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Relationship between macro nutrient intake, physical activity, and stress levels in police officers

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Abstract. Overweight cases in Banten from 2022 obesity cases increased by 22%. According to data from the Medical and Police Department (SIDOKKES) of the Cilegon City Police, the prevalence of overweight cases was 19.2% of male police officers experiencing overweight status. This study is a quantitative and observational study with a cross-sectional research design. This study aims to determine the relationship between nutrient intake, physical activity and stress levels with the incidence of obesity in police officers at the Cilegon City Police. The sample in this study were police officers at the Cilegon City Police. The results of the study concluded that the nutritional status of police officers was 60.8% experiencing normal nutrition and 39.2% experiencing overweight, with an average energy intake of 2497 Cal, 79.35 grams of protein, 87.3 grams of fat, and 350.6 grams of carbohydrates. Overall, most respondents had adequate energy, fat, and carbohydrates in the normal category. While the level of energy sufficiency in the category above the requirement figure, Judging from physical activity as many as 20.3% have light physical activity, 65.8% have moderate physical activity, and 13.9% have heavy physical activity, Based on stress levels as many as 77.2% experience light stress and 22.8% experience moderate stress, 22.8% experience moderate stress. 5. There is no significant relationship between energy intake (P = 0.333) and protein (P = 0.168) with nutritional status, but there is a significant relationship between fat intake (P = 0.030) and carbohydrates (P = 0.006) with nutritional status, There is a significant relationship between physical activity and nutritional status (P = 0.000), There is no significant relationship between stress levels and nutritional status (P = 0.607).

Keywords: Physical Activity, Macronutrient Intake, Nutritional Status, Stress Level.

Introduction

Nutritional status according to the Indonesian Ministry of Health and WHO is a condition caused by the balance between nutrient intake from food and the nutritional needs required by the body for metabolism. Nutritional status is a state of the body related to the consumption, absorption, and use of food in the body (Susneliawati et al., 2018). Nutritional status measures the fulfillment of nutritional needs obtained from intake. Nutritional status is influenced by daily food consumption. Nutritional status is a state of the body through the consumption of food and nutrients (Pakaya et al., 2020).

Increased overnutrition in adulthood must be controlled early because it has a negative impact. (Sahoo et al., 2015) the occurrence of overnutrition in adulthood can hurt physical, social, emotional, and self-esteem health. A person with overnutrition status has an intellectual level twice as low as someone with normal nutritional status

(Poh et al., 2019). Overnutrition occurs due to a discontinuity between energy intake and expenditure (Destiani et al., 2019). Diet greatly affects a person's nutritional status, especially if someone is in a poor diet (Sagala & Noerfitri, 2021).

Overnutrition is caused by several factors including nutrient intake, physical activity, and stress levels. Nutritional intake is the cause of overnutrition in adults. Mostly caused by high energy and fat consumption. Due to the heavy workload, the consumption of food with frequent eating frequencies causes police officers to consume high-energy foods so that there is an imbalance between the intake of nutrients and the energy value they need. Physical activity is related to nutritional status, for example, police with light activity have a higher nutritional status (75%) than police with heavy activity have a nutritional status (43%). Decreased physical activity due to changes in lifestyle patterns caused by increasingly advanced technological developments can be one of the main triggers for overnutrition (Suryadinata & Sukarno, 2019). In addition to physical activity, other factors affect nutritional status, namely stress. (Mayataqillah et al., 2023) Stressful behavior can lead to obesity due to increased appetite aimed at controlling stress levels. Overnutrition can cause serious health consequences because it is a risk factor for degenerative diseases.

Nutrient intake is one of the direct causes that can affect nutritional status. Nutrient intake can also be obtained from several nutrients, including macronutrients such as energy, carbohydrates, proteins, and fats. Macronutrients are nutrients that are needed in large quantities by the body and mostly play a role in providing energy. Sufficient energy and protein intake that meets the body's needs will be directly proportional to good nutritional status (Diniyyah & Nindya, 2017). Micronutrients function as energy providers and are needed in large quantities by the body. Insufficient micronutrient needs can cause several health problems. Low levels of fat intake can cause hormonal disorders, vitamin absorption, nutrient metabolism disorders, and decreased body mass. In addition to these substances, other micronutrients that can affect nutritional status are carbohydrates(Sholichah et al., 2021).

Overweight cases in Banten from 2022 obesity cases increased by 22%. According to data from the Medical and Police Service (SIDOKKES) of the Cilegon City Police, the prevalence of overweight cases was 19.2% of male police officers experiencing overweight status. The impact of overweight status on police productivity results in easy fatigue, easy drowsiness resulting in lack of concentration, frequent shortness of breath, and less than optimal performance in carrying out work duties. (Meylinda, 2018) Excess nutrition in a person is an important problem because it can affect physical endurance thereby reducing fitness, in addition, excess nutrition can also cause emotional disorders such as shame, and low self-esteem and can reduce work productivity. Some of the factors of overweight that are often found in the police are the factor of increasing age. (Irawati, 2018) age factors greatly support physical immunity which means the older a person is, the less the body's resistance to disease sources. (Kurniawati et al., 2016) Their research concluded that there is a relationship between diet, physical activity, sleep duration, and obesity levels in police officers.

Efforts to handle cases of over-nutrition for police officers include a weight monitoring program so that police officers can maintain normal nutritional status. Therefore, researchers are interested in analyzing the relationship between macronutrient

intake, physical activity, and stress levels with over-nutrition in police officers at the Cilegon City Police.

Methods

This study is a quantitative and observational study with a cross-sectional research design. This study aims to determine the relationship between nutrient intake, physical activity, and stress levels with the incidence of obesity in police officers at the Cilegon City Police. The sample in this study was police officers at the Cilegon City Police using two sample criteria, namely inclusion and exclusion criteria. The inclusion and exclusion sample criteria are as follows:

Table 1. Research Sample Criteria

Inclusion Sample	Exclusive Sample
- Male police officers at Cilegon City Police - Police members who have the rank of briptu, brigadier, and bripka - Willing to be a research respondent by signing an informed consent	- In a state of serious illness so unable to complete the questionnaire - Police officers who are unable to attend

Source: determined by the researcher

In determining the number of samples with a population of 250 male police officers serving at the Cilegon City Police, the researcher used the Slovin formula with the following formula:

$$n = \frac{N}{1 + N\,(e)^2}$$

n : Sample size or number of respondents
N : Population Size
e : The percentage of tolerance for sampling error accuracy that can still be tolerated is e = 0.1 (10%).

Based on the results of calculating the number of samples using the Slovin formula, it is known that the number of samples is 79 people. The sampling technique in this study used purposive sampling, namely the sample in this study was taken using several special characteristics according to the purpose of the study. The sampling carried out was police officers who visited the Cilegon City Police clinic, totaling 79 male police officers.

The instrument used in this study was a questionnaire filled out by respondents. The questionnaire was filled out by respondents who were included in the sample and the interviews conducted. The questionnaire data that had been filled out by respondents was then processed to become a data source in the study. The data that had been obtained was then analyzed using several analysis techniques, namely univariate analysis and bivariate analysis. Univariate analysis is a descriptive data analysis technique to describe parameters (Heryana, 2020), namely in the form of respondent characteristics in the form

of anthropometric data, nutritional status, nutritional intake, physical activity and stress levels. While bivariate analysis was carried out to analyze the relationship between macronutrient intake, physical activity and stress levels on nutritional status using chi square.

Result and Discussion

The Cilegon City Resort Police is the executor of the duties of the Republic of Indonesia Police in the Cilegon City area. The Cilegon Police Clinic cooperates with the police hospital and hospitals in the Cilegon area. The hospitals that cooperate are the Banten Police Bhayangkara Hospital, the Raden Said Sukanto TK I Bhayangkara Hospital, the Cilegon Hermina Hospital, the Cilegon Krakatau Medika Hospital, the Cilegon Kurnia Hospital, and the Cilegon Regional General Hospital. Monitoring the nutritional status of police members is through monitoring the nutritional status of members. Weighing and height are evaluated by officers every three months who are assigned by the leadership so that they can be followed up for members who have more nutritional status.

Result

Respondent Characteristics

The results of the study showed that the characteristics of respondents in filling out the instrument questionnaire on police members at the Cilegon City Police were members with the ranks of briptu, brigadir and bripka. The data on respondent characteristics are as follows:

Table 2. Frequency Distribution of Respondents Based on Age and Rank

Respondent Characteristics	N	Persentase
Age		
19 – 29 Years	36	45, 6 %
30 – 39 Years	43	54,4 %
Rank		
Briptu	16	20.3 %
Brigadir	37	46, 8 %
Bripka	26	32,9 %

Source: determined by the researcher

Based on Table 2, the total respondents were 79 police members based on age consisting of 19-29 years old as many as 36 police members (45.6%) and 30-49 years old as many as 43 police members (54.4%). Based on rank consisting of bribes as many as 16 police members (20.3%), brigadier 37 police members (46.8), and bripka as many as 26 police members (32.9%).

Nutritional Status

Nutritional status data was calculated using the Body Mass Index (BMI) based on height and weight to determine the status of male police officers.

Table 3. Data on Distribution of Respondents Based on Nutritional Status

Nutritional Status	N	Persentase
Normal Nutrition	48	60, 8 %
More Nutrition	31	39,2 %
Total	79	100 %

Source: Body Mass Index (BMI) calculation

Based on table 3, it can be seen that 48 police members (60.8%) experienced normal nutrition and 31 police members (39.2%) experienced excess nutrition..

Macronutrient Intake

Data on nutritional intake in this study were obtained from the food recall formula, then the food intake data was calculated using nutrisurvey. The following are the results of processing nutrient intake data:

Table 4 Distribution of Macronutrient Intake

Nutrients	Mean	SD	Min	Max
Intake				
Energy	2497	217,2	1813	3555
Protein	79,35	7,8	63	99
Lemak	87,3	10,7	65	125
Carbohydrate	350,6	32,6	272	527

Source: Researcher

Based on table 4, it can be seen that the average energy intake is 2497 Cal, protein 79.35 grams, fat 87.3 grams and carbohydrates 350.6 grams. The average energy nutrient requirement is 2595 Cal, protein 65 grams, fat 72.28 grams, and carbohydrates 421.84 grams according to AKG 2019.

Table 5. Distribution of Nutrient Coverage Levels

Nutritional Adequacy Level	Energi		Protein		Lemak		Carbohydrate	
	N	%	N	%	N	%	N	%
Deficit < 80 %	1	1,3	0	0	0	0	16	20,1
Normal 80 % - 120 %	77	97,5	33	41,8	40	50,6	62	78,5
Above requirement figure ≥ 120	1	1,3	46	58,2	39	9,4	1	1,3

Source: Researcher

Based on Table 5, it is known that male police officers in Cilegon City Police Department have sufficient energy nutrition at the deficit level of 1 police officer (1.1%), normal for 77 police officers (97.5%), and above the requirement level for 1 police officer (1.3%). The level of protein nutrition adequacy at the normal level is 33 police officers (41.8%), and above the requirement level is 46 police officers (58.2%).

The level of adequacy of fat nutrients at normal levels was 40 police officers (50.6%), and above the requirement level was 39 police officers (49.4%). The level of adequacy of carbohydrate nutrients at deficit levels was 16 police officers (20.1%), normal was 62 police officers (78.53%), and above the requirement level was 1 police officer (1.3%).

Physical Activity

Physical activity in police officers in this study was measured using the International Physical Activity Questionnaires (IPAQ) and then calculated so that it could be classified into light, moderate and heavy physical activity categories.

Table 6. Frequency Distribution of Physical Activity

Physucal Activity	N	%
Light	16	20,3
Medium	52	65,8
Heavy	11	13,9
Total	79	100

Source: Measured by the International Physical Activity Questionnaires (IPAQ)

Based on table 6, it is known that 16 police officers (20.3%) have light physical activity, 52 police officers (65.8%) have moderate physical activity, and 11 police officers (13.9%) have heavy physical activity.

Stress Level

The stress level of police officers was measured using the Depression Anxiety Stress Scale (DASS) questionnaire, then calculated and categorized into mild stress, moderate stress, and severe stress.

Table 7. Frequency Distribution of Stress Levels

Stress Level	N	%
Light	61	77,2
Medium	18	22,8
Total	79	100

Source: measured using the Depression Anxiety Stress Scale (DASS) questionnaire

Based on Table 7, it is known that 61 male police officers (77.2%) experienced mild stress and 18 male police officers (22.8%) experienced moderate stress.

Relationship between Macronutrient Intake and Nutritional Status

Table 8. Relationship between Energy Intake and Nutritional Status

Energy Adequacy Level	Nutritional status			P - Value
	Normal Nutrition n (%)	Overnutrition n (%)	Total n (%)	
Deficit	1 (1,3)	0 (0,0)	1 (1,3)	0,333
Normal	47 (59,5)	30 (38,0)	77 (97,5)	

Above the Need Figures	0 (0,0)	1 (1,3)	1(1,3)	
Total	48 (60,8)	31 (39,2)	79 (100)	

Source: Chi Square test by researchers

Based on the results of the Chi Square test, the P value is 0.333, so it can be concluded that there is no significant relationship between energy intake and nutritional status.

Table 9. Relationship between Protein Intake and Nutritional Status

Protein Adequacy Level	Nutritional status			P - Value
	Normal Nutrition n (%)	Overnutrition n (%)	Total n (%)	
Normal	23 (29,1)	10 (12,7)	33 (41,8)	0,168
Above the Need Figures	25 (31,6)	21 (26,6)	46 (58,2)	
Total	48 (60,8)	31 (39,2)	79 (100)	

Source: Chi Square test by researchers

Based on the results of the Chi Square test, the P value is 0.168. So it can be concluded that there is no significant relationship between protein intake and nutritional status.

Table 10. Relationship between Fat Intake and Nutritional Status

Fat Adequacy Level	Nutritional status			P - Value
	Normal Nutrition n (%)	Overnutrition n (%)	Total n (%)	
Normal	29 (36,7)	11 (13,9)	40 (50,6)	0,030
Above the Need Figures	17 (24,1)	20 (25,3)	39 (49,4)	
Total	48 (60,8)	31 (39,2)	79 (100)	

Source: Chi Square test by researchers

Based on the results of the Chi Square test, the P value is known to be 0.030. So it can be concluded that there is a significant relationship between fat intake and nutritional status.

Table 11. Relationship between Carbohydrate Intake and Nutritional Status

Carbohydrate Adequacy Level	Nutritional status			P - Value
	Normal Nutrition n (%)	Overnutrition n (%)	Total n (%)	
Deficit	15 (19,0)	1 (1,3)	16 (20,3)	0,006
Normal	33 (41,8)	29 (36,7)	62 (78,5)	
Above the Need Figures	0 (0,0)	1 (1,3)	1(1,3)	
Total	48 (60,8)	31 (39,2)	79 (100)	

Source: Chi Square test by researchers

Based on the results of the Chi Square test, the P value is known to be 0.006. So it can be concluded that there is a significant relationship between carbohydrate intake and nutritional status.

Relationship between Physical Activity and Nutritional Status

Table 12. Relationship between Carbohydrate Intake and Nutritional Status

Physical Activity Level	Nutritional Status			P - Value
	Normal Nutrition n (%)	Overnutrition n (%)	Total n (%)	
Light	2 (2,5)	14 (17,7)	16 (20,3)	0,000
Medium	35 (44,3)	17 (21,5)	42 (65,8)	
Weight	11 (13,9)	0 (0,0)	11(13,9)	
Total	48 (60,8)	31 (39,2)	79 (100)	

Source: Analysis of the Chi Square test by researchers

Based on the results of the analysis of the Chi-Square test, it is known that police officers with normal nutrition have moderate to heavy physical activity, while police officers with excess nutritional status have light to moderate physical activity. Moderate and heavy activities that are often done by police officers are cycling, aerobics, and weight lifting. In this test, the value of P = 0.000 was obtained. So it can be concluded that there is a relationship between physical activity and nutritional status.

Relationship between Stress Level and Nutritional Status

Table 13. Relationship between Carbohydrate Intake and Nutritional Status

Stress Level	Nutritional Statud			P - Value
	Normal Nutrition n (%)	Overnutrition n (%)	Total n (%)	
Light	38 (48,1)	23 (29,1)	61 (77,2)	0,607
Medium	10 (12,7)	8 (10,1)	18 (22,8)	
Total	48 (60,8)	31 (39,2)	79 (100)	

Source: Analysis of the Chi Square test by researchers

Based on the results of the analysis of the Chi-Square test, it is known that police officers with normal nutrition and overnutrition have equality between mild stress and moderate stress. The incidents that police officers experience are easily irritated, difficulty feeling calm after something makes them irritated, and feeling easily offended. In this test, the P value is 0.607. So it can be concluded that there is no significant relationship between stress levels and nutritional status.

Discussion

Relationship between Nutrient Intake and Nutritional Status

Based on the research that has been conducted, it can be seen that the level of energy and carbohydrate intake is relatively the same so the results show that there is no

relationship between energy and protein intake and nutritional status. Meanwhile, at the level of fat and carbohydrate intake, there is a relationship with nutritional status. This can be seen that the level of fat adequacy above the required level is greater in the group of police members who have more nutritional status. Furthermore, at the level of carbohydrate adequacy in the group of police members who have normal nutritional status, there are still many whose carbohydrate adequacy levels are in the deficit category. This study is not in line with the study (Khoerunisa & Istianah, 2021) in their study stating that there is a significant relationship between nutrient intake and nutritional status (P = 0.01).

Imbalanced consumption patterns result in less or more nutrients entering the body. Nutrient intake is one of the factors that directly affect a person's nutritional status because nutrient consumption that does not match the needs of both quality and quantity can cause nutritional problems. High energy intake from fat will cause weight gain. The human body also cannot accommodate excess protein, so it will be stored in the form of triglycerides by the body. This is what causes an increase in fat tissue, causing obesity (Ermona & Wirjatmadi, 2018).

Based on data from the results of the Food Recall, it is known that the fat intake of police officers at the Cilegon City Police Department is the consumption of animal side dishes such as fried chicken, fried fish, beef stew, fried eggs, fried tofu, and fried tempeh on average 2 times a day. Police officers also often consume meatballs, dim sum, chicken noodles, and fried foods. This can result in high fat intake which can lead to over-nutrition.

Relationship between Physical Activity and Nutritional Status

Based on the results of the analysis, it is known that there is a significant relationship between physical activity and nutritional status with a P value of 0.000. This shows that the lower the physical activity of police officers, the higher their nutritional status will be. This is in contrast to the research conducted by (Damayanti et al., 2019) their research showed that the relationship analysis showed a value of p = 0.071 (p => 0.05) which means that physical activity is not statistically significant to nutritional status.

Changing lifestyles also cause changes in food intake that is high in calories, fat, and cholesterol which is not balanced with physical activity so it will cause problems of overnutrition. Food intake with high calories, fat, and cholesterol must be balanced with physical activity so that there is a balance of nutritional intake. Activeness in doing physical activity will affect the body mass index so that it will have an impact on reducing the risk of overnutrition problems. This is because there is a balance between the intake eaten and the intake excreted. The benefits of this physical activity are that it can reduce body fat mass and increase muscle strength so that it can prevent excessive fat accumulation in the body (Salbe, 2020).

Most police officers still do moderate physical activities such as walking and some police officers have heavy physical activities such as lifting weights. To avoid over-nutrition, police officers should increase their physical activity and exercise at least 2 times a week for 30-45 minutes.

Relationship between Stress Level and Nutritional Status

Based on the results of the analysis, there is no significant relationship between stress levels and nutritional status with a P value of 0.607. This can happen because most of the data on stress levels in police officers experience equality between police officers with mild nutritional status and those with more nutritional status, both of whom experience mild stress. The relationship between stress levels and nutritional status is in line with research (Fitriana et al., 2022) which states that there is no relationship between stress levels and nutritional status. Other studies such as those conducted by (Muzdalifah, 2021) in their research concluded that there is no relationship between low, moderate, and high-stress levels and nutritional status.

The research that has been conducted did not find a relationship between stress levels and nutritional status. This can happen because the workload is relatively the same so that the stress level is also relatively the same. In this study, the incidents that often cause stress in police officers are easily irritated, difficult to feel calm after something makes them upset, feeling easily offended, and feeling easily angry because of trivial things that can cause police officers to feel stressed.

Conclusion

Based on the results of the research that has been conducted, the researcher concluded several studies including the nutritional status of police officers at the Cilegon City Police Department as many as 60.8% experienced normal nutrition and 39.2% experienced excess nutrition. The average energy intake was 2497 Cal, 79.35 grams of protein, 87.3 grams of fat, and 350.6 grams of carbohydrates. Overall, most respondents had a sufficient level of energy, fat, and carbohydrates in the normal category. While the level of energy adequacy in the category above the required number Judging from physical activity, 20.3% had light physical activity, 65.8% had moderate physical activity, and 13.9% had heavy physical activity. Based on stress levels, 77.2% experienced mild stress, and 22.8% experienced moderate stress. There was no significant relationship between energy intake (P = 0.333) and protein (P = 0.168) with nutritional status. However, there was a significant relationship between fat intake (P = 0.030) and carbohydrates (P = 0.006) with nutritional status. In addition, there was a significant relationship between physical activity and nutritional status (P = 0.000). However, there was no significant relationship between stress levels and nutritional status (P = 0.607).

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