

The Quality of Nutrient Intake of Table Tennis Athlete

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Abstract. This research is aimed at revealing the quality of nutrition intake of table tennis athlete in Pariaman city. The research was conducted from September to October 2016. The number of sample in this research was 20 table tennis athletes. The instruments used in this research were a questionnaire and food recall form. This research employed a descriptive approach. The research showed that the average energy intake of a table tennis athlete was 2134 + 231 calorie, the average protein intake was 77.6 + 21.1 gram, the average intake of carbohydrate was 370.9 + 49.5 gram, and the average intake of fat was 47.2 + 12.1 gram per day. In addition, the average intake of iron was 21.0 + 10.5 mg per day and the intake of vitamin C was up to 85.0 + 42.6 mg per day. In terms of quality, the energy intake was up to 76, 5% of the demand of nutrition in a day, the protein intake was 73.7% and the fat intake was 51, 8% from that of needed by an athlete. The iron intake has reached 139, 8%. The vitamin C intake, however, was still 42.5 % from that of an athlete requirement.

1. Introduction

The Indonesian sports team has not yet achieved its maximal achievement. There are many sports teams that have not gained a good reputation in regional, national, even international event. Constitutionally, the Indonesian government has regulated the National Sporting System Constitution. According to Sporting Constitution, one of the sports offshoots managed by the government is the merit sport. Table tennis is one of those merit sports. However, the achievement of tennis table team is relatively declining.

According to data from Tribun Sport, in the 26th SEA Games Indonesia only won 3 bronzes, and it showed that Indonesian team performance declines compared to Indonesian performance in the 25th SEA Games in Laos. In the 25th SEA Games in Laos, Indonesian table tennis team won a silver medal. In the 2015 SEA Games in Singapore, Indonesia also only won a bronze medal [1]. The tendency of declining table tennis achievement is also seen in local and national level. There are several factors which influence the optimal performance in sport. Factors contribute to sport performance such as (1) physic development, (2) technique development, (3) mental development, and (4) the maturity of athletes in achieving their goals [2]. Moreover, the biological aspects contribute to the sport performance are: (1) potential or the basic physical ability including strength, velocity, muscle force, heart muscle working power, lungs, flexibility, pertinence, and healthy exercise; (2) body organ functions including heart working power, breathing system organ, and the sense working power; (3) body structure and shape including height, size, width, and shape of the body; (4) nutrition including adequate amount of foods, food quality fulfills the necessity, and the availability of food variety. The optimal sport performance needs a good physical quality. One of good physical quality criteria is a good arm tendon. A good physical condition requires a balance nutrition intake. A nutritious food will provide good substances the body needs. Conversely, consuming bad quality of foods will provide the



inadequate amount of substances our body needs and the body might lose those necessary substances to function well [3].

The sport athletes training center has not yet maintained a good dietary for the athletes. Moreover, the training center based in the province or regency. The dietary of athletes often has not been arranged in accordance to a good dietary for the respected sport offshoots. Athlete dietary has not been arranged based on the age and sport category of the athletes. This condition is worsened by the athletes' bad dietary behaviors. Some different sport offshoots which are prepared to participate in various competitions are often given the same quality dietary. Moreover, the dietary for table tennis athletes in regency level; it is worse than those in the province and national level. Tennis table athletes in Pariaman city are no exception in this bad dietary. The training center over there still employs a conventional dietary without considering the age and the category of sport an athlete belongs to. The dietary of athlete only considers whether the foods will satisfy them or not, instead of considering its impact to the quality of athletes' performance. Even on some occasions, the dietary is left to the athletes themselves to choose any foods they want. This research is intended to figure out the quality of nutrient intake for athletes in Pariaman city.

2. Research Methods

The type of this research is descriptive research [4]. This research design benefits the researcher in term of its simplicity, low-research cost, and not time-consuming or the result can be obtained in the relatively short period of time. This research was taken place at Pariaman city. Data of the research was collected from September to October 2016. Population in this research was all table tennis athletes in Pariaman city. The number of samples was 20 people.

Primary data were the data directly obtained from the respondent such as name, gender, age, weight, height, and dietary. Meanwhile, the secondary data were the population data obtained from the table tennis administrator in Pariaman city. The Instrument employed in this research was the questionnaire to collect the data about respondent identity and the recall of athletes' dietary.

The research was started by filling out the questionnaire about the athletes' identity. After that, the athletes were required to measure their height and weight. The weight was measured without using footwear and the measurement was calibrated. The height was measured without using headscarf nor footwear. The athletes' nutrition, additionally, was measured by comparing the data of athlete's weight and height with the BMI standard in accordance to age and gender [5-6].

2.1. Technique of Data Analysis

To find out the energy and nutrition intake quantitatively and qualitatively, the descriptive analysis was conducted. Protein intake quality was analyzed by calculating the amount of amino acid availability with the following formula [7-8].

$$TKAE = (AA_j/AA_a) * 100\%, \text{ where}$$

TKAE = the level of amino acid availability (ranged from 0 – 100), regarded as “100+” if >100.

AA_j = total AA consumed from all foods (mg/g protein)

AA_a = value of the standard AA (mg/g protein)

3. Results and Discussion

Seventy percent of athletes are men and thirty percent others are women, and the age ranges from 12 to 26 years old. The research showed that the average energy intake was 2134 + 231 calorie, the average protein intake was 77.6 + 21.1 gram, the average carbohydrate intake was 370.9 + 49.5 gram per day and the average fat intake was 47.2 + 12.1 gram per day. Furthermore, the amount of average iron intake was 21.0 + 10.5 mg per day, while the average vitamin C intake was 85.0 + 42.6 mg per day. Quantitatively, the energy intake has just reached 76,5% from the total amount of energy needed for one day, carbohydrate intake was 96.3%, the protein intake was 73.7% , the fat intake was 51.8% from that

of the requirement by an athlete for one day. The iron intake has reached 139.8% from that of needed by an athlete, but vitamin C intake was still 42.5% of the amount needed by an athlete. Quantitatively, this research showed that the nutrition intake has not yet fulfilled the demand of an athlete for one day. The distribution of respondent's data based on the quality of nutrient and energy intake is tabulated in Table 1.

Table 1. The Distribution of Respondents Based on the Quantity of Nutrient Intake

Nutrient Intake Quality	Energy		Carbohydrate		Fat		Protein		Fe		Vitamin C	
	n	%	n	%	n	%	n	%	n	%	n	%
< 100%	19	95	14	75	20	100	19	95	5	25	20	100
≥ 100%	1	5	6	25	0	0	1	5	15	75	0	0
Total	20	100	20	100	20	100	20	100	20	100	20	100

Based on table 1, it is figured out that 95% of athlete's nutrient intake is still below 100% of daily energy intake needed, which shows that the average of daily energy intake has not fulfilled the athlete's needs to do exercise or carry out other physical activities. Energy acts as the catalyst for any physical activities including practicing table tennis that one carry out. The energy intake which has not been fulfilled will be replenished by the deposited energy contained in the muscle glycogen or fat deposit in adipose tissue. The lack of energy consumed will cause the body to have a negative balance, thus it reduces the body weight and damages the tissues our body [3]. The damages of tissue may reduce the muscle power, thus it lowers the athletes' performance.

Carbohydrate is one of the substances which provide energy for the muscle. The amount of carbohydrate needed by an athlete depends on the intensity, duration, and the type of exercise. The demand of carbohydrate intake for table tennis athlete is 50-60% of the energy intake for one day. The research shows that 25.0% of athletes have consumed enough carbohydrate (>100.0%), however, 75.0% others still consume below 100.0% amount of carbohydrate. Carbohydrates intake below 100.0% of the demand will decrease the number of carbohydrates stored in the muscle and liver. There are still many athletes who consume foods contained carbohydrate below the amount it is needed probably because of less various menu and foods containing carbohydrate consumed by those athletes. Another impact of consuming less carbohydrate is the decreasing deposit of glycogen in muscles and glucose in the blood.

Proteins are important components of the human diet and play an essential role as structural and functional components of living systems. Food proteins provide amino acids (AA) which serve as building blocks of all vital organs, muscles (including heart muscles), hormones and biological fluids such as blood. As the human body is incapable of maintaining reserves of protein, a constant supply of good quality protein is needed to maintain growth and other physiological functions. Insufficient intake of protein, especially during periods of growth and development can affect all organs in the body including the brain, heart, immune system, and other vital organs. Protein quality of foods is, therefore, an important criterion for the provision of adequate nutrition and maintenance of good health [9].

The research showed that generally (95.0%) the quantity of protein intake is still below 100.0%, only 5.0% athletes take enough amount of protein. A study by Jeukendrup and Gleeson [10] showed a linear relationship between energy intake and protein intake. Tour de France cyclist consumed 12.0% of their daily energy intake (6500 kcal) in the form of protein, and intake easily met the suggested increased requirements (2.5 g/kg b.w. /day). These results suggest that provided the energy intake matches energy expenditure on a daily basis, endurance athletes do not need to supplement their diets with protein. Qualitatively, the essential amino acid consumed has already fulfilled the deal amount (100⁺), except tryptophan. There are 5.0% athletes who still consume tryptophan below the ideal amount (<100%, table 2). Tryptophan should be replenished by consuming foods containing a high amount of tryptophan. During exercise with intensity under 70.0% $\text{VO}_{2\text{max}}$, there is only a slight change of

amino acid in the muscles. This fact portrays that there is no increasing demand for amino acid for athletes who conduct exercise under 70.0% $\text{VO}_{2\text{max}}$, [10].

Table 2. The Distribution of Respondents based on the Quality of Protein Intake

Nutrient Intake Quality	Isoleucine		Leucine		Lysine		Methoionine + Sistine		Phenylalanine + Tyrosine		Tryptophan		Valine	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
< 100%	0	0	0	0	0	0	0	0	0	0	1	5	0	0
≥ 100%	20	100	20	100	20	100	20	100	20	100	19	95	20	100
Total	20	100	20	100	20	100	20	100	20	100	20	100	20	100

Iron is a functional component of oxygen transport and energy production in humans and therefore is a critically important micronutrient for sport and exercise performance. Athletes, particularly female athletes participating in endurance sport, are at increased risk of compromised iron status due to heightened iron losses through menstruation and exercise-induced mechanisms associated with endurance activity [11]. Mostly the athletes' iron intake has fulfilled their daily need (75.0%). Nevertheless, there still some athletes (25.0%) whose iron intake is still below its ideal number. Iron is the substance needed for forming hemoglobin. Hemoglobin's function is very crucial for carrying oxygen to all tissues. A relative low iron intake in blood might be getting lower during the exercise. The iron substance lost may occur through sweat. Iron lost through sweat may reach up to 0.3 mg iron/L. If an athlete exercises for four days, he might lose 4.0 L solution from his body and 1.2 mg iron [10].

The amount of iron consumed will also decrease the consumption of vitamin C is also decreased. The research showed that the athletes' full-vitamin-C intake (100.0%) is still below the athlete's necessity. Vitamin C is the chemical substance which absorbs the iron. Besides, vitamin C deficiency will lead to the damage of tissues in the body because of sunlight radiant.

4. Conclusions

On average, the energy intake has just reached 76.5% from the demand of nutrient for one day, the protein intake was 73.7%, and fat intake only fulfills 51.8% from that of needed by an athlete. The average iron intake has reached up 139.8%, but the vitamin C intake is still poor, 42.5% from that of it is demanded. There are 95.0% athletes who consumed protein under the amount needed for daily physical activities, and carbohydrate consumed is still below 75.0%. All athletes (100.0%) still consume vitamin C below the standard it is needed by an athlete. In addition, 95.0% of athletes still consume fat below the amount is required for one day. This research proves that the nutrient demanded by the athlete is still incompatible with athletes' daily activities.

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