Correlation Intake of Energy, Protein, Fluid, Physical Activity, and Hydration Status with VO_2Max at Hockey Atlet in UKM Pancasila University

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Keyword: Energy intake, Fluid intake, Hockey athlete, Hydration status, Physical activity, Protein intake, VO_2Max.

Abstract: Hockey is a sport which is conducted in high determination so that every athlete is prosecutedfor having good physical condition and VO_2Max during the game. When the level of VO_2Max is high, then the endurance of doing exercise is also higher, which means someone who has a high VO_2Max levelwill not feel tired quickly after doing a series of activities. Purpose: Analyze Correlation intake of energy, protein, fluid, physical activity and hydration status with VO_2Max at UKM Pancasila University Hockey athletes. Research Method: This quantitative research usesa cross-sectional approach. Statistical tested by using Pearson correlation test and spearman correlation test for bivariate test. This study involved 32 samples Hockey player on UKM Pancasila University. Result: More than half of Hockey athletes on UKM Pancasila University have VO_2Max levelin the categories below standard with average 36,55±8,58 ml/kg/minute (56,2%), less Energy Intake with average 1783,31±428,15 kkal (53,1%), less Protein Intake with average 50,47±12,61 gram (56,3), less Fluid Intake with average 1957,64±569,59 ml (59,4%), Hydration status of hockey athlete before and after exercise in mild dehydration conditionis 17 people (53,1%). The physical activity of the hockey athletes is moderate with an average of 1.7759 ± 0.44 PAL (34.4%). The statistical test result showed a correlation between energy intake, fluid intake, physical activity, hydration status before exercise with VO_2Max ($p \leq 0,05$). However there is no correlation between energy intake and hydration status after exercise with VO_2Max ($p \geq 0,05$). We conclude that hockey athlete should always pay attention to food and fluid intake as well as a physical activity because VO_2Maxcorrelate with energy intake, fluid intake, physical activity and hydration status before exercise.

1 INTRODUCTION

Hockey is a sport which is conducted in high determination so that every athlete was required to have the good physical condition. A hockey athlete must play in a 70-minute in a match with some activities like jogging, running in some speed variations during the game. This proves every athlete should have the maximum aerobic capacity or good VO_2Max during the match (Yudianti, 2016). The higher the VO_2Max level, the higher the resistance during exercise, which means that a person with a high VO_2Max score will not feel fatigue after a series of activities (Sharkey, 2003).

During physical activity, muscles require energy to move. The heart and lungs need extra energy to deliver nutrients and oxygen throughout the body and remove the remains of the body. Energy requirements for physical activity depend on the number of moving muscles, time and encumbrance during exercise (Dewi and Mustika, 2012).In general, a hockey player requires 15-20% protein fulfilment of total energy. In Yasmin (2014) research, it was shown that most of the PS Barito Putera soccer athletes (33.33%) who had normal protein consumption levels, had good physical endurance as well.

According to Murray (2007) Studies and research results show that athletes or individuals who startexercise or matches with a goodbodyhydration levels will have endurance performance, the speed of response or reaction, as well as sports performance, is more excellent. Consumption of fluids during exercise

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period and hydration status after exercise in athletes resulted influid consumption during exercise period is still less than a requirement (2400-3400 ml),and all suffer from dehydration, mostly significant dehydration (89.4%), and other minimal dehydration (10.6%) (Putriana, 2014).

The purpose of this study was to analyze the relationship the relationship of energy intake, protein intake, fluid intake, physical activity and hydration status to determine the VO_2Max hockey athlete at Pancasila University.

2 RESEARCH METHOD

This research was conducted starting in June 2017. The place of research is inthe multipurpose building of Pancasila University campus on Jl. Srenseng Sawah, Jagakarsa, South Jakarta.

This quantitative research uses a cross-sectional approach. The population in this study were 32 people. The population consists of 19 men and 13 women hockey team at Pancasila University. Sampling method in this research is total sampling. Characteristics of sex and age were identified using the questionnaire method. VO_2Max levelusing bleep test method. Intake of energy, protein and liquid using food recall form method 3x24 hours. Hydration status uses a clear colored urine color comparison method with PURI card. Univariate analysis of the variables examined included energy intake, protein intake, fluid intake, physical activity, hydration status and VO_2Max. The bivariate analysis in this study was to determine the relationship of energy intake, protein intake, fluid intake, physical activity and hydration status with VO_2Max. In bivariate analysis,this study used the Spearman correlation test and Pearson correlation.

3 RESULTS AND DISCUSSION

3.1 Characteristics of Athletes

Based on Table 1 the distribution of hockey athletes in the University of Pancasila shows more men (59.8%) than women. 19 athletes (59.4%) aged over 20 years. Acceptance member of Pancasila University hockey athletes do at the beginning of the new admissions; then there is regeneration each year. The timing of this study is far from the regeneration period,so there is a decrease in the number of athletes. In the notes list of members in UKM hockey University of Pancasila there is always a reduction of members from the beginning of regeneration, but the most data reduction in female members.

In Saqurin (2013) study with Taekwondo student at Airlangga University using 20-meter shuttle run test and data analysis using the Wilcoxon test, Paired Sample T-test and independent sample t-test showed that the levels of VO_2 Max in women smaller than men that are equal to 36%. At the age of 25-30 years, there will be a decrease in the functional capacity of the whole body, approximately by 0.8-1%/year, but when diligent exercise decrease can be reduced to half (Kant and Graubard, 2010).

Table 1: Univariate Analysis Result

Variables	Information	n	%
Gender	Women	13	40.6
	Man	19	59.4
Age	<20 years	6	18.8
	> 20 years	26	81.2
VO_2Max	Very good	2	6.3
	Good	7	21.9
	Standard	5	15.6
	Low	13	40.6
	Very low	5	15.6
Energy	Less	17	53.1
	Normal	13	40.6
	More	2	6.3
Protein	Less	18	56.3
	Normal	13	40.6
	More	1	3.1
Fluid	Less	19	59.4
	Normal	12	37.5
	More	1	3.1
Physical Activity	Very Light	6	18.8
	Light	7	21.9
	Medium	11	34.4
	Weight	8	25.0
Hydration Status Before Exercise	Good Hydration	11	34.4
	Light Dehydration	17	53.1
	Dehydration	4	12.5
Hydration Status After the Exercise	Good Hydration	1	3.1
	Light Dehydration	17	53.1
	Dehydration	14	43.8

3.2 VO2Max

Based on Table 1, the fitness test results of the hockey athletes showed 18 Hockey athletes (56.2%) had VO_2Max levelunder the standard category. The average VO_2Max levelis 36.55 ± 8.58 ml / kg / min with a minimum levelof 26 ml / kg / min and a maximum of 50.80 ml / kg / min. At the time this study took place the athletes had just been in a quiet stage after facing the championship. During a quiet period where within one week of their breaks are allowed by the trainer not to exercise,so it is likely to affect the VO_2Max results. Some other factors may affect the levelof VO_2Max in hockey UKM Pancasila University that is the age of hockey athletes who have been above 20 years, discipline athletes on training programs provided by trainers, the arrival of athletes are not on time so that the duration of time required for training is reduced very much, not doing the training program with the maximum.

Factors affecting VO_2Max according to Burhanudin (2015) include gender, age, exercise, altitude somewhere (O2 levels), psychological factors, lung function, nutritional status, nutritional intake, and physical activity. Research (Indrayana, 2012) using the experimental method, with a 24-meter run test that is the ability to run training interval training can be done to improve cardiorespiratory endurance so that in every game athletes can overcome fatigue until the end of the game, and endurance cardiovascular athletes to be better.

3.3 Intake of Energy, Protein and Liquids

Based on Table 1,hockey athletes who have less energy intake are 17 people (53.1%). The average energy intake of people in Hockey Pancasila University at 1783 ± 428 kcal with a minimum leveland a maximum levelof 858.53 kcal 2673 kcal. A total of 18 people (56.3%) had less protein intake. The average intake of protein athlete hockeyat Pancasila University amounted to 50.47 ± 12.61 grams with a minimum levelof 20.83 grams and a maximum levelof 69.83 grams. 19 people (59.4%) had less fluid intake. The average intake of fluids in the hockey athletesPancasila University of 1957.64 ± 569.59 ml with a minimum level of1200.33 ml and a maximum levelof 3459.40 ml.

According to the results of a 24-hour food recall for three days obtained intake of energy, protein, and the fluid athlete does not vary and has not been fulfilled. Athletes do not pay attention to the intake of energy, protein, and fluids consumed due to lack of knowledge of the importance of consumption of energy, protein, and fluid intake. In this case, since athletes do not live in the dorms, the consumption of food and drink per day is not well monitored.

In high-moderate intensity exercise such as sprints, carbohydrate burning will serve as the body's main energy source and will contribute more than fat burning to produce energy in the body. The contribution of burning carbohydrates as the body's main energy source will increase to 100% when the exercise intensity is in the range 70-95% VO2Max (Nurkadri, 2014).

Increased protein requirement for athletes is due to athletes more at risk for damage to muscle tissue, especially during training and heavy sports. Also, in endurance sports with a long duration, a small part of the amino acids from proteins will also be used as an energy source especially as glycogen deposits are reduced. Because of these things then the need for protein consumption of an athlete in daily life will be relatively larger when compared with the needs of non-athletes (Irawan, 2007).

High activity will generate heat from energy metabolism will also increase. The fluid inside the body will perform its function as a thermoregulator. This function is run with the aim that the body's internal temperature (coretemperature) can be maintained. Water will release excess body heat through sweat. When exercising, the water that comes through the sweat is not only water produced through metabolic processes but also water obtained through the consumption of fluids. So if the process of reduced fluid from the body during exercise is left in a long time and not balanced with adequate fluid consumption, then the body will become dehydrated (Bellisle et al., 2010).

3.4 Physical Activity

From Table 1 it is found that most of the activities conducted by Hockey athletes Pancasila University in the category of 11 people (34.4%) with an average of 1.77 ± 0.44 with a minimum levelof 1.23 and a maximum of 2, 87.

Interview result gets physical activity of hockey team of the University of Pancasila being. Researchers argue that it may be due to a lack of hockey athlete's memory interview that can not explain the exact duration of activity,so the hockey athlete only estimates. It can be the effect of the

PALlevelof physical activity obtained in this research. The average activity of athletes also only exercise during the exercise because they have not approached the championship,so they do not do other sports activities. Physical activity such as aerobic exercise can increase the VO_2Max levelbecause while doing the exercise the oxygen supply to the muscle increases to give the athlete the ability to perform sports activities with longer time and VO_2Max consumption becomes larger (Mongsidi, 2007).

3.5 Hydration Status

Table 1 shows the hydration status before exercise there were 11 people (34.4%)in good hydration, 17 people in mild dehydration (53.1%), and 4 people in dehydration state (12.5%). While the hydration status after the exercise in the hydration state was 1 person (3.1%), 17 people (53.1%)in the condition of mild dehydration, and 14 people (43.8%)in dehydration condition. According to Louise (2002) level 1-2 pale yellow is good hydration, yellow level 3-4 is mild dehydration, and level 5-6 dark yellow until brown is dehydrated.

Because the results of food recall found that fluid intake in hockey athletes University of Pancasila less this affects the hydration status of athletes before starting the exercise and hydration status after exercise decreases because athletes do not balance with enough fluid intake during exercise. Gutin et al. (2002) state that dehydration during exercise can occur due to several factors, such as too much water loss, not drinking enough water and lack of knowledge about the importance of fluid consumption during exercise or games. A study in Porto states that athletes who know hydration status, pay more attention to the amount of fluid consumption during exercise (Carvalho et al., 2009).

Table 2: Results of Bivariate Analysis

Variables	Information	VO_2 Max										Total	Sig. (2 tailed)	r
		Very good		Good		Standard		Low		Very low				
		n	%	n	%	n	%	n	%	n	%			
Energy	Less	2	6.2	3	9.4	2	6.2	7	21.9	3	9.4	17		
	Normal	0	0	4	12.5	3	9.4	4	12.5	2	6.2	13	0.02	0.40
	More	0	0	0	0	0	0	2	6.2	0	0	2		
Protein	Less	0	0	4	12.5	3	9.4	8	25	3	9.4	18		
	Normal	2	6.2	3	9.4	2	6.2	4	12.5	2	6.2	13	0.06	0.33
	More	0	0	0	0	0	0	1	3.1	0	0	1		
Fluid	Less	2	6.2	2	6.2	0	0	10	31.2	5	15.6	19		
	Normal	0	0	4	12.5	5	15.6	2	9.4	0	0	12	0.00	0.55
	More	0	0	1	3.1	0	0	0	0	0	0	1		
Physical Activity	Very Mild	0	0	0	0	0	0	4	12.5	2	6.2	6		
	Mild	1	3.1	2	6.2	1	3.1	3	9.4	0	0	7	0.02	0.40
	Medium	3	9.4	2	6.2	1	3.1	4	12.5	1	3.1	11		
	Weight	0	0	3	9.4	3	9.4	2	6.2	0	0	8		
Hydration Status Before Exercise	Good Hydration	2	6.2	4	12.5	3	9.4	2	6.2	0	0	11		
	Mild Dehydration	0	0	3	9.4	2	6.2	8	25	4	12.5	17	0.00	0.51
	Dehydration	0	0	0	0	0	0	3	9.4	1	3.1	4		
Hydration Status After the Exercise	Good Hydration	0	0	0	0	0	0	1	3.1	0	0	1		
	Mild Dehydration	1	3.1	2	6.2	4	12.5	7	21.9	3	9.4	17	0.77	-0.05
	Dehydration	1	3.1	5	15.6	1	3.1	5	15.6	2	6.2	14		

3.6 Correlation Energy Intake with VO2Max

Table 2 illustrates the relationship of energy intake with VO_2Max. Statistical test results obtained p = 0.02 and r = 0.40 which means the variable energy intake with VO_2Max hockey athletes Pancasila University has a moderate relationship. The highest data distribution showed 10 people (31.3%) had VO_2Max below standard and had less energy intake.

The results of this study are in line with research conducted by Yasmin (2014) using Spearman statistical test showed a significant relationship between the level of energy consumption with physical endurance at athlete football ps baritoputra This research results obtained by using Spearman test with correlation level0, 49 and p = 0.01 (p <0.05).

According to Irawan (2007), energy needs during exercise can be fulfilled through the sources of energy stored in the body that is through burning carbohydrates, fat burning, and contribute about 5% of protein breakdown. In high-intensity sports such as hockey, required a high energy intake as a source of energy during the game.

3.7 Correlation Protein Intake with VO2Max

Table 2 illustrates the relationship between protein intake with VO_2Max. Statistical test results obtained p = 0.06 and r = 0.33 which means the variable intake of protein with VO_2Max hockey athletes in SMEs Pancasila University has no relationship but still has the possibility of a low relationship. Distribution of most data showed 11 (34.4%) had a levelbelow the VO2 Max standard and had less protein intake.

The results of this study are similar to Andhini's (2011) study which obtained the results of protein consumption data obtained from 2x24 hours recall and VO_2Max method of copper test method with Pearson correlation test between sample protein adequacy level and athlete fitness level (VO_2Max) showed no significant relationship (p> 0,05) and r = 0,25 at athlete at school of ragunanatlet Jakarta. It is shown that the more adequate sample protein requirement is not necessarily the levelof his fitness or VO_2Max will be good as well, and vice versa.

Different results with research Yasmin (2014) statistical test results show a significant relationship between the level of protein consumption with the physical endurance of athlete PS Barito Putera football. The results of this study were obtained by using Spearman's test with r = 0.46 and p = 0,02 (p <0,05) with data collecting technique using 2x24 hour food recall and physical resistance test to the player based on coach's direction. The use of protein as a source of energy during exercise will usually be prevented because it will disrupt its main function as a bodybuilding material and its function to repair damaged tissues. Protein breakdown, when compared to burning carbohydrates and fats, will also only contribute relatively small (Irawan, 2007).

3.8 Correlation Fluid Intake with VO2Max

Table 2 illustrates the relationship between fluid intake with VO_2Max. Statistical test results obtained p = 0.00 and r = 0.55 which means the variable fluid intake with VO_2Max has a strong relationship. The highest data distribution showed 15 people (46.8%) had a lowerVO_2Max leveland had less fluid intake.

Similarly, Dewi(2013) data of food consumption obtained from recall 2x24 hours and VO_2Max levelof copper test method then obtained the level of water adequacy positive correlation with physical endurance result from Pearson correlation test showed there is a correlation between water adequacy level to physical endurance (p <0.05). It is presumed that physical endurance is not only influenced by water consumption alone but from other factors such as dietary intake, intake of supplements and activity factors.

Based on the research of Silva et al. (2011) most athletes consume less fluid during exercise or match. When lack of fluid intake as well as excess fluid loss, in the blood there is an increase in osmolality so that the blood becomes hypertonic. Osmoreceptors in the hypothalamus detect an increase in blood osmolality thereby stimulating the pituitary gland to secrete antidiuretic hormone (ADH). ADH stimulates the kidneys to increase water absorption. This causes a decrease in the amount of urine output and increased urine concentration. High intensity in hockey sports results in athletes is often experiencing fatigue that occurs due to the amount of sweat that comes out during the game and not balanced with enough fluid consumption to keep the body fluid balance that can increase the risk of dehydration before the match finished (Bangsbo, 2006).

3.9 Correlation Physical Activity with VO2Max

Table 2 illustrates the relationship of physicalactivity with VO_2Max. Statistical test results obtained p = 0,02 and r = 0,40 which means physical activity variable with VO_2Maxhockey athlete in UKM University of Pancasila have a medium relation. Most data distribution shows 6 people (18,7%) have VO_2Maxbelow standard and have very mild physical activity.

Similar with previous research which suggests that between physical activity with fitness level of female futsal athlete has a significant positive relationship (p = 0,00 and r = 0,65) the result obtained is different because the sample in this study using female student-athletes in sports class with 2x24 hours of physical activity record and fitness level of athletes performed according to ACSPFT (Asian Committee on the Standardization of Physical Fitness Test) with a 800 meter test run. One of the factors that may affect the physical fitness of physical activity such as aerobic exercise may increase VO_2Maxlevelbecause while doing the exercise the oxygen supply to the muscle increases so as to give the athlete the ability to exercise longer time and VO_2Maxconsumption becomes greater (Mongsidi, 2007).

3.10 Correlation Status Hydration with VO2Max before Exercise

Table 2 illustrates the relationship of hydration status before exercise with VO_2Max. The statistical test results obtained p = 0.00 and r = 0.51 which means the variable hydration status before practice with VO_2Max hockey athletes the University of Pancasila has a strong relationship. The highest data distribution showed 12 people (37.5%) had a below standard VO_2Max and had a mild dehydration category hydration status.

3.11 After the Exercise

Table 2 illustrates the relationship of hydration status after exercise with VO_2Max. The statistical test results obtained p = 0.77 and r = -0.05 which means the variables of hydration status after exercise with VO_2Max hockey athletes University of Pancasila has no relationship. The highest data distribution showed 10 people (31.3%) had a below standard VO_2Max and had a mild dehydration hydration status.

Dehydration of 1% of body weight will result in mood and mood changes, making a person uncomfortable, while dehydration of 2% of body weight due to hot environmental temperatures or due to high physical activity can decrease concentration and decrease memory. Dehydration up to 20% can result in death (Lieberman, 2007). According to previous research, who said the Pearson correlation test results between the hydration status variables and the fitness level of the hockey athlete showed no significant relationship between hydration status and fitness level (p = 0.35 and r = 0.21) in the hydration status study obtained by measure percentage change of body weight then classify its hydration status and fitness with bleep test method.

Adverse effects of dehydration when a person is dehydrated will reduce 25% of the physical ability of the body, thus making someone work less than optimal. Dehydration can also adversely affect cognitive function, which is one of three important components in humans in the process of cognitive development. Cognitive development is a person's ability or intelligence in remembering, thinking and providing solutions. The status of hydration is not a variable that is directly related to fitness levels, according to Kaim (2002) physical activity is one of the factors that affect a person's fitness level because with regular exercise and exercise will increase endurance and reduce body fat. This is supported by Ruiz et al. (2006) who stated that physical activity has a different influence on fitness level depending on the intensity of its activity.

4 CONCLUSIONS

The result of this research is there is a relationship between VO_2Max with energy intake, fluid intake, physical activity, hydration status before exercise. There is no correlation between VO_2Max with protein intake and hydration status after exercise at hockey athletes the University of Pancasila. It is recommended for athletes to be counselled by nutritionists on food and fluid intake and monitoring physical activity by athletes.

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