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# The nutrition needs of adolescent athletes: A systematic review

**Awang Firmansyah[1], Muhammad Reza Aziz Prasetya[1]**

[1]Sport Science Department, Faculty of Sport Science, State University of Surabaya, East Java, Indonesia

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**Abstract**

Athletes certainly need better nutrition than ordinary people. These nutritional needs, especially for adolescent athletes, are very important as a supplement to produce performance, energy, growth, and in the recovery process. The purpose of this article is to explain the components or aspects that must be considered in meeting the nutritional needs of adolescent athletes. This study followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) and the Meta-analysis. There are scientific articles obtained from Elsevier, Pubmed, Science Direct, Web of Science, National Index, Google Scholar, Journal of Sport Nutrition. Some important aspects of meeting nutritional needs for adolescent athletes are as follows: calorie needs, macronutrients hydration, and timing. The analysis structure used in this study is in line with several bibliometric studies conducted on other topics. Research on nutrition in adolescent athletes, research on important aspects of nutrition to meet the needs of adolescent athletes, English and Indonesian articles, full text form, published from 2015 to 2021. Exclusion criteria, abstract only, unpublished articles in scientific journals. All aspects of fulfilling nutrition for adolescent athletes are very important to support performance and quality, especially for adolescent athletes.

**Keywords:** adolescent athlete, training, nutrition.

## INTRODUCTION

Athletes certainly have more energy needs than ordinary people. Fulfilling nutrition for adolescent athletes is also important as a supplement and additional energy to produce good performance speed up the process of recovery (Garthe & Ramsbottom, 2020). The fulfillment of good and proper nutrition for adolescent athletes is not only good for maximizing the performance process during training, but also very important for meeting growth and development requirements (Kreider et al., 2017). Athletes in the adolescent age category are an effective and important age in the level of sports coaching, especially in technique. So it is important to be able to pay attention to every need to support their performance and performance

Correspondence author: Muhammad Reza Aziz Prasetya, State University of Surabaya, Indonesia.
Email: prasetyareza44@gmail.com

during training (Panggabean, 2020). There are three broad stages of development: early childhood, middle childhood, and adolescence (Mangieri, 2017).

When coaching adolescent athletes, it is important for every athlete to get the most benefit from training, whether the training is related to strength, speed, agility, or endurance. The purpose of each exercise is to prepare each athlete to compete and achieve their best performance. For athletes to benefit from any exercise, it is imperative that both the coach and the athlete understand their proper nutritional needs and hydration habits before and after a training session (Cherian et al., 2020). In addition, it is very important that the coach also avoids lack of nutrition and hydration in terms of habits before and after matches as well as to contribute to the performance and recovery process after competition (Suherman, 2019). The health of adolescent athletes is dependent on proper nutrition. Sports nutrition also improves performance during training and competition, which can minimize injuries and speed up the recovery process (Moore et al., 2020). Building a champion athlete starts with encouraging healthy habits from a young age and understanding how the athlete thinks, grows, and develops (Mangieri, 2017).

In several previous research articles, the author has not found an article that describes the aspects that need to be considered in fulfilling nutrition for athletes, especially adolescent athletes (Bakhtiar et al., 2021). The goal of regulating the nutritional intake of athletes is to find the best diet and increase the efficiency of the body's metabolism to face training and competitions (Henjilito & Nazirun, 2021). Several articles/studies were found to separately discuss the nutritional needs of adolescent athletes and yet offend on certain aspects that need to be considered in particular. Articles have to answer questions about aspects that must be considered in meeting the needs of athletes in the adolescent athlete category (Anggita et al., 2021).


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7 (3) 2021 | 400-418

## METHOD

This study followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) and the Meta-analysis, The analysis structure used in this study is in line with several bibliometric studies conducted on other topics. The number of books and articles obtained was 337, published from 2015 to 2021. The strategy is used to find articles using PICO. methods of collecting library data or research in which the object of research is explored through various library information sources (books, scientific journals). population/problem, population or problem to be analyzed in a scientific paper: the nutritional needs of adolescent athletes. Intervention is action taken on a problem. comparison with comparisons from other similar studies. Results of research: several aspects of nutritional needs for adolescent athletes, such as calorie needs, macronutrients, hydration, timing, and supplements (Moore et al., 2020).

### Search strategy and study selection

Seven electronic databases (Elsevier, Pubmed, Science Direct, Web of Science, National Index, Google Scholar, and Journal of Sport Nutrition) The analytical structure used in this study is in line with several studies conducted on other topics. The number of articles obtained was 337 articles published from 2015 to 2021. Using reference management software (Mendeley), notes were compiled, title and abstract screening were performed, and each full-text article was reviewed against the inclusion criteria.

### Criteria for inclusion and exclusion

Search strategy and study selection: seven electronic databases (Elsevier, Pubmed, Science Direct, Web of Science, National Index, Google Scholar, and Journal of Sport Nutrition). The analytical structure used in this study is in line with several studies conducted on other topics. The number of articles obtained was 20 articles published from 2015 to 2021. Using reference management software (Mendeley), notes were compiled, title and abstract screening were performed, and each full-text article was reviewed against the inclusion criteria. Inclusion and exclusion criteria Research on


https://doi.org/10.29407/js_unpgri.v7i3.16716
7 (3) 2021 | 400-418

nutrition in adolescent athletes, research on important aspects of nutrition to meet the needs of adolescent athletes, English and Indonesian articles, full text form, published from 2015 to 2021. Exclusion criteria: abstract only, unpublished articles in scientific journals. The journals that have one or more of each of the inclusion criteria items and where there is a theme of nutritional needs for adolescent athletes are then reviewed. The journal criteria selected for review are research journals that match the inclusion criteria.

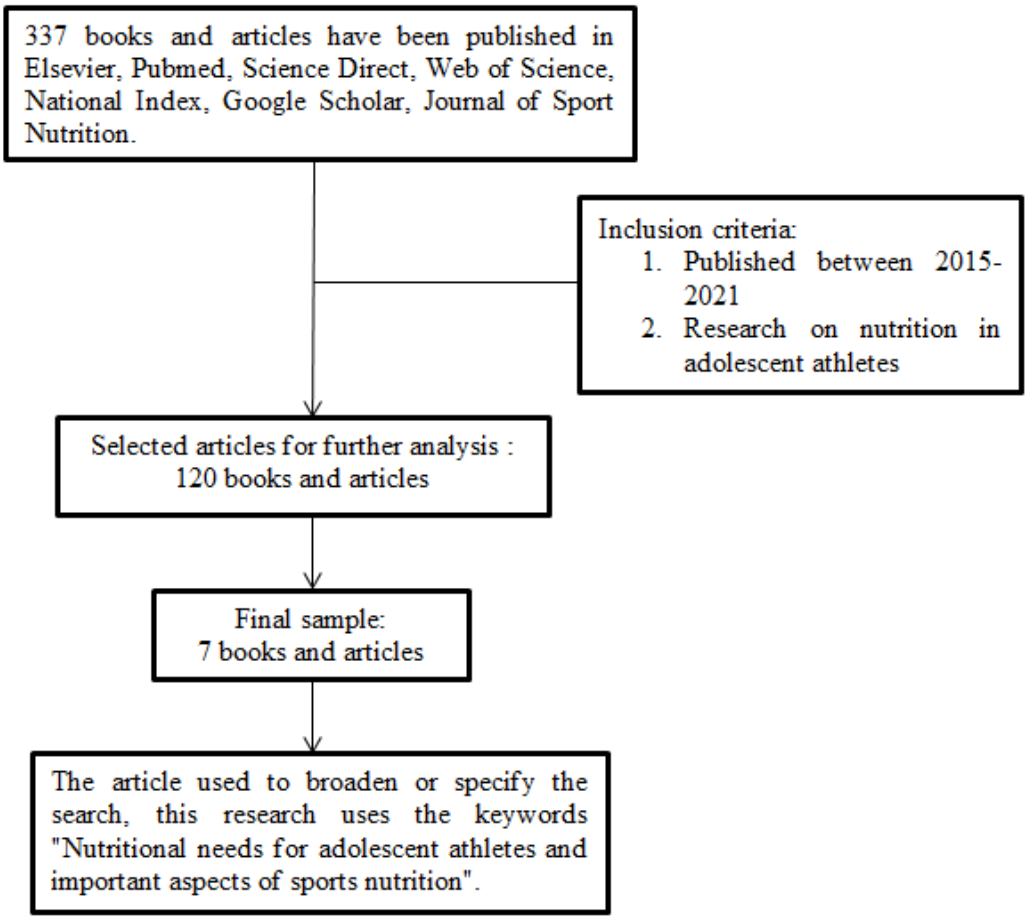


**Figure 1.** Study Design

To get metadata for all articles, the author uses the help of the Mendeley application. The author checks the completeness of the metadata for each article on Mendeley. There are several books and articles whose metadata is incomplete, so researchers must complete it.

## RESULT

Research is done by doing a review of several books and articles from several sources. As for the main book review material, among others:

1. Book by Louise M. Burke, Melinda M. Manore (2020). Nutrition For Sport and Physical Activity.
2. The book is entitled Nutrition For Elite Atheletes. Eric S. Rawson, Stella Lucia Volpe (2016)
3. The book is entitled Sports Nutrition. Ralph Esposito, Jade Teta, Keoni Teta. (2020).

And some supporting articles, journals and books as supporting sources are as follows:

1. Marius Baranuskus, Rimantas Stukas, etc (2015). Nutritional habits among high-performance endurance athletes.
2. Ricthard Hardi, Nathalie Kliemann, etc (2017). Sports Nutrition Interventions: A Systematic Review Of Behavioural Strategies Used To Promote Dietary Behaviour Change In Athletes.
3. A. Moore, L. Lamber, Etc (2020). Effectiveness of Sports Nutrition Education on Student-athlete Nutrition Knowledge.
4. Smith JEW, Holmes ME, McAllister MJ from Nutritional Considerations for Performance in Young Athletes (2015). About the nutritional needs of adolescent athletes.

**Table 1.** Result book and article review

| No | Title article/book | Publishing Year | Source | Methods | Findings |
|---|---|---|---|---|---|
| 1 | Nutrition for sport physical activity | 2020 | Elsevier/ Present Knowledge in Nutrition, Volume 2, International | consists of several chapters about sport nutrition | Athletes and active individuals have different energy, nutrient, and fluid needs compared to their sedentary peers. |
| 2 | Nutrition for elite athletes | 2016 | Crc Press Website/Elsevier, International | consists of several chapters about nutrition for elite athletes | To achieve and maintain peak performance, high-level athletes need the right nutrition at the right time. Nutrition for Elite Athletes provides a comprehensive overview of the latest research on the nutritional needs of |


https://doi.org/10.29407/js_unpgri.v7i3.16716
7 (3) 2021 | 400-418

| | | | | | |
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| | | | | | athletes at the top of their game. |
| 3 | Sports Nutrition | 2020 | Elsevier/ Textbook of Natural Medicine, International | consists of several chapters sports nutrition | Sports nutrition is about fueling and enhancing performance, recovering from stress, improving skills quickly, and maintaining optimal body composition for the sport. |
| 4 | Nutritional habits among high perforamcne endurance athletes | 2015 | Journal Medicina (Kaunas, Lithuania). | Literature Review | The diet of highly trained endurance athletes does not fully meet their requirements and in this situation cannot ensure maximum adaptation to very intense and/or long-duration physical loads. The diet of highly trained endurance athletes must be optimized, adjusted and individualized. |
| 5 | A systematic review of behavioural strategies used to promote dietary behavior change in athletes | 2017 | Journal of Nutrition Education and Behavior | Systematic Review | Student-athletes tend to refrain from energy drink use but those who use it have a tendency to have lower nutrition knowledge than do non users |
| 6 | Effectiveness of sports nutrition educaton on student athlete nutrition knowledge | 2020 | Journal of the Academy of Nutrition and Dietetics | Literature Review | Diet programs can help athletes to improve nutritional knowledge for student-athletes. It is important to document the results to support future collaboration between the department of diet and the college. Universities that do not yet have a team of nutritionists can cooperate with the dietetics department to provide needed services to their student-athletes. |
| 7 | Nutritional consederations for performance in young athletes | 2015 | Journal of Sports Medicine Volume 2015 | Literature Review | Nutrition is an integral component to any athletes training and performance program. In adults the balance between energy intake and energy demands is crucial in training, recovery, and performance. In young athletes the demands for training and performance remain but should be a secondary focus behind the |

| | |
|---|---|
| | demands associated with maintaining the proper growth and maturation. |

In general, athletes have a calorie requirement of 2,000 kcal per day to meet their energy needs. As for athletes, these needs are fundamentally insufficient with a relatively high level of activity (Heikkilä, M., Valve, R., Lehtovirta, M., & Fogelholm, 2017). A person's calorie needs will be influenced by several factors, including age, gender, weight, exercise, activity level, duration of activity, and the person's overall health. Based on several references in this study, it can be summarized that some of the results of literacy regarding aspak that must be considered in meeting nutritional needs are as follows.

## DISCUSSION

### Calorie Needs

An athlete must consume enough calories, or energy, every day to meet their weight and body composition goals, whether it is to maintain weight, lose weight, or gain weight. To maintain energy balance, food, fluids, and supplements are consumed for energy expenditure. Calorie requirements for adolescent athletes depend on age, gender, and level of physical activity. In certain types of sports, adolescents on average spend about 10–25% more energy than adults (Hardy et al., 2017). The following are the calorie needs of athletes by age category, based on estimated energy needs (EER).

**Table 2.** Calorie needs based on age and activity level in men

| Age | Normal | Active | Very Active |
|---|---|---|---|
| 12 | 1,800 | 2,200 | 2,400 |
| 13 | 2,000 | 2,200 | 2,600 |
| 14 | 2,000 | 2,400 | 2,800 |
| 15 | 2,200 | 2,600 | 3,000 |
| 16 | 2,400 | 2,800 | 3,200 |
| 17 | 2,400 | 2,800 | 3,200 |
| 18 | 2,400 | 2,800 | 3,200 |
| 19-20 | 2,600 | 2,800 | 3,000 |


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7 (3) 2021 | 400-418

Source : (U.S. Department of Agriculture and U.S. Department of Health and Human Services. Dietary Guidelines for Americans, 2020-2025. 9th Edition. 2020).

**Table 3.** Calorie needs based on age and activity level for women

| Age | Normal | Active | Very Active |
|---|---|---|---|
| 12 | 1,600 | 2,000 | 2,200 |
| 13 | 1,600 | 2,000 | 2,200 |
| 14 | 1,8 | 2,000 | 2,400 |
| 15 | 1,8 | 2,000 | 2,400 |
| 16 | 1,8 | 2,000 | 2,400 |
| 17 | 1,8 | 2,000 | 2,400 |
| 18 | 1,8 | 2,000 | 2,400 |
| 19-20 | 2,000 | 2,200 | 2,400 |

Source : (U.S. Department of Agriculture and U.S. Department of Health and Human Services. Dietary Guidelines for Americans, 2020-2025. 9th Edition. 2020)

**Macronutrients**

Macronutrients are the main foods that help the body form energy. Macronutrients consist of 3 main parts, namely fat, protein, and carbohydrates. Macronutrients are nutrients that contribute a lot of energy to the body. The term "macroscopic" describes chemicals that provide calories for energy, including carbohydrates, proteins, and fats. The body requires these nutrients in large quantities. In nutrition science, what are called macronutrients are nutrients, namely carbohydrates, proteins, and fats. Meanwhile, micronutrients are vitamins and minerals (Gaudiani, 2019). Macronutrients are essential nutrients that are needed in relatively large amounts (macro amounts) for the body. Macronutrients consist of carbohydrates, proteins, and fats. Each of the macronutrients provides different types of energy for the body. Carbohydrates and protein provide energy of about 4 calories per gram, while fat provides energy of about 9 calories per gram. In addition, macronutrients also play a role in helping growth, metabolism, and regulation of body functions (Hardy et al., 2017).

Both substances are elements essential in the daily diet, and the adequacy of these two elements is the key to the achievement of the athlete's performance. In general, the needs for macronutrients are still determined by the job, while for athletes, their needs must be determined in accordance with the type of sport, the length of exercise, and body weight

(Moore et al., 2020). The higher the exercise intensity, the more these two substances are needed. The need for carbohydrates (CHO) is usually 55–70% of the total calories, followed by 20% protein and 10–20% fat. So there is a need to know the type of macronutrient that is right as supporting energy for athletes that are not experiencing a shortage or excess energy from the food that is consumed. The journal Relationship of Energy Drink Consumption and Nutrition Knowledge in Student Athletes (Hardy et al., 2017), provides recommendations for macronutrient needs for adolescents as follows (Hardy et al., 2017).

**Table 4.** Basic macronutrient requirements for adolescent athletes

| Macronutrients | Needs |
|---|---|
| Carbohydrate | 50% of calorie intake , with total 3-8g / kg body weight . 1-1.5 g / kg post workout body weight /exercise. 7. |
| Protein | 0.8-1.2 g / sd 1.2-1.8 g / kg weight or about 10% to 30% of the total energy intake . |
| Fat | 20-25% of calorie intake , no less than 15%. |

Source : (Ricthard Hardi, Nathalie Kliemann through the journal Relationship of Energy Drink Consumption and Nutrition Knowledge in Student-Athletes 2017).

The following details the macronutrient requirements for adolescent athletes to support energy needs during exercise. For carbohydrates, 50% of calorie intake, for a total of 3–8 g/kg body weight. 1-1.5 g/kg body weight post-exercise/exercise, then protein 0.8-1.2 g/sd 1.2-1.8 g/kg body weight, or about 10% to 30% of the total energy intake, and fat, 20–25% of the calorie intake, not less than 15%. Nutritional needs in adolescence are higher than adults in the life cycle. Even for teens who don't exercise, they need a healthy mix of calories, carbohydrates, fats, and proteins. They need to be able to trigger activity and balance with their body's growth.

## Carbohydrate

Carbohydrates act as a source of energy during training and competition. Carbohydrate intake is related to regulating blood sugar levels and glycogen stores in muscles and the liver, where both blood sugar and glycogen stores will have an impact on the rate of energy production.


https://doi.org/10.29407/js_unpgri.v7i3.16716
7 (3) 2021 | 400-418

Studies show that carbohydrates should be consumed every day, especially after exercise.

Carbohydrates, like calories, should be given in a balanced or proportionate way, especially to adolescent athletes. This is because too many carbohydrates from the wrong sources can lead to weight gain and insulin resistance. Carbohydrates, on the other hand, are insufficient to increase fatigue and have a negative impact on performance (Jovanov et al., 2019). Again, athletes and important parents understand how to achieve a balance in nutrition.

**Table 5.** Carbohydrate requirement (g) per kg of body weight

| Exercise Duration (hour) | Carbohydrates (g) per Kg of body weight. |
|---|---|
| 0 to 1 | 5 to 6 |
| 1 to 2 | 6 to 7 |
| 2 to 3 | 7 to 8 |
| more than 4 | 8 to 10 |

Source: (Smith JEW, Holmes ME, McAllister MJ from Nutritional Considerations for Performance in Young Athletes 2015).

Nutrient-rich sources of carbohydrates come from bread, rice, corn, nuts, whole grains, vegetables, and cereals. Nuts and whole grains have lots of nutrients and fiber, while fruits and vegetables provide essential vitamins and minerals. Foods with a low glycemic content help maintain the levels of sugar in the blood stable throughout the day and during exercise.

**Protein**

Protein works to build and repair muscles, hair, nails, skin, and other tissues. For light exercise and short-duration exercise, protein does not act as the main energy source. However, as the duration of exercise increases, protein helps maintain blood glucose via liver gluconeogenesis (Moore et al., 2020). Each individual's daily protein requirements vary widely. In determining how much protein is needed in adolescent athletes, it is necessary to determine how much protein is needed. An adolescent athlete who exercises at a frequency of 3–4 days per week needs at least 1.0 gram per kg per day. For athletes who have high intensity and want to increase muscle volume, they at least need higher protein, namely 1.7 grams per kilogram per day (Bentley et al., 2020).

## Fat

Fat is needed to absorb fat-soluble vitamins (A, D, E, and K), to provide essential fatty acids, protect vital organs, and provide insulation. Fat also provides a feeling of fullness. It is a calorie-dense source of energy (one gram provides nine kilocalories) but is more difficult to use. Inside the creature's body, they lived like fat humans. Understanding fat is a very important source of energy that is needed by humans, especially to carry out daily activities. Humans have a body that requires a balanced level of fat. This is to maintain energy reserves. Carbohydrates are known to be the best fuel for muscle work, but fat is also an important source of fuel during activities, particularly in young athletes (Smith JEW et al.,2015).

However, if the fat contained in the body exceeds the normal limit, it will lead to obesity, which in turn will cause various types of diseases. Fat should comprise 20% to 25% of the total energy intake for children aged four to 18 years. Saturated fat should comprise no more than 10% of the total energy intake. Good sources of fat include lean meat and poultry, fish, nuts, seeds, dairy products, and olive and canola oils. Fats from chips, candy, fried foods, and baked goods should be minimized. Sometimes athletes' assumptions about fat tend to be negative. Fat is a macronutrient that has a long digestion time and tends to be stored when not in use. So, fat is the main cause of overweight and other health effects (Berg., 2019). For this reason, it is necessary to provide an understanding of the weak and healthy that is needed and needed by athletes, especially adolescent athletes. Adolescent athletes need energy not only for energy purposes, but for growth needs as well. This means that limiting fat is also at risk of not meeting energy needs.

## Micronutrient

Micronutrients are nutrients needed by the body in small amounts but have an important role in forming hormones, stimulating activities, and regulating the function of the immune system and reproductive system. Micronutrients include vitamins and minerals. Minerals are divided into two groups, namely macrominerals and microminerals. Macrominerals are


https://doi.org/10.29407/js_unpgri.v7i3.16716
7 (3) 2021 | 400-418

minerals that the body needs at least 100 mg per day (e.g. calcium, phosphorus), while microminerals (trace elements) are minerals that the body needs in amounts less than 100 mg per day (e.g. zinc, iron). Adolescent athletes can make a balanced diet difficult, which can put them at risk for micronutrient deficiencies. This deficiency was more frequently observed in girls than in boys and in mineral intake rather than vitamin intake (Hardy et al., 2017). Adolescent athletes are actually more likely to achieve vitamin intake than non-athletic teens because of their increased total calorie intake. While minerals play a role through the supply of sodium, potassium, iron, and calcium in the body, The sodium that is lost during exercise through sweat needs to be replaced with sodium during exercise. Sweating during exercise increases the concentration of salt in the body, so salt consumption after competition and exercise is not recommended (Amanda et al., 2015). This will draw water out of the cells, causing the muscles to cramp. The following are some of the macronutrient needs of adolescent athletes in the following tables.

**Table 6.** Micronutrient needs based on gender and age

| Age | Calcium | Folate | Vitamin B6 | Vitamin B6 | |
|---|---|---|---|---|---|
| | | | | Min | Max |
| All children 4 - 8 years | 800 mg / d | 200 mg / d | 0.6 mg / d | 10 mg / d | 40 mg / d |
| Male 9 - 13 years | 1,300 mg / d | 300 mg / d | 1 mg / d | 8 mg / d | 40 mg / d |
| Female 14-18 years | 1,300 mg / d | 400 mg / d | 1.2 mg / d | 11 mg / d | 45 mg / d |

Information: mg / d = milligram / day, mcg / d = microgram / day

Source: (Smith JEW, Holmes ME, McAllister MJ from Nutritional Considerations for Performance in Young Athletes 2015)

**Hydration**

Hydration is defined as the balance of fluids in the body. Hydration ensures the metabolic function of the body's cells. In contrast to hydration, dehydration means a lack of fluids in the body because the amount of fluid that comes out is greater than the amount that is entered. For branches of sport outdoor such as athletics triathlon, etc. Where the body receives heat from the outside would much remove fluid through perspiration. Although it


https://doi.org/10.29407/js_unpgri.v7i3.16716
7 (3) 2021 | 400-418

is possible that indoor sports will also experience the same thing. So it is very important to pay attention to the balance of fluids in the body for athletes when training and competing. Adolescents athletes with heavy activity levels and related to body temperature have high levels of dehydration (Smith JEW et al.,2015). Researchers found adolescent athletes tended to become dehydrated by as much as 2.5% of their body weight through sweating and experienced a decrease of up to 45% in capacity when doing high-intensity exercise (Desbrow et al., 2019). Some of the symptoms that arise from dehydration include dry lips and tongue, sunken eyes, light or dark colored urine, or urine with a strong odor, frequent urination, small urine volume, lack of energy, and a sudden decrease in performance (Hardy et al., 2017).

Conservatively, the required hourly fluid intake is 13 mL / kg (6 mL / lb) body weight 4 mL / kg (2 mL / lb) for each hour of exercise) to avoid dehydration. Or at least drink about 2 glasses or 480 milliliters of water 2 hours before exercise. During exercise, drink about 1/2 to 1 glass (120 to 240 milliliters) of fluid every 15 to 20 minutes. Proper hydration in athletes requires fluid intake before, during and after exercise or activity. The amount of fluid needed depends on many factors, including age and body size (Desbrow et al., 2019).

**Table 7.** Needs intake of fluid minimum on adolescent athletes

| Weight Body (kg) | Liquid During Exercise (ml/hour) | Fluid Replacement After Practice (ml/hour) |
|---|---|---|
| 25 | 325 | 100 |
| 30 | 390 | 120 |
| 35 | 455 | 140 |
| 40 | 520 | 160 |
| 45 | 585 | 180 |
| 50 | 650 | 200 |
| 55 | 715 | 220 |
| 60 | 780 | 240 |

Source: (A. Moore, L. Lamber, Etc (2020). Effectiveness of Sports Nutrition Education on Student-athlete Nutrition Knowledge).

Moore recommends the minimum recommended fluid intake during and after exercise in adolescent athletes, based on a calculation of 13 mL / kg during training and 4 mL / kg after training (Moore et al., 2020). To meet the needs of fluids, you can use drinks and energy drinks, vitamin water and


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7 (3) 2021 | 400-418

high caffeinated drinks. Sports and energy drinks are widely available today and many contain electrolytes. Drinks to produce energy usually contain sugar (carbohydrates) and electrolytes such as sodium and potassium. even so, basically athletes only need water to stay hydrated. For most teenagers, drinking water before, during, and after exercise will keep them hydrated. Actually it is best to avoid athletes from consuming energy drinks because there are still many ingredients whose side effects have not been studied and tend to be dangerous.

**Time**

Fulfilling a balanced diet is a priority for adolescent athletes, but determining mealtimes is equally important for optimizing exercise performance and recovery. To meet nutritional needs, experts recommend eating foods frequently outside of breakfast, lunch, and dinner. Especially with activities that are carried out outside of the training schedule, it is recommended that athletes consume food about every three hours to minimize energy deficits each day. In general, the dynamics of energy intake and expenditure during activities must be consistent (Hardy et al., 2017). Most athletes do not have a coach or expert nutritionist to understand and can set the time to eat before, at the time of, and after exercise or competition. Feeding or snacking before exercise is to increase or store energy (liver and muscle glycogen) and to ensure that athletes are comfortable and do not feel hungry or too full (Marius et al.,2015).

Before training or competition, usually high-carbohydrate and low-fat foods or snacks need to be consumed, while foods high in fat and high in fiber need to be avoided to prevent delays in emptying the stomach and cramps. Eating before exercise contains at least about 10–25% of calories from protein, in an effort to eliminate hunger (Jasmani, 2019). During training or competing, the consumption of fuel during exercise is to sustain energy and maximize performance. For drills or matches that last less than 60 minutes, fuel during workouts is often unnecessary. When training or competing in competitions that last longer than 60 minutes, intake should come from sports drinks that contain carbohydrates and electrolytes with

levels of 6–8% sugar, so that they are quickly absorbed and used for energy (Moore et al., 2020). After training or competing, The interest in consumption of material fuel after following the workout is to support the restoration and repair network of athletes who are growing and replacing the glycogen stores in the liver and muscles. Consumption of food after training or competition should contain carbohydrates and protein. Consuming a high-carbohydrate, high-protein diet after exercise helps restore muscle glycogen. The food consumed 3 hours after exercise needs to be high in carbohydrates but low in fat and fiber so that the sugar in it will quickly flow into the bloodstream and replace glycogen stores. We recommend cutting back on fast food, fried foods, and processed foods after exercise.

**Supplements**

In adolescent athletes, energy needs are an important basic need during training or competition. So it is not uncommon for them to use shortcuts, such as the use of substances or supplements, that sometimes tend to be harmful to their bodies (Rossi, 2017). Parents, coaches, and athletes at least need to understand the types of supplements that are suitable and good to use as a substitute for quick energy intake. Moreover, the coach must understand the types of supplements to avoid doping in matches. The effect of the use of supplements on the growth and development of adolescent children is still unclear, so the use of these supplements by adolescents, especially athletes, needs to be avoided. The next supplement is energy drinks and caffeine. Consuming too much caffeine, such as that found in powders, pills, and many energy drinks, can be dangerous (Hardy et al., 2017). Although it improves exercise performance in some adults, the effects vary widely. The effects of caffeine have not been well studied in children and adolescents. Adolescent athletes who take medication for disorders or hyperactivity should be very careful when using energy drinks that contain stimulants (Gaudiani, 2019). Based on the purpose of writing, this article describes aspects that must be considered in fulfilling nutrition for adolescent athletes. The following is an


https://doi.org/10.29407/js_unpgri.v7i3.16716
7 (3) 2021 | 400-418

explanation of the aspects and things that must be considered in meeting the nutritional needs of adolescent athletes by sports nutritionists.

**Nutritional Needs of Adolescent athletes**

An athlete is someone who has physical activity and energy needs that are different from people in general. Physical activity in athletes requires energy intake through proper nutrition. Providing proper nutrition helps maintain energy during exercise, ensures normal blood glucose concentrations, prevents hunger, maintains muscle mass, and speeds recovery. Providing proper nutrition to adolescent athletes will have an impact on the athlete's appearance during training and competition. Nutrition will greatly help athletes improve performance through the energy generated, delay fatigue, increase strength and focus, and speed up the recovery process. Basically, athletes who want to be able to achieve their best performance really need to pay attention to their nutritional intake (Moore et al., 2020). Adequate nutrition for adolescent athletes is not only important to maintain health and optimize the performance of the sport, but it is also very important to meet the requirements of growth and development.

In addition to consuming adequate calories and balanced nutrition for growth and performance, timing should also be a major consideration for adolescent athletes, taking into account the time before and after training. Because these components are also very important for increasing nutritional needs, carrying out activities or exercises as expected. Some things that must be considered in determining the right nutrition include calorie needs, macronutrients, hydration, time, and supplements (Zhao et al., 2021). From some of the things mentioned above, it is necessary to understand the factors that influence the provision of proper nutrition, such as the type of exercise, genes, gender, and age (Moore et al., 2020).

## CONCLUSION

An athlete certainly has physical activity and energy needs that are different from people in general. Physical activity in athletes requires energy

intake through proper nutrition. Providing proper nutrition helps maintain energy during exercise, ensures normal blood glucose concentrations, prevents hunger, maintains muscle mass, and speeds recovery. Despite the higher energy requirements, the recommended food sources for adolescent athletes do not deviate much from the general recommendations for optimal health.

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