

The Importance of Nutritional Fulfillment in Athlete Performance Improvement

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Received: 2022-02-07. Accepted: 2022-04-22. Published: 2022-07-31.

Abstract. The need for a person's body for nutrients depends on age, weight, gender, physical activity, environmental conditions, and certain circumstances. Exercise and competition encourage athletes to regulate their diet, especially no matter what. Optimal athlete performance is influenced by various factors, namely good genetics, motivation, physical exercise, and proper nutritional intake. The purpose of this study was to see the effect of the application of various nutrients on the performance of athletes. The literature study reviewed and compared various article sources accessed through the Sinta database and Google Scholar from 2013-2019. The results of the author's research stated that from various literature sources, significant results were obtained for the relationship between macronutrient fulfillment on athlete performance. In comparison, nutritional fulfillment has no relationship or influence on athlete achievement. The fulfillment of athlete nutrition, especially micronutrients, is important because it is a source of energy obtained by athletes through intake so that physical fitness, endurance, muscle strength, and VO₂max scores can be maintained properly. It can be said that the fulfillment of nutrition, both macronutrients such as energy, protein, fat, and carbohydrates, have been proven to affect the performance of athletes when exercising or competing. But not with micronutrients.

Key words: nutrition, athlete, achievement

Abstract in Indonesia: Kebutuhan tubuh seseorang akan zat gizi tergantung dengan usia, berat badan, jenis kelamin, aktivitas fisik, kondisi lingkungan, maupun keadaan tertentu. Latihan dan perlombaan yang mendorong atlet untuk mengatur pola makan, terutama menjelang kejuaraan ataupun saat kejuaraan tersebut berlangsung. Performa atlet yang optimal dipengaruhi oleh berbagai faktor, yakni genetik yang baik, motivasi, latihan fisik, dan asupan zat gizi yang tepat. Tujuan dilakukannya penelitian ini yaitu untuk melihat pengaruh mengenai pemenuhan berbagai macam zat gizi dalam kaitannya dengan performa atlet. Studi literatur dengan pengkajian dan perbandingan terhadap berbagai sumber artikel yang di dapat melalui *database Sinta* dan *Google Scholar* dari tahun 2013-2019. Hasil kajian penulis menyatakan bahwa dari berbagai sumber literatur didapatkan hasil yang signifikan untuk hubungan antara pemenuhan zat gizi makro terhadap performa atlet. Sementara, tidak terdapat hubungan atau pengaruh dari pemenuhan zat gizi mikro terhadap performa atlet. Pemenuhan gizi atlet terutama zat gizi mikro penting untuk dilakukan, karena merupakan sumber energi yang didapatkan oleh atlet melalui asupan, sehingga kebugaran jasmani, ketahanan fisik, kekuatan otot, dan skor VO₂max dapat terjaga dengan baik. Dapat disimpulkan bahwa pemenuhan gizi, baik zat gizi makro seperti energi, protein, lemak, dan karbohidrat terbukti dapat mempengaruhi performa atlet saat latihan maupun bertanding. Tetapi tidak dengan zat gizi mikro.

Keywords: zat gizi, atlet, performa

How to Cite:Febriyana, S. A. & Sefrina, L. R. (2022). The Importance of Nutritional Fulfillment in Athlete Performance Improvement. *MIKI: Media Ilmu Keolahragaan Indonesia 12 (1) July*, 41-44.

DOI: <http://dx.doi.org/10.15294/miki.v12i1.36009>

INTRODUCTION

A person's body's needs for nutrients depend on age, weight, gender, physical activity, environmental conditions, and certain circumstances (Daryanto, 2015). Nutrients can be found in food and beverages consumed daily, as well as other additional supplements. The main source of energy and other nutritional needs for the human body is obtained from these foods. The content of nutrients needed by the human body includes carbohydrates, proteins, fats, vitamins,

minerals and so on. Each food has a different nutritional composition. Therefore, it is necessary to regulate and calculate the nutritional content of the food consumed so that the body's needs for nutrients can be fulfilled properly. In addition to food composition, it is also important to pay attention to the portion of food consumed so that the portion is more following the needs or not more. When all the components have been met, the diet is said to be optimal (Rachmat et al, 2016).

Everyone needs an optimal diet in their daily food consumption, especially athletes with more activity. An athlete is an athlete who gets regular training and tries hard to train. An athlete certainly needs more nutrient intake (Daryanto, 2015). The routines undertaken by an athlete are generally heavier than those of non-athletes. Exercises and competitions encourage athletes to regulate their diet, especially those related to whatever is going on (Rachmat et al, 2016). Diet is an attempt to regulate the amount and type of food with a specific purpose, such as maintaining health and nutritional status and preventing or helping cure disease (Muharam et al, 2019).

Optimal athlete performance is influenced by various factors, namely good genetics, motivation, physical exercise, and proper nutrient intake. Good nutritional status is needed to maintain fitness and health, help children grow, and support the development of athlete achievement (Agustin et al, 2018). Athletes' performance is also a determinant of victory in a match. Athletes have high stamina, so they do not get tired easily (Dieny et al., 2020).

Every athlete has variations in the type of sport. The sports involved also have different criteria and needs. In national athlete competitions and other sports competitions, athletes will need much energy to support their activities. In meeting energy needs, an athlete is generally advised to meet their needs with 55-65% through the consumption of carbohydrates, 20-35% fat, and 12-15% protein (Muharam et al, 2019).

Therefore, athletes need to pay attention to nutritional needs and maintain their food intake to support performance during training and matches to achieve the expected victory. The author analyzed various sources to look at the interaction of the fulfillment of various substances in various sources with the performance of athletes.

METHODS

Researchers conduct studies and comparisons of various literature sources related to the topic of discussion raised by researchers to be used as a literature review. The sources of literature used by the researchers were obtained from various articles in journals accredited by Sinta 2-3, with articles published starting from 2013-2019. The keywords used in the search for related literature are nutritional fulfillment, athlete performance, and nutrients. There were 10 articles obtained from the systematic search study of the sinta database and google scholar's.

RESULTS AND DISCUSSION

Macro Nutrients

Based on the analysis in table 1, 8 articles discuss the relationship of macronutrients to athlete performance. They all showed significant results related to fulfilling macronutrients such as energy, carbohydrates, protein, and fat to increase performance. In this case, the increase in performance is assessed from the level of physical fitness, endurance, muscle strength, and VO₂max score.

Lack of energy intake affects the decrease in energy reserves, especially glycogen. Lack of glycogen will reduce the expeditor's total energy, reducing oxygen uptake by up to 75%. For athletes, protein is also needed to support growth and body formation to achieve optimal height. Protein is also useful for forming red blood cells, the body's defense against disease, and synthesizing body tissues. Fat in the body acts as an energy source, especially in moderate-intensity sports for a long time, such as endurance sports such as soccer, basketball and running. Although fat is the highest energy source, athletes are not advised to consume excessive fat because energy cannot be directly used for training or competition (Dieny et al, 2020). In addition, a lack of carbohydrates also has the same impact as a lack of energy because the source of energy is mostly obtained from carbohydrates. If there is a lack of carbohydrates in the athlete's daily food intake, there will be insufficient glycogen reserves and early fatigue.

Micro Nutrients

Based on the analysis in table 1, 4 articles discuss the relationship of micronutrients to athlete performance. They all showed results not significantly related to fulfilling micronutrients such as vitamin C, iron, and other micronutrients to improve athlete performance. Only one article states a correlation between iron and athlete performance, namely research conducted by Dieny et al, 2020 which states that iron plays an important role in oxygen transportation and use. Decreased iron levels in the body can interfere with aerobic physical performance. In addition, iron also plays a role in helping the metabolism of macronutrients in producing energy.

Athletes need energy fulfillment following the need to maintain body tissue mass (fat mass and fat-free), immune system, reproductive function, and optimal performance of athletes. However, a study conducted by Amin et al, (2019) stated that

Table 1. Results of the Study of the Relationship between Nutrients and Athletes' Performance

Researcher & Year of Publication	Method	Nutrients	Results
Anies Setiowati (2014)	<i>Cross-section</i>	Protein	There is a relationship between percent body fat and muscle strength (p=0.024) and a relationship between protein intake and muscle strength (p=0.04).
Yeni Agustin, Eka Novita Indra, Yuni Afriani (2018)	<i>Cross-section</i>	Protein	Protein intake in Pencak silat athletes had an average of 92.89 ± 3.031 , with 40% having a good category, 40% less, and 20% more. Statistical test results show a p-value = 0.014 <0.05 (a relationship between energy intake and physical endurance).
Firyal Yasmin, Magdalena, M. Syarif (2015)	<i>Cross-section</i>	Energy & Protein	Statistical test results show a p-value = 0.024 <0.05 (there is a relationship between protein intake and physical endurance). Statistical tests showed a relationship between energy intake and VO2Max score (p=0.021; r=0.218).
Fillah Fithra Dieny, Nurmasari Widyastuti, Deny Yudi Fitranti, A. Fahmy Arif Tsani, Firdananda Fikri J (2020)	<i>Cross-section</i>	Energy, protein, fat and iron	Protein intake was also associated with VO2Max scores (p=0.029; r=0.207). Fat intake is also known to have a relationship with the VO2Max score (p=0.018; r=0.224). There was a relationship between iron intake and VO2Max score (p=0.003; r=0.276).
Mailina Prima Sahara, Nurmasari Widyastuti, Aryu Candra (2019)	<i>Cross-section</i>	Diet quality	Based on table analysis (table 5), the better the quality of the diet, the better the endurance, but it is weak and not statistically related (r = 0.122) (p = 0.353).
Nur Amin, Yanesti Nur Avianda Lestari (2019)	<i>Cross-section</i>	Energy & nutrients (carbohydrates, protein, fat, potassium, magnesium, sodium, calcium and iron)	The analysis showed that the average level of nutritional adequacy, both energy and substance intake (carbohydrates, protein, fat, potassium, magnesium, sodium, calcium, and iron), was not significantly correlated with the performance of research subjects.
Isti Dwi Puspita Wati (2018)	<i>Case study</i>	Macronutrients	In this study, it was found that although on average, fighting athletes consume sufficient carbohydrates, in terms of the percentage of fulfillment which shows the figure of 71, 87%, there are athletes who experience a lack of carbohydrate intake. In addition, 2 athletes consume too many carbohydrates, even more than 100% of daily calorie needs.
Kartika Indaswari Dewi, R. Bambang Wirjatmadi (2017)	<i>Case control</i>	Vitamin C & iron	There is no significant relationship between the evaluation of vitamin C (p value = 0.869) & iron (p value = 0.620) on the improvement of athletes' physical fitness.
Desty Ervira Puspaningtyas, Toto Sudargo, Arta Farmawati (2015)	<i>Experimental: Same subject design</i>	Maltodextrin & Vitamin C	The analysis shows that the subject's average VO2 max when receiving a combination of maltodextrin and vitamin C (51.95 ml/kg/minute) is lower than the subject's average VO2 max when receiving plain water (53.89 ml/kg/minute). Statistical test results showed a p-value = 0.955 (p>0.05), which means that the energy intake of athletes with VO2max does not have a significant relationship.
Evi Komala Dewi, Mury Kuswary (2013)	<i>Cross-section</i>	Macronutrients	Meanwhile, for protein, the results show a p-value = 0.529 (p>0.05), which means that the athlete's protein intake with VO2max does not have a significant relationship. Fat: 0.065 (0.1>p>0.05), which means a significant limitation that the athlete's fat intake with VO2max can be said to have a significant relationship. Carbohydrates: p-value = 0.421 (p> 0.05), which means that carbohydrate intake with VO2max does not have a significant relationship

there was no relationship between micronutrients such as potassium, magnesium, sodium, calcium, and iron with the performance of hockey athletes. The no relationship between micronutrients happened because nutritionists were unavailable at the hockey athlete association, so almost all nutrients were in deficit. The food they get during the competition comes from catering. However, the calculation of needs is not following the principles of nutritional guidelines because the needs of each athlete are different, thus requiring a nutritionist to perform nutritional interventions.

A study by Puspaningtyas et al., (2015) stated that there was no significant relationship between giving vitamin C to VO₂max. The contrast to the benefits of vitamin C for athlete performance. Namely, vitamin C supplementation can reduce levels of biomarkers of oxidative stress. Low levels of vitamin C in the body are associated with low physical performance and increased oxidative stress, so administering vitamin C can reduce oxidative stress levels and improve physical performance.

CONCLUSION

Fulfillment of nutrition, both macronutrients such as energy, protein, fat, and carbohydrates, has been shown to affect the performance of athletes during training and competition. Nevertheless, not with micronutrients, the literature evidence obtained by the authors found that many articles stated that there was no significant relationship between micronutrients such as vitamins and minerals on athlete performance. Macronutrients can affect the level of physical fitness, physical endurance, muscle strength, and VO₂max score.

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