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ADEQUACY LEVELS OF MACRO NUTRIENTS ON BADMINTON PLAYERS FITNESS

By
Ahmad Hariyanto
Department Of Nutrition Science Program, Institut Kesehatan dan Bisnis Surabaya, Surabaya, Indonesia
Email: ahmad.hariyanto@ikbis.ac.id

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ABSTRACT
Adequate protein intake is essential for health and well-being at all ages. In children, adequate protein intake is essential for growth and development. In adults, adequate protein intake helps maintain lean body mass and prevents age-related loss of skeletal muscle mass. An athlete is required to always maintain physical fitness. Fitness is one indicator to determine a person's level of health, especially for an athlete. The fitter a person is, the healthier that person is. This study aims to analyze the relationship between adequate levels of macronutrients and fitness in badminton athletes. This research uses a quantitative type of research with a cross-sectional research design and a sample of 32 athletes. Data was obtained via online Google form, namely data on carbohydrate, protein and fat intake with 3x24 hour food records via the IPAQ questionnaire sheet. Data analysis used the Spearman Rank Correlation test. as many as 28 (87.5%) respondents had insufficient levels of carbohydrate sufficiency, and as many as 31 (96.9%) respondents had sufficient levels of protein which was more as well as adequate levels of fat. 31 (96.9%) respondents had sufficient levels of fat. which is excessive. And it is known that as many as 25 (78.1%) respondents were fit. There was no significant relationship with all research variables ($p \geq 0.05$). The conclusion of this study shows that there is no relationship between adequate levels of carbohydrates, adequate levels of protein, adequate levels of fat on athlete fitness ($p \geq 0.05$). There is no significant relationship between the level of macronutrient adequacy and the fitness of badminton athletes

Corresponding Author:
Ahmad Hariyanto
Department of nutrition science program Institute of Health and Business of Surabaya
Email: **ahmad.hariyanto@ikbis.ac.id**

1. INTRODUCTION

Badminton is a sport played on a rectangular court by two or four players. The game involves hitting a feather object called a shuttlecock over a tall net. Players use light, long-handled rackets to volley back and forth. Badminton is a popular recreational and competitive sport, whose origins date back to the 19th century and has been included in the Olympic Games since 1992.

Classic forms of protein deficiency include marasmus, protein calorie deficiency, and kwashiorkor, protein deficiency in an energy-sufficient diet. Marasmus is characterized by dry, wrinkled skin, extreme muscle wasting, loss of subcutaneous fat, and atrophy of internal organs with preserved histology. Kwashiorkor is characterized by severe edema that is more pronounced in the hands and feet, wasting, diarrhea, easy seizures, skin depigmentation, fatty liver, and organ dysfunction. Although these conditions are usually described as distinct entities, there is significant clinical overlap, and many patients exhibit features of both conditions.

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In fact, carbohydrates are not considered an essential nutrient because the body can synthesize carbohydrates endogenously and use alternative energy sources. In addition, the absence of carbohydrates in the diet does not cause typical deficiencies. However, nutrient-dense carbohydrate sources, such as whole grains, fruits, and vegetables, contain nutrients and bioactive compounds that provide many health benefits and are not available in other food sources (Cena H, Calder PC.2 2015 and Tondt J, Yancy WS, Westman EC). Therefore, nutrient-dense forms of carbohydrates are included in dietary guidelines.

The human body can also synthesize various forms of lipids endogenously. However, unlike carbohydrates, lipids are important macronutrients. They must be sufficient in the diet to provide essential fatty acids and allow absorption of fat-soluble vitamins (Liu AG, et all. 2015). Essential fatty acids include alpha-linolenic acid (omega-3) and linoleic acid (omega-6) (Di Pasquale MG.2009). Essential fatty acid deficiencies are rare in individuals on regular diets and most common in individuals on severe fat malabsorption or fat-free parenteral nutrition. Findings indicating essential fatty acid deficiency include dermatitis, alopecia, liver dysfunction due to mitochondrial dysfunction, and increased susceptibility to infections.

An athlete is required to always maintain physical fitness. Physical fitness is defined as a person's body's ability to carry out daily activities without causing significant fatigue. To achieve optimal physical fitness, this can be done by increasing physical activity and carrying out programmed exercise properly, correctly, measurably and regularly. If an athlete has a poor fitness level, this will greatly affect the athlete's performance when competing in a competition. Therefore, athlete fitness must be given great attention and supported by nutritious intake as well as regular physical activity and training for the athlete (Ministry of Health, 2015).

There are several factors that can influence physical fitness, namely: food intake, nutritional status, body fat composition, health status, physical activity, exercise, and adequate fluid consumption. Adequate and fulfilled food intake according to each athlete's needs will have a good impact on the training they do. This can support the athlete's achievement. The need for macronutrients such as carbohydrates, protein and fat is very important in maintaining body balance and body health. The nutritional requirements required by athletes vary for each individual. The factors that differentiate the amount an athlete needs for macronutrients depend on gender, intensity of physical training, time, and the athlete's body fat composition (Sari, 2016).

2. RESEARCH METHOD

This type of research uses quantitative research with a cross sectional research design. This research was conducted using Google Form in January-September 2022. The research subjects were 32 people taken using purposive sampling technique, with inclusion criteria, namely: a) male and female athletes, b) teenage athletes aged 17 -18 years old, c) athlete has active status, d) athlete is willing to be a research sample and take part in the entire research series, e) athlete is physically and mentally healthy.

Data collected includes data on athlete characteristics, anthropometry in the form of height and weight. Height was measured using microtoise and weight based on body mass index for age (BMI/U). Food intake was obtained using a 3x24 hour food record (2 days of training and 1 day off). Fitness was categorized into 2 categories, namely, fit with a fitness value of 35.0 to > 55 ml/kg/min and not fit with a fitness value of < 35.0 ml/kg /min. The bivariate analysis used in this research aims to see the relationship between 2 categories of variables (independent and dependent) using the Spearman Rank Correlation test.

3. RESULTS AND ANALYSIS

The respondents in this research were 32 badminton players who would carry out this research process, with the following characteristics

Table 1. Frequency Distribution of Respondent Characteristics

	Characteristics	Amount (n)	Persentase (%)
Gender	Gentelment	11	34,4
	Ledies	21	65,6
Age	Middle Teenager (16-18 tahun)	24 8	75 25
Adequate Carbohydrate Levels	Not enough	28 4	87,5
	Enough		12,5
Protein Adequacy Level	Not enough	1	3,1
	More	31	96,9
Adequate Fat Level	Not enough	1	3,1
	More ih	31	96,9

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	Characteristics	Amount (n)	Persentase (%)
Adequate Carbohydrate Levels	Not enough	28 4	87,5
	More		12,5
Fitness Level	Less fit	7	21,9
	Fit	25	78,1
Amount		32	100

Table 1 shows that the frequency distribution of athlete characteristics based on gender showed that the highest percentage was female, namely 21 athletes (65.6%) and 11 athletes (34.4%) were male. The average age of the athletes who were respondents was in the early teens category, namely 12-15 years, with an average athlete weight of 55 kg and athlete height of 160.5 cm. The level of carbohydrate adequacy obtained was that 28 athletes (87.5%) had an insufficient level of carbohydrate adequacy. The level of protein adequacy obtained was that 31 athletes (96.9%) had an excessive level of protein adequacy. The level of fat adequacy obtained was that 31 athletes (96.9%) had an excessive level of fat adequacy. The level of physical activity obtained showed that 19 athletes (59.4%) had a moderate level of physical activity. The fitness level obtained was that 25 athletes (78.1%) had a good fitness level.

The level of carbohydrate adequacy using the 3x24 hour food record method has an average range of adequate levels of carbohydrate consumed, namely 28 out of 32 athletes (87.5%) have a carbohydrate adequacy level that is less than the individual's total needs per day, and as many as 4 out of 32 athletes (12.5%) have an adequate level of carbohydrates that correspond to individual needs per day.

Furthermore, the results of the protein adequacy level using the 3x24 hour food record method have an average range of protein adequacy levels consumed, namely 31 out of 32 athletes (96.9%) have a protein adequacy level that is more than the individual's total requirement per day, and as many as 1 of 32 athletes (3.1%) had an adequate level of protein that corresponded to individual needs per day. Then for the level of fat adequacy using the 3x24 hour food record method, the average range for the adequacy level of fat consumed is that 31 out of 32 athletes (96.9%) have a sufficient level of fat that is less than the individual's total requirement per day, and as much as 1 of 32 athletes (3.1%) had an adequate level of fat in accordance with individual needs per day.

Based on statistical results using the Spearman Rank test, the relationship between carbohydrate adequacy levels and fitness shows a p value = 0.877 ($p \geq 0.05$), which means there is no significant relationship between carbohydrate adequacy levels and fitness, thus H0 fails to be rejected. The r result of the relationship between the level of carbohydrate adequacy and fitness is r = -0.029, which indicates the strength of the correlation is weak in the negative direction, which means that the higher the level of carbohydrate adequacy, the lower the fitness. The absence of a significant relationship between adequate levels of carbohydrates and fitness could be due to the absence of a significant relationship between adequate levels of carbohydrates and fitness could be due to the body composition of athletes differing from one individual to another, inappropriate food record methods, and the possibility of service providers. food or catering that has portioned each athlete's food, the types of carbohydrates consumed by athletes are rice, processed foods made from flour, and also corn. There are other factors that can influence fitness that come from factors other than food, namely the level of physical activity or physical exercise carried out by athletes (Dewi, 2013). The badminton athletes who were the research subjects were athletes in the teenage age category, where teenagers are still in their optimal growth period and the most productive phase in the development of the athlete's motor system abilities.

This research is in line with research by Dewi (2013) which states that there is no significant relationship between the level of carbohydrate adequacy and fitness in badminton athletes with p value = 0.421 ($p \geq 0.05$) and has a correlation value of r = 0.145 which is the level of adequacy carbohydrates have a weak relationship in the positive direction. The absence of a relationship between adequate levels of carbohydrates and fitness could be caused by other factors that have a greater influence on a person's fitness, namely the aerobic exercise undertaken by the individual (Pertiwi, 2012).

Macronutrient requirements can vary greatly between individuals depending on several factors such as age, weight, physical activity level, and related medical conditions. In general, recommendations for intake and distribution of macronutrients provide a lot of flexibility. Provided that essential macronutrient and micronutrient requirements are met and the number of calories consumed is appropriate, macronutrient distribution can be adjusted to suit individual preferences and goals.

From a practical standpoint, the implications of these findings are significant. Coaches and athletes can use this information to design more effective nutrition programmes, which focus on what is consumed and when consumed to maximise performance. This includes adjustments to daily diets and nutritional strategies before, during and after competition. For example, integrating carbohydrates with a high glycaemic index in the postworkout recovery window can accelerate muscle glycogen replenishment. At the same time, high-quality protein consumption can support muscle

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recovery and growth. However, it is essential to recognise the limitations of this systematic review. One of the main limitations is the variation in the design of the studies reviewed, which includes differences in sample size, duration of nutritional interventions, and performance measurement methods used. This variability makes data synthesis challenging and may affect the strength of conclusions that can be drawn. In addition, most of the studies reviewed focused on young and healthy athlete populations, which limits the ability to generalise findings to a broader population of athletes, including master athletes or athletes with specific medical conditions.

4. CONCLUSION

Healthy sources of carbohydrates include nuts, seeds, fruits, and vegetables. Unlike refined grains, which have had the germ and bran removed, whole grains are rich in fiber and micronutrients and have been linked to a reduced risk of cardiovascular disease, cancer, diabetes, and all causes of death. Likewise, fruit and vegetable intake is inversely correlated with chronic noncommunicable diseases, including hypertension, cardiovascular disease, metabolic syndrome, and lung cancer. Although the reasons behind these health impacts are not yet fully understood, they are likely related to the phytochemicals and bioactive compounds present in the food matrix of these foods.

This study evaluated the influence of nutrition on the performance of badminton athletes, revealing that nutrition plays an important role in improving athletes' performance and recovery. Key findings suggest that carbohydrates, protein, hydration, and certain micronutrients, such as vitamins and minerals, can improve strength, stamina, recovery, and concentration during training and competition when consumed in the right amounts and at the right times. However, there is variation in individual responses to nutritional strategies, emphasizing the importance of a tailored approach.

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