

SEDENTARY BEHAVIOR, MACRONUTRIENT CONSUMPTION LEVELS AND CHILDREN'S NUTRITIONAL STATUS POST COVID-19 PANDEMIC AT SMP NEGERI 5 MENGWI

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ABSTRACT

Background: Nutritional status is influenced by food consumption and physical activity of a person. Sedentary activity is the behavior of a person sitting or lying down in daily life excluding sleeping. School-age children tend to prefer sedentary activities such as playing on computers and smartphones. The purpose of this study was to determine the relationship between sedentary activity and the level of consumption of macronutrients with the nutritional status of students in the Post-COVID-19 Pandemic at Junior High School 5 Mengwi.

Method: The type of research used is Observational analytic with a Cross-Sectional design and using the Simple Random Sampling technique with a total of 90 people. The data was collected by interview and measurement methods. Data is presented with frequency tables and cross tables.

Result: The results of the Spearman rank analysis test showed that there was a significant relationship between nutritional status and sedentary activity ($p=0.000$, $r=0.63$). Furthermore, with the same test, the result that there was a relationship between the level of energy consumption and nutritional status ($p=0.000$, $r=0.659$), there was a relationship between the level of carbohydrate consumption and nutritional status ($p=0.000$, $r=0.427$). Furthermore, that there was no relationship between the level of protein consumption and nutritional status ($p=0.0619$, $r=0.053$) and then, that there was a relationship between the level of fat consumption and nutritional status ($p=0.001$, $r=0.338$).

Conclusion: Sedentary activity and the level of consumption of energy, carbohydrates and fats are strong variables that affect the nutritional status of school children.

Keywords: Sedentary activity, Consumption rate, Macro nutrients, Nutritional status

INTRODUCTION

In 2020, the world was shocked by the emergence of a new virus called SARS-CoV-2 and which causes Coronavirus Disease 2019 (COVID-19) (Yuliana, 2020). All aspects of human life are disrupted, including education. The long-term consequences of the COVID-19 crisis include a drastic increase in the prevalence of stunting, overweight and obesity. This is caused by a lack of physical activity and a continuous increase in consumption of processed foods containing high levels of sugar, salt and fat (Unicef, 2020). School age children are a very valuable investment for the nation. Students at school are in a phase of very rapid growth and very active physical activity, so health levels need

to be improved, through improving nutritional status (Ulfa, Et al, 2018).

Based on the results of the 2018 Basic Health Research for adolescent students aged 13-15 years, the percentage of overweight based on Body Mass Index/Age was 11.2%. Meanwhile, the percentage of obesity is 4.8% (Kemenkes, 2018). School-aged children tend to choose less active activities such as playing games, using smartphones and watching television, especially when the pandemic forces them to learn online (Rahma, 2020). In Bali, the district with the highest prevalence of obese nutritional status in adolescents 13-15 years old based on BMI/U is Tabanan District with a prevalence of 21.47% and the highest obesity is Badung District with a prevalence of 15.27% (Riskesdas, 2018).

Bali Province shows a lack of physical activity with an average of 25.98% and Badung Regency is a district that has a figure of less activity that is higher than the average value of 34.35% (Kemenkes, 2018). Sedentary activities have a reversible relationship with the risk of obesity, meaning that people who frequently engage in sedentary activities have a higher risk of obesity, as well as people who are obese will be reluctant to carry out activities (Kemenkes, 2019).

Objective

In general, this research aims to determine the relationship between sedentary activities and levels of macronutrient consumption and the nutritional status of school children in the post-COVID-19 pandemic at SMP Negeri 5 Mengwi. Meanwhile, the specific aim of this research is to identify sedentary activities, levels of consumption of macronutrients (energy, carbohydrates, protein and fat), nutritional status, and analyze the relationship between sedentary activities and levels of consumption of macronutrients with the nutritional status of school children in the post-COVID-19 pandemic at SMP Negeri 5 Mengwi.

METHODS

This type of research is observational with a cross-sectional design. The research was conducted at SMP Negeri 5 Mengwi in December 2022. The population was all students in grades VII and VIII, both male and female. The sample consisted of 90 people with the sampling technique: proportional simple random sampling. Sedentary activity data was collected by filling in the ASAQ questionnaire and consumption level data by interviews using an instrument in the form of a 2x24 hour Recall form. Meanwhile, anthropometric data uses digital scales and microtoise. Calculation of nutritional status is using the z-score formula with categorization based on BMI/U. Meanwhile, the results of the sedentary activity data are categorized as

low (<2 hours/day), medium (2-5 hours/day), and high (>5 hours/day). Data on macronutrient consumption levels is processed using the Nutrisurvey application and compared with daily nutritional requirements of Indonesia. Hypothesis testing was carried out using the chi-squared test.

RESULTS AND DISCUSSION

SMP Negeri 5 Mengwi is a state junior high school located on Jalan Lurah Office no.1, Banjar Negara Kaja, Sading Village, Mengwi District, Badung Regency. The number of students recorded in the 2022/2023 academic year is 1.075 with the number of study groups being 33. Students at SMP Negeri 5 attend school from Monday to Saturday. In one day, students take part in learning activities at school from 07.30 AM to 12.00 AM.

1. Sample Characteristics

The characteristics of the sample in this study are as shown in Table 1.

Table 1. Generalized Characteristic Subject

Variable / Category		F	%
Gender	Man	33	36.7
	Woman	57	63.3
Age (years)	13	79	87.8
	14	10	11.1
	15	1	1.1
Class	VII	44	48.9
	VIII	46	51.1
N		90	100.0

Based on Table 1, it can be seen that the largest gender group is women with 57 people (63.3%), the largest sample age is 13 years with 79 people (87.8%), and the largest class is class VIII with 46 (51.1%).

2. Sedentary Activities

The lowest sedentary activity in the sample was 28.4 minutes and the highest was 399.08 minutes, with an average of 143.3633 minutes in the moderate level sedentary activity category. The sample sedentary activities are described in Table 2, as follows:

Table 2. Characteristic subject sedentary activities

Sedentary Activities	f	%
Low (< 2 hours a day)	38	42.2
Medium (2-5 hours a day)	36	40.0
High (> 5 hours a day)	16	17.8
Total	90	100.0

Based on Table 2, it can be seen that the majority of the sample (42.2%) had low sedentary activity. Meanwhile, there were 40.0% samples whose sedentary activity was classified as moderate and 17.8% samples which were classified as high.

3. Macronutrient Consumption Levels

The lowest energy recall result in the sample was 231.95 kcal and the highest was 3,216.7 kcal, with an average of 2,096.985 kcal. Most of the sample energy consumption levels are in the excess category (47,8%), while there are 8,9% in the deficit category.

Base on the data of this research, the lowest carbohydrate recall result in the sample was 55.2 grams and the highest was 566.68 grams, with an average of 278.244 grams. Most of the carbohydrate consumption levels of the samples were in the adequate category (55.6%) and 8.9% samples of excessive consumption levels.

The lowest fat recall result in the sample was 31.16 grams and the highest was 125.2 grams, with an average of 70.29 grams. Most of the sample fat consumption levels were in the excess category, namely 66 samples and the deficit consumption level was 3.3%.

The sample macronutrients consumption levels are described in Table 3, as follows:

Table 3 Characteristic subject on Macronutrients Consumption Level

Variable/Category		f	%
Energy	Deficit	8	8.9
	Adequate	39	43.3
	Excess	43	47.8
Carbohydrate	Deficit	32	35.5
	Adequate	50	55.6
	Excess	8	8.9
Fat	Deficit	1	1.1
	Adequate	23	25.6
	Excess	66	73.3
Total		90	100.0

4. Nutritional status

After calculating the nutritional status of the samples based on BMI/U, the results showed that there were no samples with poor

nutritional status. The complete nutritional status of the sample is described in Table 4, as follows:

Table 4. Characteristic Subject on Nutritional Status

Nutritional Status (BMI/A)	f	%
Undernutrition	3	3.3
Normal	36	40.0
Overweight	28	31.1
Obesity	23	25.6
Total	90	100.0

Most of the samples had good nutritional status (40.0%), and there were 31.1% overweight and 25.6% had obesity.

5. Relationship between Sedentary Activities and Nutritional Status of School Children

The results showed that of the 23 samples with obese nutritional status, there was 1 sample with low sedentary activity, 16 samples with moderate sedentary activity, and 6 samples with high sedentary activity. Of the 28 samples with over nutritional status, there were 3 samples with low sedentary activity, 17 samples with moderate sedentary activity, and 8 samples with high sedentary activity. Details regarding the relationship between sedentary activity and nutritional status can be seen in Table 5, as follows:

Table 5. Bivariate analysis based on Sedentary Activity and Nutritional Status

Nutritional Status										p	r
Sedentary Activities	Obesity		Overweight		Normal		Under nutrition				
	f	%	f	%	f	%	f	%			
Low	1	1.1	3	3.3	31	34.5	3	3.3	0,000	0,677	
Medium	16	17.8	17	18.9	3	3.3	0	0			
High	6	6.7	8	8.9	2	2.2	0	0			
Total	23	25.6	28	31.1	36	40.0	3	3.3			

The results of the Spearman correlation test show a p value of 0.0000. This means that there is a significant relationship between sedentary activity and students' nutritional status. The strength of the relationship is shown by the r value or correlation coefficient, which is 0.677, which means the level of correlation is strong.

6. Relationship between Macronutrient Consumption Levels and Nutritional Status

The research results showed that of the 23 samples with obese nutritional status, there

was 1 sample whose energy consumption level was classified as deficit, 2 samples were classified as adequate, and 20 samples were classified as excessive. Of the 28 samples with excess nutritional status, there was 1 sample whose energy consumption level was classified as deficit, 7 samples were classified as adequate, and 20 samples were classified as excessive. Details regarding the relationship between energy consumption levels and nutritional status can be seen in Table 6, as follows:

Table 6 Bivariate analysis on Energy Consumption Level and Nutritional Status

Consumption Levels	Obesity		Overweight		Normal		Under nutrition		p	r
	f	%	f	%	f	%	f	%		
Energy										
Deficit	1	1,1	1	1,1	5	5,6	1	1,1	<0,001	0,659
Adequate	2	2,2	7	7,8	28	31,1	2	2,2		
Excess	20	22,3	20	22,2	3	3,3	0	0		
Carbohydrate										
Deficit	2	2,2	8	8,9	19	21,1	3	3,3	<0,001	0,427
Adequate	17	18,9	18	20,0	15	16,7	0	0		
Excess	4	4,5	2	2,2	2	2,2	0	0		
Protein										
Deficit	4	4,5	3	3,3	9	10,0	1	1,1	0,619	0,053
Adequate	16	17,8	21	23,3	20	22,2	2	2,2		
Excess	3	3,3	4	4,5	7	7,8	0	0		
Fat										
Deficit	0	0	0	0	1	1,1	0	0	0,001	0,338
Adequate	3	3,3	3	3,3	16	17,8	1	1,1		
Excess	20	22,2	25	27,8	19	21,1	2	2,2		
Total	23	25,6	28	31,1	36	40,0	3	3,3		

The results of the Spearman correlation test show that there is a significant relationship between the level of energy consumption and the nutritional status of students ($p < 0.05$), with a correlation coefficient of 0.659, which means a strong correlation level.

Based on the results of data analysis, the level of carbohydrate consumption and nutritional status of the research shows that of the 23 samples with obesity nutritional status, there are 2 samples whose level of carbohydrate consumption is classified as deficit, 17 samples are classified as adequate, and 4 samples are classified as excessive. Of the 28 samples with excess nutritional status, there were 8 samples whose carbohydrate consumption levels were classified as deficit, 18 samples were classified as adequate, and 2 samples were classified as excessive. There is a significant relationship between the level of carbohydrate consumption and the nutritional status of students ($p < 0.05$). The strength of the relationship is shown by the value $r = 0.427$, which means the correlation level is quite strong.

The research results showed that of the 23 samples with obese nutritional status, there were 4 samples whose protein consumption levels were classified as deficit, 16 samples were classified as adequate, and 3 samples were classified as excessive. Of the 28 samples with overweight, there were 3 samples whose protein consumption levels were classified as deficit, 21 samples were classified as adequate, and 4 samples were classified as excess. After carrying out the Spearman correlation test, it was concluded that there was no significant relationship between the level of protein consumption and the students' nutritional status ($p > 0.05$).

Of the 23 samples with obese nutritional status, there were 3 samples whose level of fat consumption was classified as adequate, and 20 samples were classified as excessive. Of the 28 samples with excess nutritional status, there were 3 samples whose level of fat consumption was classified as adequate, and 25 samples were classified as excessive. There is a significant relationship between the level of fat consumption and the nutritional status of students ($p < 0.05$) with a correlation coefficient of 0.338, which means the correlation level is quite strong.

Based on the results of research on the sedentary activity of students at SMP Negeri 5 Mengwi in 6 days (Monday-Saturday), it was found that the majority of samples had sedentary activity which was classified as low, as many as 38 samples. Meanwhile, there were 36 samples classified as moderate sedentary activity and only 16 samples for high activity. Sedentary activities are activities related to all types of activity that occur outside sleep time and are characterized by a very low-calorie output, namely less than 1.5 METs (Putra, 2017). This is different from the research conducted (Mozo, 2017) with the title "The Relationship between Dietary Patterns, Physical Activity and Sedentary Activity with Overweight in SMA Negeri 5 Surabaya" which obtained the results that most of the samples had high sedentary activity. This is because the majority of the sample often

engages in sedentary activities such as playing with gadgets and there is an increase in sedentary activities on Saturday-Sunday.

Based on the results of calculating students' energy consumption levels, the results showed that the majority of samples had consumption levels that were classified as excessive, namely 43 samples. Energy sources are dietary fat sources such as fats and oils, nuts and seeds (Putra, 2017). This is in accordance with what was stated in research (Revi, et al, 2015) entitled "The Relationship between Energy Intake and Nutritional Status of Female Students at SMA Negeri 4 Manado". The results of this study state that excess energy intake can be caused by excess fat intake, malnutrition as a process of deficiency due to one or more nutrients not being met, this is supported by the theory that 1 gram of fat is equal to 9 calories, so excess fat intake also affects energy intake (Primashanti dan Sidhiarta, 2018).

Meanwhile, regarding students' carbohydrate consumption levels, the results of this study show that the majority have adequate consumption levels, namely 50 samples. Carbohydrates function as a sweet taste, save protein, regulate fat metabolism, and help excrete feces (Adriani dan Wiratmadji, 2016). In research conducted (Rosida dan Adhi, 2017) entitled "The Relationship between Breakfast Habits, Adequate Levels of Energy, Carbohydrates, Protein and Fat, with Nutritional Status of Students at the Al-Fattah Buduran Islamic Boarding School, Sidoarjo" it was found that the majority of respondents had sufficient levels of carbohydrate consumption. have normal nutritional status. Apart from that, research entitled "Breakfast Habit and Nutritional Status of Undergraduates in Ekiti State, Nigeria" (Adeshola, et al, 2014) stated that teenagers who skipped breakfast showed differences in the average carbohydrate intake between teenagers who skipped breakfast.

The level of protein consumption of students shows that the majority of samples have adequate levels of protein consumption,

namely 59 samples. Protein functions for growth and maintenance of tissue, as a material for forming enzymes, as a means of transportation and storage, as a movement regulator, and as a mediator for the transmission of nerve impulses (Proverawati dan Wati, 2014). In research conducted (Paputungan, 2016) entitled "The Relationship between Iron and Protein Intake and the Incidence of Anemia in Class VIII and IX Students at SMPN 8 Manado" showed the results that there was a relationship between protein intake and the incidence of anemia in female students at SMP Negeri 8 Manado. This is in line with the theory which states that protein functions as a transporter, namely in transporting iron in the body.

The results of research on students' fat consumption levels were that the majority of samples had excessive levels of fat consumption, namely 66 samples. Fat is rich in energy, so fat is important for maintaining energy balance and body weight (Desthi, et al, 2019). The results of research on levels of fat consumption are the same as research conducted (Dewi dan Kartini, 2017) entitled "The Relationship between Nutritional Knowledge, Physical Activity, Energy Intake and Fat Intake with the Incidence of Obesity in Junior High School Adolescents", which shows that the level of excess fat intake is quite high, namely as much as 66.7%.

Based on the results of calculating nutritional status according to BMI/U for students, the results showed that the majority of samples had good nutritional status, namely 36 samples. Apart from that, there were 2 samples that had less nutritional status, 28 samples had more nutritional status, and 23 samples had obesity status. The primary factor that influences nutritional status is food composition.

CONCLUSIONS

There is a significant relationship between sedentary activity and nutritional

status. In addition, there is a significant relationship between the level of energy, carbohydrate and fat consumption and nutritional status. There is no relationship between the level of protein consumption and the nutritional status of students.

The advice we can convey is: school institutions are expected to provide education regarding the prevention of overweight and obesity, as well as the importance of physical activity in improving the health of school children. Students are expected to increase their physical activity. Meanwhile, future researchers are expected to carry out further research on the relationship between protein intake and nutritional status to identify the factors causing there to be no relationship between protein intake and nutritional status.

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CONFLICT OF INTEREST

We all authors declare that there is no conflict of interest from this research activity.

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