environment is a place where children grow and develop and environment plays a direct role in the formation of habits in children. The role of parents has a major contribution in shaping the habit of eating breakfast in children. Parents should prepare nutritious food so that children can eat before they go to school and so that parents can directly monitor the food consumed by their children during breakfast[2,19,29,30].

This study, including the community service, had several limitations, including limited time and uncontrolled food intake, which made it difficult to assess the total calorie intake and measure physical activity. However, this study's result showed no association between nutritional status and breakfast before and after the intervention. There was a significant association between knowledge of the importance of breakfast and regular breakfast habits among students[5,7,26,30].

The limitation in this study is the short treatment time period (6 days) of the research subjects but it is hoped that by increasing the treatment time, there will be a change in breakfast habits. This breakfast activity can be proposed to be an ongoing school programme so that routine breakfast habits will develop. It is also hoped that school children can apply these habits to their everyday life to support their nutritional needs.

Furthermore, we propose that further research on breakfast habits with other factors, such as concentration, ability to receive lessons, school grades, physical activity and cognitive abilities of teenage students, should be conducted.

CONCLUSION

Regular breakfast habits for a short period of time (6 days) appeared to have no impact on nutritional status; however, knowledge of the importance of breakfast was associated with regular breakfast habits. Breakfast was not the main factor contributing to adolescent nutritional status and other possible factors include total nutritional intake and physical activity.

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