Journal of Physical Education and Sport ® (JPES), Vol. 22 (issue 12), Art 371, pp. 2939-2946, December 2022
online ISSN: 2247 - 806X; p-ISSN: 2247 – 8051; ISSN - L = 2247 - 8051 © JPES

Original Article

Nutritional status and adequacy of disabled athletes from Indonesia

ABDUL SUKUR[1], JOHANSYAH LUBIS[2], EKO JULI FITRIANTO[3], FAJAR VIDYA HARTONO[4], MANSUR JAUHARI[5], RIZKY NURULFA[6], HERNAWAN[7]
[1,2,3,4,5,6,7] Faculty of Sports Science, Universitas Negeri Jakarta, INDONESIA.

Published online: December 25, 2022
(Accepted for publication December 15, 2022)
DOI:10.7752/jpes.2022.12371

Abstract:
This study aims to determine the level of nutritional status of athletes with disabilities in Indonesia. Good nutritional intake will also help repair or replace damaged body cells. The right food choices will help optimize energy and help athletes recover after competing. The subjects in this study were Indonesian athletes with disabilities who are members of the DKI Jakarta Provincial Government Team of 90 people in several sports, including track and field swimming, table tennis, badminton, shooting, chess, archery, wheelchair tennis, table tennis, judo blind, and boccia. The research method used is descriptive quantitative with a purposive sampling technique. The data collection technique was through a Google Form questionnaire distributed directly to athletes. In contrast, blind athletes who needed to fill in were assisted when filling out the questionnaire. An overview of nutritional status was obtained by calculating BMI (Body Mass Index) by measuring height and weight. In contrast, nutritional intake was determined by a nutritional intake questionnaire for the last 30 days, questions about energy intake, protein intake, fat, carbohydrate and fluid intake. Through this research, data was obtained, which showed that the majority of athletes with disabilities in DKI Jakarta who had a thin nutritional status were 13. Fifty-one people have normal nutritional status. While the healthy rate of obesity (13 people) and obesity (11 people). Most athletes have a level of adequacy of energy intake deficits. The level of Carbohydrate intake is mostly deficits, The level of fat intake is mostly excessive, and The level of protein intake is primarily excessive. And fluid intake in athletes is a minimum of 1000 ml/day and a maximum of 8000 ml/day.
Key Words: nutritional status, disabled athletes, sports nutrition.

Introduction

Optimal achievement in sports is determined by many factors, including talent, optimal training, application of science and technology, and good nutrition. Nutritional needs, such as carbohydrates, protein, fat, fiber, fluids, and micronutrients, are essential for maintaining health, adapting to training, and increasing stamina during training sessions and competitions (Guimaraes-Ferreira et al., 2017). Fulfillment of nutritional intake is a basic need for athletes. Athletes' food must contain nutrients needed for daily activities and sports (Driskell & Wolinsky, 2016). Food must contain a certain amount of energy-producing nutrients; additionally, it must be able to replace the body's nutrients after sports activities. Nutritional strategies for exercise before, during, and after training can help athletes achieve their best performance.

The focus of nutritional regulation is the balance of energy obtained through food and drink with the energy needed by the body to maintain a balance of metabolism, bodywork, and energy supply at rest, during exercise, and during competition. The nutritional needs of athletes differ from the nutritional needs of non-athletes due to differences in physical activity/activity and psychological conditions (Fitzgerald, 2008). Each sport has different nutritional needs. The athlete's diet should contain all macronutrients and micronutrients. Macronutrients include carbohydrates, fats, and proteins, while micronutrients include vitamins and minerals.

Nutrition is one of the biological factors that influence athletic achievement. Athletic achievement is influenced by two factors: technical factors and non-technical factors. Technical factors include health conditions, level of physical fitness, food consumed, nutritional conditions, match nutrition regulation, and restoration of nutritional status. If nutrition is not appropriately implemented, it can hinder athletic training (Oded Bar-Or, 2000). An accurate assessment of nutritional status is essential to optimize performance because it affects health, body composition, and athletic recovery (Mielgo-Ayuso et al., 2015). Accordingly, this review aims to highlight the current knowledge of the influence of pre-exercise nutrition ingestion on the metabolic, physiological, and performance responses to endurance training (Rothschild et al., 2020).

Nutrition assessment is a necessary first step in advising athletes on dietary strategies that include dietary supplementation and evaluating effectiveness of supplementation regimens. Although the dietary assessment is the cornerstone of the nutrition assessment process, it should be performed within a complete assessment that includes the collection/evaluation of anthropometric, biochemical, clinical, and environmental data (Larson-Meyer et al., 2018). Therefore, athletes need knowledge in regulating the nutritional intake needed by the body in accordance with the exercise program being carried out. This involves organizing various types of food to

Corresponding Author: ABDUL SUKUR, E-mail: abdul-sukur@unj.ac.id

meet essential nutritional needs in support of preparation, competition, and recovery times (Collins et al., 2011) (Miškulin et al., 2019). This also applies to typical athletes and disabled athletes. Nutrition plays a vital role in sports performance because it supports an athlete in maintaining ideal body weight, body composition specific to sports. and faster recovery (Bindu Malla Scholar et al., 2017). Selecting nutrient-rich foods is also essential for reducing the risk of nutrient deficiencies that may impair health and performance, mainly when energy intake is restricted to minimize body mass/fat mass (Lim & Pranata, 2021). Sports nutrition can be the difference between being competitive and standing at the podium. Sports nutrition for Paralympic Athletes is an essential complement to resources for anyone interested in the sports nutrition needs of our Paralympic athletes. However, there have not been many studies on athlete nutrition in athletes with disabilities. As a resource, this study is significant for researching nutrition for athletes with disabilities because the Paralympic profile is rapidly increasing, and research will be needed for the public and sports activists who are hoping to give their athletes a competitive advantage.

The disability umbrella term covers impairments, activity limitations, and participation restrictions. Disability is broadly defined as the consequence of an impairment that may be physical, cognitive, mental, sensory, emotional, developmental, or some combination of these. A disability may be present from birth or occur during a person's lifetime. Impairments may include physical, sensory, cognitive or developmental disabilities. Mental disorders (also known as psychiatric or psychosocial disabilities) and various types of chronic disease may qualify as disabilities (different countries, regions, and even organizations often define disability in a similar but slightly different manner). Disability has be classified by several organizations, such as the Disabled World (2020-04-07) and the WHO (Disability and health 1, 2021) (World Health Organization (WHO), 2015), and Broad (2014). A person with disabilities includes someone in a targeted subgroup at particular risk for disease and premature mortality that can be reduced or prevented by increasing participation in regular physical activity (Santiago & Coyle, 2004). Disability sports is a relatively new phenomenon that specifically addresses the context of social inclusion, thus attracting much political and academic attention (Thomas & Smith, 2008). The opportunities for individuals with any impairment to participate in sport and exercise have increased substantially over recent decades, with specialist coaches/trainers, sporting events, national and international competitions, and opportunities to become an elite-level athlete competing at the Paralympic Games (Broad, 2014). Paralympic sport is one field where the challenge of an objective representation of disability becomes particularly important due to the ever-increasing amount of television attention to the Paralympic Games as a global sports event and some persisting stereotypes in the media representation of athletes with disabilities (Kolotouchkina, Llorente-Barroso, García-Guardia, & Pavón, 2021).

In Indonesia, persons with disabilities include any person who experiences physical, intellectual, mental, and sensory limitations for a long time and who, upon interacting with the environment, may experience obstacles and difficulties in participating fully and effectively with other citizens based on equal rights, (Law Number 8 of 2016 concerning Persons with Disabilities, 2016), while article 5 paragraph (2) of Law number 20 of 2003 concerning the National Education System states that they are “Citizens who have physical, emotional, mental, intellectual and/or physical disabilities or socially entitled to special education.” (Directorate General of Legislation, 2003).

One of the disability sports development centers in Indonesia is located in the capital city of the province of Jakarta. In Jakarta itself, athletes with disabilities obtain coaching carried out by the National Paralympic Committee (NPC) DKI Jakarta. The National Paralympic Committee (NPC) of DKI Jakarta Province is one of the disability sports organizations in Indonesia. This organization fosters athletes with disabilities to be prepared for regional, national, and international sports competitions. The sports that are fostered in the NPC organization are boccia, blind judo, athletics, badminton, chess, shooting, archery, swimming, table tennis, and wheelchair tennis.

Based on the above background, it is necessary to determine the general description of nutritional status, consumption of energy, protein, and fluids in athletes with disabilities in the National Paralympic Committee (NPC) of DKI Province as a basis for preparing a training program for athletes with disabilities towards the Indonesian National Paralympic Games (PEPARNAS).

Method

The population in this study included athletes with disabilities in the National Paralympic Committee (NPC) DKI Jakarta Province. The sample was the entire population of athletes with disabilities in the National Paralympic Committee (NPC) DKI Jakarta Province totaling 90 people from different sports, namely boccia, blind judo, athletics, badminton, chess, shooting, archery, swimming, table tennis, and wheelchair tennis. The anthropometric data measured included height and weight; the tool used in this measurement was a Sojikyo HS 200 digital scale. Meanwhile, data on the fulfillment of nutritional intake (energy, carbohydrates, protein, fat, and fluids) were obtained using a questionnaire via feeding interviews using a 24-h recall questionnaire. The method used in this study was a quantitative approach of tests and measurements. In this study, the data analysis was performed using SPSS 26 software. The data collection procedure used the BMI (Body Mass Index) instrument (BMI = Weight (kg) / Height (m^2)) and anthropometric tests and questionnaires for disabled sports.

Procedure

Body Mass Index data collection procedure:

1. Athletes were barefoot and only wore light clothing (such as t-shirts and shorts).
2. The weighing device was set to zero.
3. The testee stood upright, facing forward, with the body weight evenly distributed in the center of the weighing instrument.
4. For athletes who use wheelchairs, the height measurement was done upon lying down and then measuring with a manual meter from the tip of the head to the end of the lower body.

The data collection procedure used the BMI (Body Mass Index) instrument (BMI = Weight (kg) / Height (m^2)) and anthropometric tests and questionnaires for sports with disabilities. As a guideline, the BMIs are classified based on the classifications of the Ministry of Health of the Republic of Indonesia as follows:

Table 1. Guidelines for BMI Norms

Classifications	BMI
Underweight	< 17.0
Mild thinness	17.0 – 18.4
Normal	18.5 – 25.0
Overweight	25.2 – 27.0
Obese	>27

Results And Discussion

Results

Calculation of nutritional status can be determined directly by BMI. To calculate BMI, data on weight and height are needed. Table 2 describes the weights and heights of the NPC athletes.

Table 2. Descriptive Statistics of Weight and Height

	N	Minimum	Maximum	Mean	Std. Deviation
Weight	90	30	115	59.84	14.769
Height	90	74	180	161.44	12.695
Valid N (listwise)	90				

Based on Table 2, the average body weight for NPC athletes was 59.84 kg, with a minimum weight of 30 kg and a maximum weight of 115 kg. The average height for the athletes was 161.44 cm, with a minimum height of 74 cm and a maximum of 180 cm. Body Mass Index (BMI) is a simple tool for monitoring the nutritional status of adults, especially those related to weight (Supariasa, 2013). It is defined as a person's weight in kilograms divided by height in meters (kg/m^2) (Irianto, 2017). The following is a descriptive table of BMI statistics for the athletes who are members of the DKI Jakarta NPC organization.

Table 3. Descriptive Statistics for BMI

	N	Minimum	Maximum	Mean	Std. Deviation
BMI	90	14.69	54.78	23.0640	5.73340
Valid N (listwise)	90				

Table 3 describes the nutritional status of the athletes in each sport. From Table 3, it is known that the average BMI of the athletes was 23.06 kg/m^2 (normal BMI category). The minimum BMI was 15.69 kg/m^2, and the maximum was 54.78 kg/m^2.

Table 4. Sport Types and BMI Cross Tabulation

Sports	Classifications of BMI				Total
	Normal	Thin	Obesity	Overweight	
Boccia	2	2	0	0	4
Blind Judo	3	0	4	1	8
Athletics	5	2	2	1	10
Badminton	10	4	0	3	17
Chess	4	3	0	0	7
Shooting	0	0	3	0	3
Archery	1	0	2	1	4
Swimming	14	3	1	2	20
Table Tennis	10	0	1	1	12
Wheelchair Tennis	2	1	0	2	5
Total	51	15	13	11	90

As shown in Table 4, most of the athletes had normal nutritional status (51 people / 56.66%). Athlete nutritional status was based on those who were thin (15 people/16.66%), obese (13 people/14.44%) and overweight (11 people/12.22%). Speed, agility, and anthropometric structure are some of the most important characteristics in various sports. Athletes should have a proportional body posture to balance the movement or energy to be expended. Differences in height and weight make individuals have different body postures, which have an important role in their physical abilities. Table 4 provides a description of the consumption of the athletes.

Table 5. Descriptive Statistics Nutritional Intake

	N	Minimum	Maximum	Mean	Std. Deviation
Energy	90	1105.00	3834.10	2.0907E3	571.44959
Protein	90	31.60	127.80	65.2122	18.84513
Fat	90	20.60	202.10	80.6616	37.85455
Carbohydrate	90	109.60	447.60	2.7997E2	70.79325
Fluid	90	1000	8000	2601.11	1315.465
Valid N (listwise)	90				

Table 5 shows that the average energy intake was 2,090 kcal/day with protein at 65.21 g/day, fat at 80.66 g/day, carbohydrates at 279.96 g/day, and fluid at 2600.1 mL/day. Still, some athletes had consumption that was below average, and some were above average. Minimum energy consumption was at 1105 kcal/day, and the maximum was at 3834.1 kcal/day. Protein consumption was a minimum of 31.6 g/day and a maximum of 127.8 g/day. The minimum fat consumption was 20.6 g/day, and the maximum was 202.1 g/day. The minimum consumption of carbohydrates was 109.6 g/day, and the maximum was 447.6 g/day. Fluid consumption was at a minimum of 1000 mL/day and a maximum of 8000 mL/day. Table 6 shows the level of energy adequacy for each sport.

Table 6. Energy Adequacy Cross tabulation of Sports

Sports	Energy Adequacy Cross tabulation					
	good	enough	deficit	excess	less	Total
Boccia	1	0	2	1	0	4
Blind Judo	0	4	4	0	0	8
Athletics	0	1	6	2	1	10
Badminton	2	4	2	8	1	17
Chess	1	2	1	1	2	7
Shooting	0	1	0	1	1	3
Archery	0	0	4	0	0	4
Swimming	2	6	9	0	3	20
Table Tennis	4	3	2	3	0	12
Wheelchair Tennis	1	2	0	2	0	5
Total	11	23	30	18	8	90

Table 6 shows the adequacy number of energy consumed compared to the nutritional adequacy rate for each sport. Most of the energy consumption by athletes compared to adequacy was at a deficit. Some athletes had a level of consumption that was sufficient and good. There are also those whose consumption levels exceeded the recommended levels. Table 6 shows the level of carbohydrate adequacy for each sport.

Table 7. Carbohydrate Adequacy Cross tabulation of Sports

Sports	Carbohydrate Adequacy Cross tabulation					
	good	enough	deficit	excess	less	Total
Boccia	0	2	2	0	0	4
Blind Judo	0	1	6	0	1	8
Athletics	0	2	8	0	0	10
Badminton	1	8	2	3	3	17
Chess	0	2	5	0	0	7
Shooting	0	2	1	0	0	3
Archery	0	0	4	0	0	4
Swimming	0	0	16	1	3	20
Table Tennis	5	3	3	0	1	12
Wheelchair Tennis	1	1	3	0	0	5
Total	7	21	50	4	8	90

Table 7 shows the percentage of carbohydrate consumed compared to the nutritional adequacy rate for each sport. Most of the carbohydrate consumption levels in the athletes compared to adequacy is in a deficit. Some athletes have a level of consumption that is sufficient. There are also those whose consumption levels exceed the recommended levels. Only a few athletes had a good level of consumption. Table 7 shows the level of fat consumtion for each sport.

Table 8. Fat Adequacy Cross tabulation of Sports

Sports	Fat Adequacy Cross tabulation					Total
	good	enough	deficit	excess	less	
Boccia	0	1	0	2	1	4
Blind Judo	1	3	2	2	0	8
Athletics	1	1	3	5	0	10
Badminton	0	4	3	10	0	17
Chess	2	0	1	4	0	7
Shooting	1	0	0	2	0	3
Archery	0	1	3	0	0	4
Swimming	2	8	8	2	0	20
Table Tennis	1	1	3	7	0	12
Wheelchair Tennis	1	0	0	4	0	5
Total	9	19	23	38	1	90

Table 8 shows the percent adequacy of fat consumed compared to the nutritional adequacy for each sport. Most of the fat consumption in athletes compared to the adequacy was in excess. Most of the energy contributors in the athletes can be assumed to be from fat, not the main energy-producing nutrient of carbohydrates. Table 8 shows the level of protein adequacy for each sport.

Table 9. Adequacy of Protein Cross Tabulation of Sports

Sports	Adequacy Protein Cross Tabulation					Total
	Good	Enough	Deficit	Excess	Less	
Boccia	0	2	0	2	0	4
Blind Judo	0	4	2	1	1	8
Athletics	1	2	1	4	2	10
Badminton	2	7	1	7	0	17
Chess	3	0	1	2	1	7
Shooting						
Archery	0	1	0	2	0	3
Swimming	0	0	3	1	0	4
Table Tennis	1	8	1	3	7	20
Wheelchair Tennis	4	3	1	3	1	12
Boccia	1	0	0	4	0	5
Total	12	27	10	29	12	90

Table 9 shows the percent adequacy of protein consumed for each sport. Most of the protein consumption in athletes compared to the adequacy was in excess, and for some athletes, level of consumption was sufficient. There were also some whose consumption levels were in deficit, but only slightly.

Discussions

The nutritional status of athletes with disabilities in DKI Jakarta can affect their maximum performance. Because healthy athletes can create outstanding athletes in the future, healthy athletes are needed; this is because balanced and healthy nutrition has a role that should be considered as one way to prevent fatigue that may occur due to insufficient energy nutrients required by the athlete.

Nutritional status indicates excellent or inadequate daily food supply. Good nutritional status is needed to maintain fitness and health, help children's growth, and support the development of athletes' achievements (Irianto, 2007). The results of this study indicate that 14.44% were obese and 12.22% were overweight. Direct factors that primarily influence nutritional status are the level of consumption of fat, protein, and carbohydrates and genetics.

Meanwhile, indirect factors that influence nutritional status through consumption levels consist of individual factors, economic factors, and diet. Individual factors include a negative body image, namely judging oneself as unattractive. Good nutritional retention encourages the behavior of limiting fat, protein and carbohydrate intake (Febriani, 2018). Penggalih (2019) researched disabled swimmers and showed that 12.5% of the athletes were obese.

The results of this study are in accordance with Berning (2000), who said that to sustain life, the consumption of macronutrients is crucial to provide energy. The energy requirements may differ depending on individual factors, such as the activity being performed or body composition; however, the average daily caloric requirement is approximately 2000 kcal for adult women and 3000 kcal for adult males.

According to Buell (2016), the timing of carbohydrate intake around exercise is quite standard. For many athletes, carbohydrate or glycogen loading (consuming a high-carbohydrate diet) for a few days prior to a big event is a popular fueling strategy. In addition, if the athlete wishes to top off the glycogen stores in the muscle prior to exercise, a small carbohydrate-rich snack or drink may help accomplish the extra muscle fuel. It is important to remember that fluids or foods high in calories in the stomach will slow gastric emptying.

The science of nutrition remains a complex topic, and it is continually evolving and sometimes contradictory. Although there have been significant advances in understanding nutritional requirements for endurance athletes, many gaps still exist in the literature. Health professionals need to have current knowledge and skills in nutrition. The knowledge and skills have to be acquired in continuing medical education programs and undergraduate medical education (Kulakova et al., 2016), (Vitale & Getzin, 2019).

According to the research results of Tiwari & Virginia (2018), "Based on the present investigation, it is concluded that the nutrient intakes of female sportspersons, such as energy, protein, carbohydrate, fat, iron, and calcium, were lesser than RDA. The average intakes of male sportspeople were better than females. The intake of nutrients, such as fat, carbohydrates, iron, and calcium, was higher in males, according to RDA.

Specifically, regarding nutrition, giving the proper food intake, both in quality and quantity, can produce optimal physical conditions and provide sufficient energy for athletes during their activities (Rusli L et al., 2000). Within sports development, various sciences support achievements, such as psychology, anatomy, physiology, education, sports health, nutrition and others. However, there are still mistakes in the nutritional management of athletes, which is one of the weaknesses of sports development in different regions. Very few regions have nutritionists who can provide dietary guidelines to support athlete performance before, during, and after a match (Alit Arsani, 2014).

Mielgo-Ayuso et al. (2015) mentioned that continuous physical exercise leads the athlete to maintain a precarious balance between dietary intake, energy expenditure, and the additional demands of a high amount of physical activity. Thus, an accurate assessment of nutritional status is essential to optimize the performance because it affects health, body composition, and the athlete's recovery. Specific aspects must be considered, such as the type of sport, specialty or playing position, training schedule and competition calendar, category, and specific objectives, which differ from those of the general population.

With good nutrition, sufficient energy will be available for physical performance that is beneficial for health, fitness, growth during childhood, and fostering sports achievement. Knowledge of nutrition is crucial for a nutritionist and the wider community, including athletes (Driskell & Wolinsky, 2016), (Figueroa Pedraza, 2004). Therefore, understanding the relationship between nutrition, lifestyle, self-image, and physical performance will be able to help the growth process of children, coaches, and community sports athletes to be able to help achieve health and fitness and sports achievements. Everyone needs different amounts of food, depending on age, weight, gender, physical activity, environmental conditions, and specific circumstances.

Larson-Meyer et al. (2018) also said that nutrition assessment is a necessary first step in advising athletes on dietary strategies that include dietary supplementation and evaluating the effectiveness of supplementation regimens. Although the dietary assessment is the cornerstone component of the nutrition assessment process, it should be performed within a complete assessment that includes the collection/ evaluation of anthropometric, biochemical, clinical, and environmental data. Balanced nutrition is food consumed by an athlete daily that is diverse and fulfills five groups of nutrients in sufficient quantities that are not excessive and not deficient (PERMENKES RI, 2014). A balanced menu includes a variety of foods that meet nutritional needs following the General Guidelines for Balanced Nutrition (Kemenkes RI, 2020). The average energy intake and nutrients were obtained from interviews with research subjects using a semi-FFQ (Food Frequency Questionnaire) questionnaire 30 days prior (30 days past).

Baranauskas et al. (2015) mentioned that for athletes, the primary purpose of nutrition is to ensure the compensation of increased energy consumption and the need for nutrients in the athlete's body, thereby enabling maximum adaptation to physical loads. That study aimed to determine the habits of highly trained endurance athletes depending on sports type, sex, and age to improve the planning and management of the training of athletes using targeted measures.

Other foods can fulfill nutrient deficiencies from one food by providing a balanced menu. For this reason, providing a balanced menu with a variety of foods is needed to meet nutritional adequacy. According to a prior study (Netty Thamaria, 2017), the classifications of the level of consumption of nutrients (energy, carbohydrates,

protein, fat) based on the RDA are divided into five groups, namely deficit (<70% RDA), less (70–80% RDA), sufficient (80–100% RDA), good (100–110% RDA), and more (>110% RDA). Khodabakhshi–Koolaee & Flasafinejad (2018) stated that the role in promoting appropriate decisions on the health of individuals and health literacy could affect quality of life. That study determined the correlation between health literacy and quality of life in athletic disabled women in Tehran.

Furthermore, based on our results above and the results of previous research and the theory of the function of nutrition for athletes with disabilities in DKI Jakarta, to determine the fitness and health of athletes with disabilities in DKI Jakarta can be achieved via tests of the nutritional status of athletes on a regular and ongoing basis.

Conclusions

In this study, we showed that the nutritional status of athletes is based on BMI. The athletes were underweight (13 people), obese (13 people), and overweight (11 people). Based on the table number 4, most athletes had normal nutritional status (51 people). Athletes were thin (13 people), obese (13 people), and overweight (11 people). The level of adequacy of energy intake in the athletes was compared to the sport type. The adequacy of carbohydrate intake in the athletes compared to the nutritional needs of most were deficient. The adequacy of fat intake in the athletes compared to nutritional needs was primarily excessive. The adequacy of protein intake in the athletes compared to nutritional needs was excessive. Fluid intake in the athletes was at least 1000 mL/day and a maximum of 8000 mL/day. Most athletes had normal nutritional status (51 people). Nutritional status and adequacy of nutrition of disability athlete are need to be improved. To achieve the expected results overall, it is necessary to provide education and nutrition counselling and assistance to change athletes' eating habits or consumption patterns to suit their adequacy. Good nutritional intake will also help repair or replace damaged body cells. The right food choices will help optimize energy and help athletes recover after competing. There is a need for further research to measure the nutritional status of athletes in more detail.

Acknowledgement

We would like to thank the DKI Jakarta youth and sports department, Faculty of Sports Science, State University of Jakarta and Falcon Scientific Editing (https://falconediting.com) for proofreading the English language in this paper.

References

Alit Arsani, N. L. K. (2014). Manajemen Gizi Atlet Cabang Olahraga Unggulan Di Kabupaten Buleleng. *JST (Jurnal Sains Dan Teknologi)*, *3*(1), 275–287. https://doi.org/10.23887/jst-undiksha.v3i1.2906

Baranauskas, M., Stukas, R., Tubelis, L., Žagminas, K., Šurkiene, G., Švedas, E., Giedraitis, V. R., Dobrovolskij, V., & Abaravičius, J. A. (2015). Nutritional habits among high-performance endurance athletes. *Medicina (Lithuania)*, *51*(6), 351–362. https://doi.org/10.1016/j.medici.2015.11.004

Berning, J. (2000). *The Training Table*. https://doi.org/10.1201/9781420036916.pt3

Broad, E. (2014). Sports nutrition for paralympic athletes. In *Sports Nutrition for Paralympic Athletes*. https://doi.org/10.1201/b16375

Buell, J. (2016). Endurance Sports Medicine. *Endurance Sports Medicine*. https://doi.org/10.1007/978-3-319-32982-6

Collins, A. L., Hunking, P. J., & Stear, S. J. (2011). Nutrient Basics. *Sport and Exercise Nutrition*, 1–15. https://doi.org/10.1002/9781444344905.ch1

Disability and health 1. (2021). *December 2020*, 1–5.

Driskell, J. A., & Wolinsky, I. (2016). Nutritional Assessment of Athletes: Second Edition. In *Nutritional Assessment of Athletes: Second Edition*.

Figueroa Pedraza, D. (2004). Nutritional status as a factor and a result of nutritional and food security and their representations in Brazil. *Revista de Salud Pública (Bogotá, Colombia)*.

Fitzgerald, H. (2008). Disability and youth sport. In *Disability and Youth Sport*. https://doi.org/10.4324/9780203889732

Gardašević, N. *et al.* (2021) 'Nutritional status and gender differences of adolescent students', *Journal of Physical Education and Sport*, 21(3), pp. 1354–1360. doi: 10.7752/jpes.2021.03172.

Guimaraes-Ferreira, Rossi, F. E., Landreth, A., Beam, S., Jones, T., Norton, L., & Cholewa, J. M. (2017). The Effects of a Sports Nutrition Education Intervention on Nutritional Status, Sport Nutrition Knowledge, Body Composition, and Performance during Off Season Training in NCAA Division I Baseball Players. *Journal of Sports Science and Medicine*, *16*(March), 60–68. http://www.jssm.org

Hasan, M. F., Bahri, S. and Adnyana, I. K. (2021) 'Identification of nutritional status and body composition in weightlifting athlete', *Journal of Physical Education and Sport*, 21(4), pp. 2308–2312. doi: 10.7752/jpes.2021.s4294.

Khodabakhshi-koolaee, A., & Flasafinejad, M. R. (2018). *Correlation of Health Literacy with Quality of Life in Athletic Disabled Women*. *5*(19), 31–37. https://doi.org/10.21859/jech.5.3.31

Kolotouchkina, O., Llorente-Barroso, C., García-Guardia, M. L., & Pavón, J. (2021). Disability, sport, and television: Media visibility and representation of paralympic games in news programs. *Sustainability (Switzerland)*, *13*(1), 1–13. https://doi.org/10.3390/su13010256

Kulakova, E. N., Nastausheva, T. L., & Usacheva, E. A. (2016). Healthy eating: Implementation of a practice-oriented training program. *Voprosy Pitaniia*.

Larson-Meyer, D. E., Woolf, K., & Burke, L. (2018). Assessment of nutrient status in athletes and the need for supplementation. *International Journal of Sport Nutrition and Exercise Metabolism*, *28*(2), 139–158. https://doi.org/10.1123/ijsnem.2017-0338

Mielgo-Ayuso, J., Maroto-Sánchez, B., Luzardo-Socorro, R., Palacios, G., Palacios Gil-Antuñano, N., & González-Gross, M. (2015). Evaluation of nutritional status and energy expenditure in athletes. *Nutricion Hospitalaria*, *31*, 227–236. https://doi.org/10.3305/nh.2015.31.sup3.8770

Miškulin, M., Dumić, A., Špiranović, Ž., Šašvari, A., Miškulin, I., Bilić-Kirin, V., & Pavlović, N. (2019). the General Nutrition Knowledge of Professional Athletes. *The General Nutrition Knowledge of Professional Athletes*, *8*(1), 25–32.

Netty Thamaria. (2017). *Penilaian Status GizI*. KEMENKES RI.

Oded Bar-Or. (2000). Nutrition for Child and Adolescent athletes. *Sports Science Exchange*, *13*(2), 77.

Nobre, G. C., Valentini, N. C. and Nobre, F. S. S. (2018) 'Motor and school performance, self-perception of competence and nutritional status of children across ages: The role of social vulnerability on child development', *Journal of Physical Education and Sport*, 18(3), pp. 1478–1487. doi: 10.7752/jpes.2018.03218.

Penggalih, M. H. S. T., Dewinta, M. C., Solichah, K. M., Pratiwi, D., Niamilah, I., Nadila, A. & Asyulia, R. (2019). Anthropometric characteristics and dietery intake of swimming athletes with disabilities before the competition. *Jurnal Gizi dan Dietetik Indonesia (Indonesian Journal of Nutrition and Dietetics)*, *6*(1), 33

PERMENKES RI. (2014). *Pedoman Gizi Seimbang*. 1–96.

Rothschild, J. A., Kilding, A. E., & Plews, D. J. (2020). What should i eat before exercise? Pre-exercise nutrition and the response to endurance exercise: Current prospective and future directions. *Nutrients*, *12*(11), 1–23. https://doi.org/10.3390/nu12113473

Santiago, M. C., & Coyle, C. P. (2004). Leisure-time physical activity and secondary conditions in women with physical disabilities. *Disability and Rehabilitation*, *26*(8), 485–494. https://doi.org/10.1080/09638280410001663139

Thomas, N., & Smith, A. (2008). Disability, sport and society: An introduction. In *Disability, Sport and Society: An Introduction*. https://doi.org/10.4324/9780203099360

Tiwari, S., & Virginia, P. (2018). Assessment of nutritional status of sports persons in Allahabad District. *Interntational Journal of Food Science and Nutrition*, *3*(1), 161–164.

Vitale, K., & Getzin, A. (2019). Nutrition and supplement update for the endurance athlete: Review and recommendations. In *Nutrients*. https://doi.org/10.3390/nu11061289

World Health Organization (WHO). (2015). *Er Health for All Better People Health With for Disability All People With Disability*. 1–32.