

Original article:

Relationship between Nutritional Knowledge, Physical Activity, Carbohydrates Intake and Fat Intake on Nutritional Status of Overweight Adolescents In Banjarmasin

Amelia RN¹, Suminah², and Budiastuti VP³

Abstract

In Indonesia, the prevalence of overweight in adolescents has increased during the past ten years. Being overweight at a young age can lower the quality of life and cause early death at any age, affecting both men and women equally. This study analyzed the relationship between nutritional knowledge, physical activity, carbohydrate intake and fat intake in overweight adolescents in Banjarmasin. It used an observational study with the cross-sectional approach. Purposive sampling was used to determine its samples, consisting of 64 respondents. The data on nutritional knowledge, physical activity, carbohydrate intake and fat intake were collected through structured questionnaires. Data of intake was collected by 3x24 hours food recall method on weekend and class days. They were analyzed by using the Pearson Product Moment statistical test. The results indicated that there is no relationship between nutritional knowledge ($p=0,529$) physical activity ($p=0,218$), carbohydrates intake ($p=0,776$) with nutritional status and there is relationship between fat intake with nutritional status ($p=0.045$) in overweight adolescents in Banjarmasin.

Keywords: Carbohydrate Intake, Fat Intake, Physical Activity, Nutritional Knowledge, Overweight

*International Journal of Human and Health Sciences Vol. 07 No. 02 April'23
DOI: <http://dx.doi.org/10.31344/ijhhs.v7i2.565>*

Introduction

Adolescence is a period of psychological and social transition from childhood to adulthood that will last and end in their teens or early twenties. Adolescent nutritional problems that are a threat in Indonesia today include iron deficiency anemia, stunting, chronic energy deficiency, overweight and obesity.¹ The prevalence of overweight adolescents in Indonesia in 2018 with an age range of 16-18 years was 9.5%, while in the province of South Kalimantan it was 8.9%.¹ Banjarmasin City has a fairly high overweight prevalence, reaching 12.3%.²

The main cause of being overweight is a long-term energy imbalance between calories consumed and calories expended.³In addition, there are various factors that can cause overweight, including gender, age, socioeconomic conditions, environmental factors, psychological factors, genetic factors, eating habits and physical activity.⁴

Changes in eating habits in adolescents are caused by low nutritional knowledge. Adolescents who have good nutritional knowledge will prefer food according to their needs.⁵The diet that is run by teenagers today is a high-energy diet that mostly consists of carbohydrates and fats.⁶On the other

1. The Study Program of Nutrition Science, Master's Degree Program, Universitas Sebelas Maret, Surakarta, Indonesia.
2. The Study Program of Agricultural Extension and Communication, Faculty of Agriculture, Universitas Sebelas Maret, Surakarta, Indonesia.
3. The Study Program of General Medicine, Faculty of Medicine, Universitas Sebelas Maret, Surakarta, Indonesia.

Correspondence to: Reri Noor Amelia, The Study Program of Nutrition Science, Master's Degree Program, Universitas Sebelas Maret, Surakarta, E-mail: rerinooramelia@gmail.com

hand, the proportion of physical activity in most adolescents in Banjarmasin is in the less category.² To support metabolic processes, a teenager should receive food according to their needs, because food intake and physical activity affect a person's nutritional status.⁷ Overweight at a young age if it continues to be obese can increase the risk of experiencing hypertension, hyperlipidemia, coronary heart disease and type 2 diabetes mellitus and can reduce the quality of life and is associated with premature death at all ages, both for men and women.⁶ Adolescents are said to be overweight if the BMI Z-score is from 1 to 1.99.⁸ The purpose of this study was to determine the relationship between nutritional knowledge, physical activity, carbohydrate intake and fat intake to the nutritional status of overweight adolescents in Banjarmasin.

Methods

This study used a cross-sectional design. The sample size is 64 students of SMAN 4 and SMAN 7 Banjarmasin aged 15-17 years. Sample selection was done through screening. The inclusion criteria in this study were adolescent girls and boys with BMI Z-score is from 1 to 1.99 (overweight) and willing to fill out informed consent. This research has been approved by the Research Ethics Committee of the Faculty of Medicine, Universitas Sebelas Maret.

This study begins with the measurement of the weight and height of the sample population based on gender and age. Overweight nutritional status was determined by calculating the BMI Z-score. Data on nutrition knowledge, physical activity and food intake were obtained by filling out a nutritional knowledge questionnaire, a PAL (physical activity level) questionnaire and a 24-hour food recall form. The data on the nutritional status of adolescents was processed using the WHO Anthro Plus software, the BMI Z-score. Data analysis was carried out using the nutrisurvey application to determine carbohydrate and fat intake compared to the RDA. The statistical test to see the relationship between nutritional knowledge and physical activity on carbohydrate intake and fat intake for overweight adolescents is the Pearson Product Moment correlation test.

Results

Characteristics of respondents including gender, knowledge of nutrition, physical activity, carbohydrate intake, and fat intake are presented in the following table.

Table 1. Respondent's characteristics

| Characteristics | Amount (n) | Percentage % |
|------------------------------|------------|--------------|
| Gender | | |
| Male | 29 | 45.3 |
| Female | 35 | 54.7 |
| Age | | |
| 15 years | 12 | 18.8 |
| 16 years | 31 | 48.4 |
| 17 years | 21 | 32.8 |
| Nutritional Knowledge | | |
| Moderate | 25 | 30.1 |
| Poor | 39 | 60.9 |
| Physical Activity | | |
| Moderate | 4 | 6.3 |
| Light | 60 | 93.8 |
| Carbohydrates Intake | | |
| Excessive | 3 | 4.7 |
| Sufficient | 19 | 29.7 |
| Insufficient | 42 | 65.6 |
| Fat Intake | | |
| Excessive | 27 | 42.2 |
| Sufficient | 26 | 40.6 |
| Insufficient | 11 | 17.2 |

Respondents who are female as much as 54.7% while men as much as 35.3%. Respondents aged 15-17 years, respondents aged 15 years by 18.8%, aged 16 years by 48.4% and aged 17 years 32.8%. Most of the respondents' knowledge of nutrition is included in the less category (60.9%). The majority of respondents have physical activity in the light category (93.8%). The level of carbohydrate intake in the insufficient category is high enough, namely 65.6% while the level of excessive fat intake is 42.2%, sufficient fat intake is 40.6% and insufficient is 17.2%.

Table 2. Relationship between Nutritional Knowledge, Physical Activity, Carbohydrates Intake and Fat Intake on Nutritional Status

| Variable | Min | Max | Mean ± SD | P Value |
|-------------------|-------|--------|----------------|---------|
| BMI-for-age | | | | |
| Nutritional | 1.00 | 2.00 | 1.58 ± 0.27 | - |
| knowledge | 13.00 | 77.00 | 53.96 ± 12.74 | 0.529* |
| Physical activity | 0.56 | 1.57 | 1.00 ± 0.22 | 0.218* |
| Carbohydrates | 91.00 | 423.00 | 214.34 ± 66.18 | 0.776* |
| intake | 29.00 | 213.00 | 78.73 ± 31.455 | 0.045* |
| Fat intake | | | | |

*Pearson Product Moment

Discussion

In this study, statistically, there was no significant relationship between nutritional knowledge and nutritional status with a p-value of 0.529 ($p > 0.05$). This is in line with Mali's research in 2022, which means that nutritional knowledge is not directly a factor related to nutritional status in overweight adolescents.⁹ The cause of the absence of a relationship between nutritional knowledge

and nutritional status is that nutritional knowledge has an indirect influence on nutritional status, but nutritional knowledge is the main problem of nutritional problems. Meanwhile, the direct causes of nutritional problems are nutritional intake and infectious diseases.¹⁰ Knowledge of nutrition is an indirect factor that affects nutrition. People who already know about the amount, frequency, content, type, method of administration and benefits of nutrients will try to obtain foods that contain appropriate nutrients as needed by their bodies.¹¹ Another study states that a person's nutritional knowledge can affect attitudes and behavior in choosing food and will later affect the nutritional state of the individual.¹²

Several previous studies have shown that being overweight and obese are also associated with lifestyle factors such as a sedentary lifestyle, physical activity etc. Even so, not all studies can prove it significantly.¹³ The results of this study indicate that there is no relationship between physical activity and nutritional status of overweight adolescents with a p-value of 0.218 ($p > 0.05$). This is in line with school-based survey research from 146 countries, and regions including 1.6 million students aged 11-17 years which states that globally students at that age are not physically active enough for both male and female groups. Regions with the highest prevalence of underactivity are Asia Pacific countries. The level of physical activity and the incidence of obesity can be said to be very weakly correlated.¹⁴ Most of the respondents have a light physical activity level, it is recommended to increase physical activity such as walking or jogging. The more active a person is in doing physical activity, the more energy he or she expends, if the nutritional intake is more with light physical activity, the person is prone to overweight and even obese nutritional status.¹⁵ Physical activity if done regularly according to age and ability will reduce risk and prevent fat accumulation that will cause obesity or overweight in the body. This is because physical activity can increase fat-free tissue mass and decrease fat-tissue mass.¹⁵

Carbohydrate intake in this study did not have a relationship with the nutritional status of overweight adolescents as indicated by the p-value of 0.076 ($p > 0.05$). This is in line with the research of Wulandari (2017) in Surakarta, that there is no relationship between carbohydrate intake and the nutritional status of overweight adolescents. In

another study, a very weak relationship strength was found between all carbohydrate intakes and the nutritional status of overweight adolescents. However, an interesting finding was the direction of the correlation between simple carbohydrate intake and body mass index, in contrast, the opposite direction between saturated fat intake and physical activity with body mass index. These results indicate that the higher the body mass index of adolescents, the higher the intake of simple carbohydrates and the lower the physical activity. On the other hand, the positive result is an indication that the higher the body mass index, the lower the saturated fat intake of adolescents.¹⁶

The results showed that there was a relationship between fat intake and nutritional status of overweight adolescents with a p-value of 0.045 ($P < 0.05$). This explains that a good level of intake will affect good nutritional status and if the level of intake is excessive, it can result in overweight status.¹⁷ Epidemiological studies show that high fat intake is a risk factor for excess body weight which will lead to fat accumulation in adipose tissue.¹⁸ This study is in line with the theory that states that excess fat intake will lead to being overweight. Fatty foods that have a delicious taste can increase appetite which eventually consumes excessive food. Fat is also the largest energy reserve in the body. Regarding the contribution of slightly excess fat, special attention needs to be given to improving the diet in adolescents to prevent non-communicable diseases as early as possible.¹⁹ Adolescents who have an excessive intake of macronutrients (energy, protein, fat and carbohydrates), frequent fast food consumption and light physical activity are at greater risk of obesity.²⁰

Conclusion

There is a relationship between fat intake and nutritional status and there is no relationship between nutritional knowledge, physical activity and carbohydrate intake on nutritional status in overweight adolescents in Banjarmasin. Further identification of other more influential factors and the use of more diverse research locations are needed for further research. It is necessary to know other factors such as genetic predisposition and more specific characteristics of food intake that may have a greater influence on the occurrence of overweight to support this study.

Conflict of Interests:

There is no conflict of interest regarding the publication of this paper.

Ethical clearance

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.

Authors' contribution

Reri Noor Amelia conceptualized and designed the study, prepared the draft of the manuscript and reviewed the manuscript. Suminah conducted the study, data analysis and interpretation, assisted in drafting of the manuscript, reviewed the manuscript. Veronika Ika Budiastuti assisted in drafting of the manuscript, reviewed the manuscript.

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