# Nutritional Status and Growth of Height and Weight Youth Athletic Athletes in Jakarta

Mansur Jauhari[1], Abdul Sukur[1], Uzizatun Maslikkah[1], Heni Widyaningisih[1], Eva Julianti[1], Ika Novitaria Marani[1,] Ari Subarkah[1,] Linda Dwi Jayanti[2]

[1] Universitas Negeri Jakarta, Jalan Pemuda No 10 Rawamangun Jakarta Timur 13220 Indonesia
[2] Badan Kependudukan dan Keluarga Berencana Nasional (BKKBN) Jalan Permata No 1 Halim Perdanakusuma Jakarta Timur 13650 Indonesia
`mansurjauhari@unj.ac.id`

**Abstract**. Nutritional status and growth in young athletes are important for building the ideal physical condition of athletes from an early age. This study aims to identify the nutritional status and growth of youth athletic athletes in Jakarta. The study was conducted on 20 youth track and field athletes. Determination of nutritional status based on Body Mass Index (BMI)/Age and Height/Age. The BMI/Age value for all male athletes was 83.33% in the normal category, 8.33% included in the overweight category, and 8.33% included in the thin category, while the Height/Age value for male athletes was 100% included in normal category. BMI/Age and Height/Age values for all female athletes are in the normal category. The average of male athletes's weight growth for 1 year was 4.61 kg and the average male athletes's height growth for 1 year was 7.01 cm. While the average growth of female athlete height for 1 year is 5.87 kg and height growth is 6.85 cm

**Keywords:** Young Athletes, Nutritional Status, Growth.

## 1.    Introduction

Adolescence is a period of significant physical development, in which there are changes in body composition, metabolic and hormonal fluctuations, as well as the maturation of organ systems, all of which affect future health [9]. Involvement in sports plays an important role in supporting psychological well-being and developing a healthy self-image for most adolescents [3]. During adolescence there is rapid physical growth and development. The role of nutrition is very important to support this phase, because adolescent athletes carry out a series of exercises and competitions that require greater nutrition when compared to other youth who are not athletes. If nutritional needs are not met, it can result in the disruption of the physical growth of the adolescent.

The athletics branch is one of the sports that has many race numbers including running, throwing, jumping, and fast walking. In Indonesia, athletics is a sport that has produced many medals in various competitions. The development of athletic athletes

in relation to nutrition is carried out from an early age starting from monitoring nutritional status, body composition, to planting a balanced nutritional diet according to needs, this is a long-term investment in supporting athlete performance in the future. This study aims to determine the nutritional status and growth of adolescent athletic athletes in Jakarta.

## 2. Method

### 2.1 Study Design

This research is a non-experimental research using descriptive method with a quantitative approach. Processing, analysis, and presentation of data obtained from quantitative measurements is carried out descriptively

### 2.2 Research Participants

This research consisted of 20 youth athletics athletes in DKI Jakarta, consisting of 12 male athletes and 8 female athletes, with an age range of 11-14 years and an average age of 12.75 years. Subjects are DKI Jakarta youth athletic athletes who are members of the DKI Jakarta Sustainable Achievement Sports Development (POPB).

### 2.3 Data Collection and Instrumentation

Data collection was carried out in two periods, namely November 2021 and November 2022 at the Jakarta State University Sports Hall. Anthropometric measurements of nutritional status, in this study, the athletes' height and weight were measured. Height and weight data are used to calculate body mass index (BMI). BMI for age (BMI/A) and height for age (TB/A) are used as indicators for assessing the nutritional status of athletes because the athletes involved are under 19 years old. The indicators for BMI/A and Height/Age are calculated by involving the components of body weight and height, expressed based on the Z-score using the WHO Anthro Plus application. Nutritional status categories based on BMI/Age and Height/Age are shown in Table 1.

**Table 1.** Nutritional status based on BMI/A and TB/A

| Nutritional status (BMI/U) | Z-Scores |
|---|---|
| Very thin | $Z < -3$ SD |
| Thin | $-3$ SD $\leq Z < -2$ SD |
| Normal | $-2$ SD $\leq Z \leq +1$ SD |
| Fat | $+1$ SD $< Z \leq +2$ SD |
| Obesity | $Z > +2$SD |

| Nutritional Status (TB/A) | z-Scores |
|---|---|
| Very short | $Z < -3$ SD |
| Short | $-3$ SD $\leq Z < -2$ SD |
| Normal | $-2$ SD $\leq Z \leq +2$ SD |
| Tall | $Z > 2$ SD |

## 2.4    Statistical Analysis

Descriptive statistical analysis was carried out to determine the average value of each measurement variable. The results of data analysis are presented in the form of an average with a standard deviation (SD).

## 3.    Result

Anthropometric aspects of the nutritional status assessment measured are body weight and height to obtain data on BMI, BMI/age, and height/age. Nutritional status data is shown in Table 2. The results of measuring the value of BMI/age for all male athletes showed that 83.33% of the nutritional status of male athletes was in the normal category, 8.33% was in the overweight category, and 8.33% were in the overweight category. 33% are in the thin category, while the BMI/age value for all female athletes is normal (100%). The results of measurements of height/age, both male and female athletes were in the normal category. The average growth data is shown in Table 2, the average body weight (BB) growth for male athletes for 1 year is 4.61 kg and the average height (TB) for male athletes is 7.01 cm. Meanwhile, the average height growth for female athletes for 1 year was 5.87 kg and the average height growth for female athletes was 6.85 cm.

**Table 2.** Nutritional Status of Adolescent Athletic Athletes

| Nutritional status | BMI/U | | | | | | TB/U | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Normal | % | Overweight | % | lean | % | Normal | % | Short | % |
| Man | 10 | 83,33 | 1 | 8.33 | 1 | 8.33 | 12 | 100 | 0 | 0 |
| Woman | 8 | 100 | 0 | 0 | 0 | 0 | 8 | 100 | 0 | 0 |

**Table 3.** Average Height and Weight Growth for Adolescent Athletic Athletes

|  | Height(cm) | | | Weight (kg) | | |
|---|---|---|---|---|---|---|
|  | Period 1 | Period 2 | Growth | Period 1 | Period 2 | Growth |
| Man | 154.34±9.50 | 161.35±8.57 | 7.01 ±2.90 | 42.38±8.25 | 47±8.41 | 4.61±2.25 |
| Woman | 146.43±6.58 | 153.28±4.91 | 6.85 ±3.84 | 35.43 ±4.25 | 41.31±4.11 | 5.87±2.18 |

## 4.     Discussions

To be able to ensure optimal growth and development of young athletes, nutritional status assessment needs to be done. According to Anwar and Riyadi [1], nutritional status is the state of health of a person or group of people caused by consumption, absorption, and use (utilization) of food nutrients. During adolescence, height growth increases rapidly, during puberty the height can reach 20% of the adult height and the body weight can reach 50% of the adult body weight [8]. In this study, during 1 year there was an average increase in body weight of 4.61 kg in male athletes and 5.87 kg in female athletes. For height, there was a greater increase in men, namely 7.01 cm per year. In adolescent boys there is a lot of muscle and bone growth, the height increase of teenage boys is higher than the teenage girls [7]

The increase in height is fluctuating, namely the increase in height during infancy takes place quickly, then slows down and rapidly returns in adolescence. The achievement of late adult height is influenced by the speed of growth during adolescence [11]. The speed of growth in height (height velocity) will accelerate (growth spurt) during puberty and lasts about two years, will reach a peak height velocity (PHV), then in about three years it will decrease and will continues to grow until the epiphyses close and growth in height stops [12].

During puberty, growth hormone is released in large quantities and is related to the growth spurt process. Growth hormone secretion increases up to five times during sleep at night about one hour after deep sleep begins, compared to when waking up [10]. Growth hormone (Growth Hormone/GH) functions as a simulator for growth and cell division in every part of the body and cartilage, as well as increasing the growth of skeletal structures [5]. Growth hormone secretion is also influenced by physical activity or exercise [10]. Physical activity or sport plays an important role in the physical health of children and adolescents such as increasing lean body mass, muscle and bone strength.

In this study, the assessment of the nutritional status of adolescent athletic athletes was carried out based on the height-for-age index (TB/A) and body mass index for age (BMI/A). The height/age indicator provides an indication of the presence or absence of chronic nutritional problems as a result of long-lasting conditions, while the BMI/age indicator provides indications of the presence or absence of acute nutritional problems [2]. In this study there were still male athletes who were obese (8.33%) or overweight, this condition requires attention so that athletes can lose weight in order to achieve ideal body weight and there are athletes with thin nutritional status (8.33 %) which also requires attention in order to gain weight in order to achieve normal weight. Athletes who have normal nutritional status in order to maintain it in order to

achieve optimal growth and development into adulthood so that their performance will be good. Fulfillment of nutritional needs in adolescence needs to be considered because there is an increase in nutritional needs to support physical and psychological growth and development. Changes in lifestyle and eating habits in adolescents affect the need for and intake of nutrients. Teenagers as athletes pay more attention to the intake of nutrients to support their activities. Changes in lifestyle and eating habits in adolescents affect the need for and intake of nutrients. Teenagers as athletes pay more attention to the intake of nutrients to support their activities. Changes in lifestyle and eating habits in adolescents affect the need for and intake of nutrients. Teenagers as athletes pay more attention to the intake of nutrients to support their activities. Adolescent girls generally begin a growth spurt and reach peak height 2 years earlier than boys, for girls it occurs around the age of 12 while for boys it occurs around 14 years for boys [4].

## 5.    Conclusion

The nutritional status of male athletes based on BMI is 83.33% normal, 8.33% overweight and 8.33% thin, while nutritional status based on a 100% normal body. The nutritional status of female athletes based on BMI and the entire height is normal. The average weight growth of male athletes is 4.61kg/ year and height of 7.01 cm/ year. While the average growth of female athlete height is 5.87 kg / year and height growth is 6.85 cm / year

## References

[1] Anwar F & Riyadi H.. Nutritional status and health status of the Baduy tribe. Journal of Nutrition and Food, 4(2), 72—82. (2009)
[2] Burke L, Cox G. The complete guide to food for sport performance peak nutrition for your sport. 3rd ed. Crown Nest Australia: Allen & Unwin; p. 303.(2010)
[3] Ekeland E, Heian F, Hagen KB. Can exercise improve self-esteem in children and young people? A systematic review of randomized controlled trials. Br J Sports Med..39(11):792–8. https://doi. org/10.1136/bjsm.2004.017707. (2005)
[4] Grgic O, Shevroja E, Dhamo B, Uitterlinden AG, Wolvius EB, Rivadeneira F, et al. Skeletal maturation in relation to ethnicity S10 B. Desbrow background in children of school age: the Generation R Study. bones;132:115180.https:// doi.org/10.1016/j.bone.2019. 115180. (2020)
[5] Guyton, Arthur C, Hall, John E. Textbook of Medical Physiology. 11th ed. Jakarta: EGC Medical Book Publisher; pp. 968-976. (2007)
[6] Karlberg J. On the construction of the infancy-childhood puberty growth standard. Acta Paediatr Scand Suppl.;356:26–37. 21. (1989)
[7] Kathleen, L.M & Escott-Stump, S. Krause's Food. Nutrition & therapy. Philadelpia : Saundres Company. (2004)

[8]  Rogol AD, Clark AP, Roemmich JN. Growth and pubertal development in children and adolescents: effects of diet and physical activity. Am J Clin Nutr. 72(2 Suppl):521S8S. (2000)

[9]  Sawyer SM, Aff RA, Bearinger LH, Blakemore SJ, Dick B, Ezeh AC, et al. Adolescence: a foundation for future health. Lancet ;379(9826):1630–40. https://doi.org/10.1016/ S0140-6736(12)60072-5. (2012)

[10] Sherwood L. Human Physiology from Cells to Systems. 6th. ed. Jakarta: EGC Medical Book Publisher;  pp. 740-746. (2011)

[11] Soetjiningsih. Child Development. Jakarta : EGC Medical Book Publisher. pp 2-15. (2015)

[12] Soetjiningsih. Somatic Growth in Adolescents. Jakarta: Sagung Seto;  pp 1-16. (2010)

[13] Susetyowati, 2017 Gizi Remaja, Ilmu Gizi Teori dan Aplikasi. Penerbit Buku Kedoteran EGC. Jakarta