Analysis of the Relationship between Nutritional Influence with the Obesity Phenomenon among Primary School Students in Banda Aceh, Aceh Province, Indonesia

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Abstract

BACKGROUND: The prevalence of obesity in children has reached the limit of the pandemic number. Obesity has become a major public health problem in Indonesia due to increasing prevalence. Aceh Province has a prevalence of obesity in children 6–14 years at 5.9% in 2013 and increased to 9.5% in 2017.

AIM: Analyzing the effect of fiber intake, snack foods, breakfast, and sedentary on the incidence of obesity in elementary schoolchildren in the city of Banda Aceh.

METHODS: This research used case–control design. Determination of the sample was done by probability sampling with cluster sampling technique. Study sample was of 84 children. Data collection was done by interviewing the parents, observation using questionnaires. Data analysis was carried out bivariate and using Chi-square statistical tests.

RESULTS: School food intake from daily snacks (p = 0.001, odds ratio [OR] = 5) and fiber consumption (p = 0.017, OR = 3.3) was related to the incidence of obesity in elementary schoolchildren in Banda Aceh (p < 0.05). Sedentary behavior was associated with the incidence of obesity in primary school children (p = 0.002, OR = 4.6). Breakfast is not related to the occurrence of obesity in primary schoolchildren in the city of Banda Aceh.

CONCLUSION: There was a significant influence between intake from daily snack foods, fiber consumption, and sedentary on the incidence of obesity in primary schoolchildren in the Banda Aceh City area.

Introduction

Indonesia is currently ranked tenth as the country with the largest obesity rate in the world [1]. Obesity is one of the problems of excess feeding that occurs in more developed and developing countries. Obesity or being overweight can be found from the baby to the elderly [2]. Common causes of obesity are low consumption of vegetables, fruits, and high consumption of sweet and fatty foods. Some studies have found that low consumption of vegetables and fruit can risk obesity [3], [4], [5]. Some studies describe that overweight and obesity are usually associated with cognitive impairment [6], [7]. The habit of consuming ethanol which exceeds energy requirements causes fat buildup, weight gain, and obesity [8]. Residents of the city of Banda Aceh are an example of one community in Aceh Province which has the highest obesity prevalence in adolescents and in primary schoolchildren. The high problem of obesity in primary schoolchildren in the city of Banda Aceh is supported by the results of monitoring nutritional status wherein 2017 the prevalence of obesity reached 9.5% [9]. One of the factors that cause obesity in children is a poor diet.

Furthermore, changes in the pattern of food consumption in the city of Banda Aceh have led to reduced consumption of vegetables and low fiber intake. Obesity at children age is currently one of the nutritional problems that must receive special attention. Since 2015, the prevalence of obese schoolchildren continues to increase. As a result, declining learning achievement is one of the short-term effects of obesity. Snack consumption and lack of fiber intake are at risk of obesity in children. Therefore, the purpose of this study was to analyze the effect of fiber intake, snack foods, breakfast, and sedentary on the incidence of obesity in primary schoolchildren in the city of Banda Aceh, Aceh Province.

Methods

This quantitative study used a case–control study design that was carried out descriptively analytic.
The study was conducted in several primary schools in the Banda Aceh area. The selection of the city of Banda Aceh as the location of the study by considering the prevalence of obesity in children aged 6-14 years was very high. The population in the study was all elementary schoolchildren from grade 1 to grade 6 who were suspected of being obese (Z-score body mass index >2 SD). This study used a retrospective study approach that allows for case–control groups so that the sample size in each group is a case group of 42 students who were obese and a control group of 42 normal students.

Determination of the sample was done by probability sampling with cluster sampling technique. Determination of the sample was carried out in two stages, namely, the first stage of choosing a cluster for each sub-district and the second stage selects samples of elementary schoolchildren in each cluster. Data analyzed began by doing descriptive, and continued with bivariate analysis, namely to measure whether there was a relationship between the dependent and independent variables. To reinforce the results of the analysis, the Chi-square test was used to prove the proposed hypothesis and calculate the odds ratio (OR) with 95% CI.

### Results

**Univariate analysis**

Univariate analysis is used to describe each variable. Based on the results of the research that has been done, processing of univariate data related to the variables under study can be seen as follows.

Sample for the case group who were obese was 42 students and the normal weight control group was 42 people. The sample characteristics in this study in the two intervention groups by sex were dominated by female students in the case group (59.5%) and the control group (52.4%). The age of the respondents in class 4 was more control groups in class 4 (45.3%). The results of testing the Chi-square test showed that there was a significant effect between daily snack food intake and the incidence of obesity in elementary schoolchildren with a value of $p = 0.001$ and OR = 5.0. There is also a significant influence between fiber intake and the incidence of obesity in primary schoolchildren with a value of $p = 0.190$ and OR = 1.9. Unhealthy or excessive daily snacks have a risk of 3.3 times for obesity compared to healthy snacks. Lack of fiber intake has a risk of 5.0 times obesity compared to healthy snacks.

### Bivariate analysis

Bivariate analysis was conducted to determine the relationship between the independent variables and the dependent variable. The relationship between the independent variable and the dependent variable is indicated by the value $p < \alpha (0.05)$, the value of OR >1, and the CI value: 95%. Bivariate analysis here looks at the effect of food intake and sedentary on obesity phenomena in schoolchildren in the city of Banda Aceh.

### Table 1: Analysis of characteristics of the study sample according to the case–control group

| Characteristic sample | Sample group | p value
|-----------------------|--------------|--------|
|                       | Case         | Control |
| Gender                |              |        |
| Male                  | 17           | 20      | 0.660 |
| Female                | 25           | 22      | 0.619 |
| Age                   |              |        |
| 7–8                   | 8            | 10      | 0.238 |
| 9–10                  | 17           | 12      | 0.286 |
| 11–12                 | 15           | 16      | 0.381 |
| 13–14                 | 2            | 4       | 0.955 |
| Grade                 |              |        |
| 4                     | 20           | 19      | 0.300 |
| 5                     | 14           | 14      | 0.300 |
| 6                     | 8            | 9       | 0.214 |
| Total                 | 42           | 42      |        |

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### Table 2: Analysis of statistical results of the effect of food intake on the incidence of obesity in elementary school students in Banda Aceh city

| Food consuming | Obesity phenomenon | Score $p$ | OR (CI: 95%) |
|----------------|--------------------|----------|--------------|
|                | Good               | Normal   |              |
|                | n                  | n        |              |
| Daily snacks   |                    |          |              |
| High consumption| 28                 | 12       | 28.6         | 0.001 | 5.0 (1.98-12.64) |
| Moderate consumption| 14       | 33.3     | 30            | 71.4  | 3.3 (1.33-8.22)  |
| Fiber          |                    |          |              |
| Low            | 33                 | 75.0     | 20            | 47.6  | 0.017 | 3.3 (1.33-8.22)  |
| Adequate       | 11                 | 25.0     | 22            | 52.4  | 0.619 | 1.9 (0.82-4.67)  |
| Breakfast      |                    |          |              |
| Not good       | 25                 | 59.5     | 18            | 42.9  | 0.190* | 1.9 (0.82-4.67)  |
| Good           | 17                 | 40.5     | 24            | 57.1  |            |              |
| Total          | 42                 | 100.0    | 42            | 100.0 |            |              |

Sedentary is one of the habits of children in the life of someone who does not do much physical activity. Statistical results show a sedentary effect on obesity. Primary schoolchildren who were obese are 73.8% of children who have difficulties or bad habits. The results of the Chi-square statistical test obtained a value of $p = 0.002$ with OR = 4.6, while it means significant to the incidence of obesity in elementary schoolchildren with a value ($p < 0.05$), Table 3.

### Table 3: Analysis of sedentary influence on obesity phenomenon

| Sedentary   | Obesity phenomenon | Score $p$ | OR (CI: 95%) |
|-------------|--------------------|----------|--------------|
|             | Obesity            |          |              |
|             | Good               | Normal   |              |
|             | n                  | n        |              |
| Sedentary   |                    |          |              |
| Not good    | 31                 | 73.8     | 18            | 38.1  | 0.002 | 4.6 (1.81, SD = 11.58) |
| Good        | 11                 | 26.2     | 26            | 61.9  |            |              |
| Total       | 42                 | 100      | 42            | 100.0 |            |              |
Discussion

The results showed that there was a significant effect between the intake of daily snack foods on the phenomenon of obesity. Snacks for children in schools that are not good or excessive have a risk of 5.0 being obese. Snacks and eating patterns also contribute to being overweight and obese. Inadequate family eating patterns can cause early obesity [10]. Mentions that there has been a shift in diet, where there is an increase in modern diets consisting of more energy and fat [11]. Increased energy intake and decreased energy expenditure are the main causes of obesity. The nutritional value of fiber consumption shows a significant relationship with the incidence of obesity in schoolchildren. Lack of fiber consumption is at risk of 3.3 times the phenomenon of obesity in primary schoolchildren in the city of Banda Aceh. Fiber consumption and eating fruits have an impact on children’s health. Obesity in children is also influenced by the area of residence. Several countries in Asia found that children living in cities experience faster weight gain than children who live in villages [12]. The results showed that sedentary significantly affected the phenomenon of obesity in elementary schoolchildren. A sedentary lifestyle in elementary schoolchildren has a risk of 4.6 times the incidence of obesity in Banda Aceh City. The impact of the use of technology contributes to increasing sedentary lifestyles. Sedentary lifestyles are one of the obese factors [13]. Households with higher socioeconomic conditions make it easier to access fast food, fatty foods, and sweet foods or drinks compared to low socioeconomic households. In addition to being associated with access to food, households with high socioeconomic conditions also allow them to access technology such as watching television, computers, and video games. The ratio of obesity increases linearly in children who have longer time watching TV. Children who watch TV 4–8 h/day have a risk of obesity by 1.37 times higher at 7 years of age, while those who watch TV more than 8 h/day increase their risk of obesity to 1.55 times [14]. Obesity phenomenon is very complex, factors that influence can occur from various multifactorial conditions such as genetic and non-genetic factors [15]. In general, obesity in children occurs due to lack of physical activity, unhealthy eating patterns that cause excessive energy intake or a combination of both of which cause an increase in energy. Childhood obesity is also a multifactorial condition that results from genetic and non-genetic factors and complex interactions among them [16].

Conclusion

There was a significant influence between intake from daily snack foods, fiber consumption, and sedentary on the phenomenon of obesity in primary schoolchildren in the Banda Aceh area. Primary schoolchildren snacks that are not good or excessive have a risk of 5.0 being obese. Lack of fiber consumption is at risk of 3.3 times the phenomenon of obesity in primary schoolchildren. The sedentary lifestyle in elementary schoolchildren has a risk of 4.6 times the incidence of obesity. Breakfast is not related to the phenomenon of obesity in elementary schoolchildren in that city.

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