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## The Difference in Nutritional Intake and Physical Activity to Nutritional Status in Adolescents

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### Abstract

**Background:** Nutritional problems in adolescents are characterized by overweight or obesity. Being overweight is affected by an imbalance in nutrient intake and physical activity in adolescents. **Purpose:** This study aims to determine differences in nutrient intake and physical activity on nutritional status in adolescents. **Methods:** This type of research uses a cross-sectional design. Subjects were 94 students with a purposive sampling technique with a sample of 94 students. Collecting data on nutritional intake using food 2x24 hour recall and physical activity was measured using Adolescent Physical Activity Questionnaire (APAQ). Analysis of statistical data using the Independent Sample Test and the Mann -Whitney Test. **Results:** The results showed that there was a meaningful difference in nutritional intake (protein, carbohydrates, fiber) between normal nutritional status and more nutritional status in adolescents with value ( $p < 0.05$ ), but there was no meaningful difference in nutritional intake (energy, fat) and physical activity between normal nutritional status and more nutritional status in adolescents with value ( $p > 0.05$ ). **Conclusion:** It can be concluded that there is a difference in the intake of nutrients (protein, carbohydrates, and fiber) to the nutritional status in adolescents. Furthermore, there was no difference in nutritional intake (energy and fat) and physical activity to nutritional status in adolescents. Adolescents should pay attention to nutritional status early by paying attention to nutritional intake through diet and still doing physical activity to avoid nutritional problems that will impact non-communicable diseases.

**Keywords:** intake of nutrients; physical activity; nutritional status; adolescents.

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## **1. Introduction**

One of the nutritional problems in adolescents is characterized by being overweight or obese. Undernutrition is when excessive or abnormal fat deposits in adipose tissue interfere with health. More than 1.9 billion adults are overweight (39% men and 40% women), and 650 million people (13%) are obese. The prevalence of overweight and obesity aged 5-19 years has increased dramatically from 4% in 1975 to 18% in 2016 [1]. Overweight and obesity are the fifth leading cause of death globally, with nearly 3.4 billion deaths each year [2].

The results of the Basic Health Research (Riskesdas) 2018 report showed the prevalence of overweight children aged 13-15 years experienced a nutritional improvement of more than 16% (overweight 11.2% and obesity 4.8%). In East Kalimantan, the prevalence of nutrition over children aged 13-15 years (BMI-for-age) by 19.1% (overweight 12.0% and obesity 7.1%). The prevalence of non-communicable diseases also increased in East Kalimantan, namely heart disease 1.0% (2013) to 2.2% (2018) and stroke 10.0% (2013) to 14.7 (2018) [3]. Overweight and obesity are risk factors for non-communicable diseases (heart disease, stroke, diabetes, and cancer) [4,5,6].

Many factors are instrumental in being overweight: eating habits, nutritional intake, and physical activity. Nutrition results from an imbalance between the energy consumed and the energy expended, eating energy-dense foods and drinks (high in sugar and fat), and less physical activity. The shift of infectious diseases to non-communicable diseases is due to economic development accompanied by the increased availability of food, the number of snacks sold to street vendors, and lack of physical activity [7].

In general, teenagers prefer to eat snacks rather than food prepared at home. Dietary changes and physical activity contribute to more nutritional problems in [8]. Physical activity decreases both at home and in schools and poor eating habits, frequent snacks, and various kinds of eating have sprung up. Obesity in children aged 5-15 years is caused by diet, fast food consumption, education level, gender, offspring, and physical activity [9,10,11]. Consumption of oil and fried foods increases the risk of obesity [12,13,14]. Fats and oils contribute the most energy compared to other nutrients. Oil consumption of more than 30 ml per day is associated with obesity in adults in urban areas [15].

Physical activity will increase the energy expenditure obtained from consumption behaviors. Various studies say that being physically active is a protective factor against obesity. Sedentary behavior becomes a risk factor for obesity [16,17]. Sedentary behavior is behavior that lazes or lacks movement [18]. Watching television is a form of sedentary behavior. Duration of television viewing is shown to increase the risk of obesity [19,20,21]. Watching more than two hours of television per day increases the risk of obesity. Children who watched 1.0 hours of television per day had a risk of obesity (129%) and central obesity (78%) compared to those who did not watch television [22].

In addition, there is an increase in obese adolescents diagnosed with commonly experienced disease conditions in adults, such as type 2 diabetes and hypertension. Obese teenagers throughout their lives are also at higher risk for suffering from several serious health problems, such as heart disease, stroke, diabetes, asthma, and some

cancers. Overweight and obesity in childhood and adolescence are associated with mortality and morbidity in adulthood [23,24].

More nutritional problems in children and adolescents can increase the incidence of type 2 diabetes mellitus (DM). In addition, it is risky to become obese in adulthood and potentially result in impaired glucose metabolism and degenerative diseases such as heart disease, blockage of blood vessels, and others [25,26,27]. Changes in knowledge, attitudes, behaviors, lifestyle, and increased income affect the selection of the type and amount of food consumed [28,29,30,31]. This study aims to determine the difference in nutritional intake and physical activity to nutritional status in adolescents in Samarinda City.

## **2. Materials and Methods**

The type of research used is cross-sectional was conducted at Samarinda City Junior High School from November 2020 to Januari 2021.

The population in this study was a student of State Junior High School 20 Samarinda City. The sample in this study was students of grades VII and VIII, based on the formula of large calculations of samples from survey studies, with the results of calculations of as many as 94 subjects. Sampling by purposive sampling met the criteria for inclusion and exclusion in this study. Inclusion criteria in this study are: adolescents with normal nutritional status (BMI 18.5-22.9 kg/m<sup>2</sup>) and overweight adolescents (BMI ≥ 23.0 kg/m<sup>2</sup>).

The data collected in the study included the characteristics of the subjects (age, gender, religion, ethnicity, large allowance, and use of pocket money), the nutritional status of the subjects (weight and height), nutritional intake, and physical activity. Data on the nutritional status of subjects is done by measuring weight, height, and BMI (kg/m<sup>2</sup>). Height measurements using stature meters (microtoise) have been standardized with a maximum capacity of 200 cm, a level of accuracy of 0.1 cm, and weight measurements using BIA (Bioelectric Impedance Analysis) scales HBF-375.

Using the 2x24-hour food recall filling form, food intake data calculates the amount and type consumed daily and on holidays. The food intake data obtained is then converted into nutritional value (carbohydrates, proteins, fats, and fiber) in the nutrisurvey.

Daily physical activity measurement data using the Adolescent Physical Activity Questionnaire (APAQ) questionnaire form for filling out a daily physical activity record for 7 days (7x24 hours) based on the compendium of physical activity. Measurement of physical activity is carried out to determine energy expenditure in physical activity. Activity levels in adolescents were categorized as follows: light activity (PAL 1.4 - 1.6), moderate (PAL >1.6 -1.9), and severe (PAL>1.9 - 2.5) [32].

Data analysis is average (mean), standard deviation (SD), and percentage. The relationship between variables in the test with the Independent Samples Test and the Mann-Whitney Test. The results of statistical analysis are considered significant if the value of p<0.05.

Ethical approval/Informed Consent: This research has obtained an Ethical Clearance from the Commission on Research Ethics Involving Human Subjects, Bogor Agricultural University Number: 282/IT3. KEPMSM-IPB/SK/2020.

### 3. Results & Discussion

#### 3.1. Characteristics of Research Subject

Table 1. The subjects in the study consisted of normal nutrition and more than 47 (50.0% of each). Karekteristic subjects by gender proportion of men 42 (44.7%) and women 52 (55.3%). The average subject age was  $12.65 \pm 0.79$  years.

**Table 1:** Characteristics of the research subject

Variable	Nutritional Status		Total n=94 n(%)	P <sup>a)</sup>
	Normal Nutrition (n=47) n(%)	Overnutrition (n=47) n(%)		
Sex				0.940
Boy	25(53.2)	17(36.2)	42(44.7)	
Girls	22(46.8)	30(63.8)	52(55.3)	
Age (years)**	12.66±0.81	12.62±0.73	12.65±0.79	0.099
11	0(0.0)	1(2.1)	1(1.1)	
12	24(51.1)	21(44.7)	45(47.9)	
13	16(34.0)	21(44.7)	37(39.4)	
14	4(8.5)	3(6.4)	7(7.4)	
15	3(6.4)	1(2.1)	4(4.3)	
Weight (kg)**.	51.68±8.88.	57.21±8.03.	49.81±9.03	0.000*
Height (cm)**	150.77±8.24.	150.85±8.69.	149.81±8.79	0.668
BMI (kg/m <sup>2</sup> )**	22.66±2.92	25.06±2.05	23.49±15.84	0.000*
Religion				0.641
Islam	38(80.9)	36(76.6)	74(78.7)	
Catholic	6(12.8)	8(17.0)	14(14.9)	
Protestant Christianity	3(6.4)	3(6.4)	6(6.4)	
Ethnic				0.697
Javanese	27(57.4)	26(55.3)	53(56.4)	
Banjar	7(14.9)	4(8.5)	11(11.7)	
Bugis	1(2.1)	3(6.4)	4(4.3)	
Others	12(25.5)	14(29.8)	26(27.7)	
Pocket money per day**	6872.34±2740.51	6808.51±2886.53	6943.09±2668.27	0.806
Use of pocket money				0.086
Food/snacks	17(36.2)	11(23.4)	28(29.8)	
Food/snacks/drinks	30(63.8)	33(70.2)	63(67.0)	
Others	0(0.0)	3(6.4)	3(3.2)	

\*\*Data is presented as mean±SD (standard deviation), \*Significant  $p < 0.05$ ; <sup>a)</sup>Mann-Whitney Test.

The subjects' weight was generally  $49.81 \pm 9.03$  kg and a height of  $149.81 \pm 8.79$  cm. Adolescent nutritional status can be seen by measuring weight and height and then converted into BMI. The average BMI of subjects was  $23.49 \pm 15.84$  kg/m<sup>2</sup>, which was at more nutritional status standards. Most Muslims are 74 (78.7%) and are from the Javanese 53 (56.4%). The allowance given averaged Rp.  $6943.09 \pm 2668.27$  per day, most of the subjects' allowances were used to buy food/snacks/drinks 63 (67.0%) compared to other uses such as transportation or

pulses.

### 3.2. The Difference in Nutritional Intake and Physical Activity of Subjects

Table 2. The results showed the average subjects of normal nutritional status and more nutritional status were protein intake (118.20±41.55% and 128.44±42.43%), energy intake (104.20±28.03 and 108.10±29.83%), and fat intake (51.99±7.71 and 50±6.34%).

**Table 2:** The difference in Nutritional Intake and Physical Activity of Subjects

Variable	Nutritional Status		p
	Normal Nutrition (n=47)	More Nutrition (n=47)	
	Mean±SD	Mean±SD	
<b>Intake of Nutrients</b>			
Energy Intake (%)	104.20±28.03	108.10±29.83	0.258 <sup>b)</sup>
Protein Intake (%)	118.20±41.55	128.44±42.43	0.011 <sup>*b)</sup>
Fat Intake (%)	29.61±7.38	30.80±7.45	0.120 <sup>a)</sup>
Carbohydrate Intake (%)	51.99±7.71	50.30±6.34	0.034 <sup>*a)</sup>
Fiber Intake (%)	39.73±22.75	45.89±24.73	0.003 <sup>*b)</sup>
Physical Activity (PAL)	1.11±0.33	1.12±0.32	0.335 <sup>b)</sup>

\*significant  $p < 0.05$ ; <sup>a)</sup>Independent Samples test; <sup>b)</sup>Mann-Whitney test.

The results of statistical tests showed that there was a significant difference in nutrient intake (protein, carbohydrates, fiber) between normal nutritional status and overweight status in adolescents ( $p < 0.05$ ), where protein intake was higher in subjects with overweight status (128.44±42.43). Compared to subjects with normal nutritional status (118.20±41.55), carbohydrate intake was lower in subjects with more nutritional status (50.30±6.34%) with subjects with normal nutritional status (51.99±7.71%), and higher fiber intake in subjects with nutritional status. over nutrition (45.89±24.73%) compared to normal nutritional status (39.73±22.75%). When compared to the recommended standard of fiber consumption according to WHO 30 grams/day, both subjects with more nutritional status and normal nutritional status have met the recommended standards, both more nutritional status and normal nutritional status.

Nutrient intake showed no significant difference between energy intake, fat intake, and physical activity on nutritional status. Subject's physical activity based on physical activity level (PAL), both over nutritional status (1.12±0.32) and normal nutritional status (1.11±0.33), were categorized as light activity.

Eating intake is strongly influenced by adolescent eating habits. Adolescent eating habits start from parents, especially when children are young. By the time children reach adolescence, eating habits are influenced by the

environment, peers, social life, and activities outside the home. Eating habits in adolescents are related to consuming foods that include the type of food, the amount of food, the frequency of food, the distribution of food, and how to choose food.

The usual eating intake of adolescents consumed in this study, including snack foods and fast food. The results of this study found that most subjects like fried foods. Snack foods often eaten are meatballs, menthol, noodles, fried foods, and other snack foods, namely chiki-chiki. The sample was particularly fond of fast food, such as McD, Pizza, burgers, and french fries. Soft drinks consumed are coca-cola, Fanta, and sprite. Eating that is often consumed every day is then translated into the nutritional intake.

#### **4. Discussion**

##### ***4.1. Energy Intake on Nutritional Status***

Table 2. It showed that there was no significant difference in energy intake with normal nutritional status and more nutritional status in adolescents ( $p < 0.05$ ), i.e., higher energy intake in subjects with more nutritional status ( $108.10 \pm 29.83\%$ ) compared to normal nutritional status ( $104.20 \pm 28.03\%$ ). Energy results from the metabolism of carbohydrates, fats, and proteins. A person's eating behavior strongly influences energy intake. Eating behavior is influenced by appetite and satiety. Signals in the body to start and stop eating start in the digestive tract. When approaching mealtime, the hormone ghrelin will be secreted especially from the stomach that stimulates appetite. The hormone ghrelin causes stomach contractions that can cause hunger. Hunger will cause a person to consume food or drink to eliminate this discomfort [33]. and significantly higher in the state of hunger than the state of fullness, the state of hunger has a major impact on the desire to eat, which is further modulated by the emotional state [34]. Weight loss by reducing energy intake can trigger changes in eating behaviors that are prone to overeating, increasing susceptibility to more weight gain [35].

Increasing the amount of energy intake above the recommended nutritional adequacy can affect the development of nutrition, both overweight and obesity. The level of excess energy intake if the percentage of energy intake is above 100% of RDA while the percentage of 80-100% of RDA is said to be a good energy intake level. Energy intake levels that exceed 100% RDA will produce overweight both overweight and obesity.

The study results obtained that the average energy intake of more nutritional status subjects was  $108.10 \pm 29.83\%$ , meaning the subject's energy intake was above the recommended nutritional adequacy figure. At the same time, the average energy intake of normal nutrition subjects is  $104.20 \pm 28.03\%$ . This study proves that subjects with energy intake exceeding the need will increase their weight to become more nutritional. This is following the opinion of energy intake above needs and above-average percentages resulting in a measure of body mass index above normal [36,37].

Snack eating habits influence high energy intake rates in adolescents with nutritional status. The average teenager often eats meatballs, snacks, fried rice, yellow rice, sweet martabak, egg martabak, rissoles, bakwan, pastels, various types of cakes and biscuits, ice cream, and sweets. Forslund and his colleagues 2005 prove that the frequency of snack foods is related to energy intake and nutritional status. Obese school children consume

snacks more often than children with normal nutrition. Energy intake increases along with the increasing frequency of snacking cakes (cookies), sweets, chocolate, and desserts with sweet taste so that it affects overweight and the incidence of obesity [38,39].

The choice of type of food is very dependent on the environment. The environment and modernization very easily influence school children, so it is not surprising that fast food consumption has become a trend among teenagers nowadays. Fast food plays a role in the contribution of energy because of its unbalanced nutritional content. Consumption of fast food affects nutritional status. On average, subjects in this study who were overweight more often consumed fast food. Fast food most often consumed is fried chicken, french fries, burgers, pizza, and various soft drinks. Fast food is high in calories, fat, sugar, and sodium but low in vitamin A, ascorbic acid, calcium, and fiber. This excessive calorie intake will result in overweight [40]. The results of a study in Iran showed that fast food consumption was associated with abdominal obesity as WHR (OR: 1.46, 95% CI: 1.11, 2.26), 72.4% (67.4% in women and 80.7% in men). had at least one type of fast food consumption in the past month ,including sandwiches 44.4%, pizza 39.7%, and fried chicken 13.8% at BMI and WHR were 21.3% (95% CI: 19.4, 23 .2%) and 33.2% (95% CI: 0.7, 35.7) [41].

Coca-cola and hamburgers are examples of fast food that has high energy. Coca-cola 1 liter produces 400 kcal, Hamburger, Mc Donald's 250 kcal, so fast food increases positive energy balance thus will increase excess weight [42,43]. Fast food is associated with higher BMI and weight gain. Fast food reduces diet quality and provides unhealthy choices, especially among children and adolescents, increasing the risk of obesity. Research conducted by Bowman and his colleagues (2004) showed that one in four adults who consume fast food are at risk of overweight and obesity [44]. Research conducted by Zuhdy and his colleagues (2015) shows that nutritional problems are widely encountered in young women where most types of food that are often consumed are snacks and fast food [45].

Teenagers already have a preferred choice of food from food prepared in the house. They assume that nutritional needs have been met by eating a lot of food and a full stomach. In adolescence, sometimes formed unhealthy eating habits, often school children snack outside the house and did not eat breakfast before going to school.

#### **4.2. Protein Intake on Nutritional Status**

Table 2. Showed that protein intake has a significant difference with normal nutritional status and more nutritional status in adolescents ( $p < 0.05$ ). Protein intake was higher in subjects with more nutritional status ( $128.44 \pm 42.43\%$ ) than subjects with normal nutritional status ( $118.20 \pm 41.55\%$ ). Protein intake affects nutritional status. Subjects with more nutritional status had more protein adequacy levels above normal needs. High protein intake will cause excess weight because a high fat intake always accompanies high protein intake. The excess fat will be stored in adipose tissue. Excess weight is characterized by an increase in the number of adipose cells in adipose tissue, commonly called hyperplasia, and is indicated by an increase in the size of adipose cells in adipose tissue, called hypertrophy [46]. Accumulation of fat in adipose tissue leads to overweight. Protein serves to form tissue, namely muscle. A large muscle frame in the individual will affect the individual's weight.

According to the results of Xu and Xue's study (2016), high protein intake in infancy increases the risk of obesity. High protein intake during the first years of life can lead to obesity. Infants who experience increased protein intake when switching solid foods are usually 3 to 4 times greater than the average physiological needs of the baby [47]. The percentage of protein-energy is 7-8% in infant formula, 20% in full-fat cow's milk, 5% in breastfed infants, and 12-20% in the family diet. Breastfed babies have a lower BMI than infants who are fed formula. High protein consumption is at risk of obesity and is a risk factor for PTM later in life. Protein intake in infancy and early childhood is associated with an increased risk of obesity later in life [48]. High protein consumption (OR= 13.28. 95% CI= 2.33 to 35.12, p= 0.001 shows a significant influence on the risk of obesity [49,50,51,52]. Protein intake correlates with weight gain with BMI measurements. Protein affects the muscular skeleton. A large muscular skeleton in an individual will affect the weight and BMI of that individual [53,54,55,56,57].

#### **4.3. Fat Intake on Nutritional Status**

Table 2. This shows no significant difference in fat intake between normal nutritional status and overweight status in adolescents ( $p > 0.05$ ). Fat intake was higher in subjects with more nutritional status ( $30.80 \pm 7.45\%$ ) than subjects with normal nutritional status ( $29.61 \pm 7.38\%$ ). Fat is an energy source that is most often used for other than carbohydrates. Fat intake above 30% tends to increase body weight, impacting being overweight (overweight and obesity).

There was no difference between the fat intake of overweight subjects and normal nutrition subjects. The percentage of fat intake in both was high ( $30.80 \pm 7.45\%$  and  $29.61 \pm 7.38\%$ ). The effect of dietary fat intake on the risk of being overweight may vary according to the type of fatty acid because the type of dietary fat intake affects the composition of lipid (fat) membranes and metabolic activity. Subjects with more nutritional status often consume chicken and beef to affect total fat intake. Frequently the subject consumes animal fat is influenced by the subject's habits and ethnic origin. Subjects prefer animal fat because it is savory. Fish are not very liked because, on average, they do not like the fishy smell of fish. Subjects who most like meat consumption come from the Javanese tribe. The Banjar and Bugis tribes prefer to eat fish over meat, although some are otherwise. High fat intake will increase energy intake; therefore, fat intake is often considered a cause of overweight. Excessive consumption of fat with its low satiety and high-calorie density results in weight gain. Excess energy from the fat intake is a factor in obesity [58,59,60].

Intake of fats, proteins, and carbohydrates has a relationship related to mass index or body mass index [61]. The intake of fatty foods has a greater energy density, is more filling, and has a smaller thermogenesis effect than foods containing lots of protein and carbohydrates [62]. Fatty foods also have a delicious taste to increase appetite which eventually occurs excessive consumption. Research in the United States and Finland showed that groups with high fat intake had a greater risk of weight gain than those with low fat intake with OR 1.7.

#### **4.4. Carbohydrate Intake on Nutritional Status**

Table 2. Showing that carbohydrate intake has a significant difference with normal nutritional status and more



nutritional status in adolescents ( $p < 0.05$ ). Carbohydrate intake was lower in subjects with more nutritional status ( $50.30 \pm 6.34\%$ ) with subjects with normal nutritional status ( $51.99 \pm 7.71\%$ ). Carbohydrates are the main source of energy for the population of Indonesia because the composition of the main food is sourced from carbohydrates. In addition, the energy source of carbohydrates is very cheap. The main role of carbohydrates in the body is providing glucose to the body's cells, converted to energy. Excess glucose will be stored in the liver in the form of glycogen.

Excess carbohydrates in the body will be converted into fat to without that triggers more nutrition, namely obesity, and obesity. According, to WHO recommendations, the recommended carbohydrate intake is 55% of total energy. Excessive carbohydrate intake without a balanced energy expenditure causes glucose to accumulate, and if this condition continues continuously and overtime time will lead to more nutrition, namely overweight and obesity [63,64]. Consuming a low-carb diet (about  $< 47\%$  of energy) is associated with a greater likelihood of being overweight or obese among healthy, free-living adults. The lowest risk can be obtained by consuming 47% to 64% of energy from carbohydrates [65].

The percentage of carbohydrate intake in the study subjects was both subjects with more nutritional status and subjects with normal nutritional status, below the recommended carbohydrate intake figures. A low percentage of carbohydrate intake due to the average subject, especially women consuming less carbohydrate source foods such as rice, potatoes, noodles, and others. Rice, although consumed every day but small portions with a frequency of 1-2 times a day.

#### ***4.5. Fiber Intake on Nutritional Status***

Table 2. Showing that fiber intake has a significant difference with normal nutritional status and more nutritional status in adolescents ( $p < 0.05$ ). Fiber intake was higher in subjects with more nutritional status ( $45.89 \pm 24.73\%$ ) than normal ( $39.73 \pm 22.75\%$ ). Compared to the recommended standard of fiber consumption according to WHO 30 grams/day, both subject grams/day nutritional status and normal nutritional status have met the recommended standards, both more nutritional status and normal nutritional status.

Dietary fiber is part of carbohydrates that are classified in polysaccharides. Dietary fiber has many functions in the diet, one of which is helping in controlling energy intake and reducing the risk of obesity. The benefits of fiber can improve the function of the large intestine, which can inhibit the digestion and absorption of carbohydrates and fats and reduce the risk of non-communicable diseases.

According to WHO whomber intake is associated with weight regulation and obesity prevention. People who consume high fiber can secrete more bile acids, thus removing more fat and sterols. Fiber intake can prevent excess fat in the body, leading to excess weight. Foods high in fiber can decrease insulin response, increase satiety, and lower hunger [66]. The results of research conducted by Field and his colleagues (2003), fruit and vegetable consumption can provide changes to the body mass index of children and adults in the United States [67,68].

The average fiber intake of the subject, both more nutritional status and subjects with normal nutritional status

above the recommended fiber intake (30 grams). Fruits that are often consumed are bananas and papayas because they are cheap and easy to obtain, while they are expensive for other types of fruit. People do not consider fruit a basic need, so it is rarely provided in the family.

#### **4.6. Physical Activity on Nutritional Status**

Table 2. There was no meaningful difference in physical activity between normal nutritional status and more nutritional status in adolescents ( $p > 0.05$ ). The physical activity of subjects based on physical activity level (PAL), both nutritional status more ( $1.12 \pm 0.32$ ) and normal nutritional status ( $1.11 \pm 0.33$ ) categorized as light activity. Physical activity is a body movement carried out by skeletal muscles that produce a certain amount of energy. Physical activity is the main component of energy expenditure, which is about 20-50% of total energy expenditure. Energy intake that exceeds that of energy expended for physical activity can result in an energy imbalance in the body. Unused energy in the body will be stored as fat and accumulated in fat cells in adipose tissue [69]. Research in developed countries shows a link between low physical activity and the incidence of being overweight [70]. In adolescence, the tendency to watch television and play games is one of the causes of obesity. Elif No and his colleagues research, (2011) Turkish adolescent physical activity and habits of watching television, playing games, computers affect the development of obesity [71]. The average Turkish teenager spends more time watching TV, playing games and computers than doing sweat-emitting physical activity. Research conducted by Hancox and Poulton (2006), time spent watching television can be used as a trigger factor for a significant increase in body mass index [72].

The study showed that the average activity of the subjects was light. A must and cyber study (2005) showed that physical activity is reciprocally associated with being overweight [73]. Physical activity affects the amount of energy expended; the higher the physical activity, the greater the energy expended the nutritional status produced is normal. In this study, subjects often do sports activities such as running, cycling, swimming, and futsal, often done at home and school. They often exercise to lose weight because, at first, the subjects rarely exercise, so weight is not controlled.

In this study, the subjects of most of the activities were in the mild category and spent more time watching, playing games, and other activities, namely learning. Not all subjects liked to exercise, only a small part and the most widely performed sports were running, jogging and cycling. The time to exercise is mostly less than 30 minutes (15 minutes). It is best to do physical activity 30-60 minutes/day. Regular 30 minutes of physical activity can help prevent or manage health problems including stroke, metabolic disease, stress, cancer, type 2 diabetes mellitus, and arthritis, one of which by walking for 30 minutes can reduce stress and emotional problems [74,75].

Excessive food consumption coupled with a person's lack of physical activity becomes one of the causes of obesity. Low physical activity has a 3 times greater chance of being overweight cothantrenuous activity. Energy imbalance due to watching too much television, video, games linked to increased teen BMI [76,77,78,79]. Increased regular physical activity can benefit mental well-being and quality of life in adolescents [80]. In this study, most teenagers have light activity so he, the possibility of becoming obese and obese is very large. There

is no relationship between physical activity and nutritional status because both normal nutrition adolescents and nutrition adolescents have more light physical activity.

Limitation of the study: does not intervene physical activity in the form of physical freshness gymnastics on the subject, due to time constraints and the pandemic period covid-19.

## 5. Conclusions

There are differences in the intake of nutrients (protein, carbohydrates, and fiber) to the nutritional status in adolescents. Furthermore there was no difference in nutritional intake (energy and fat) and physical activity to nutritional status in adolescents. Adolescents should pay attention to nutritional status early by paying attention to nutritional intake through diet and still doing physical activity to avoid nutritional problems that violence of non-communicable diseases.

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