Evaluation Of Anthropometric Measurements For Physical Development Of Early Age Futsal Players: A Case Study Of Kuantanamo Futsal Academy

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Abstract

Sports science is one of the fields of sports science that can help sports develop and coach each athlete. Phenomena and problems that occur during the training process in the field can be solved by applying sports science based on data obtained scientifically; this data record assists coaches in determining and providing the proper method for their athletes. One way to use sports science in the field is by measuring the anthropometry of Kuantanamo Futsal Academy students. This study aimed to determine and examine anthropometric measurements in Kuantanamo Futsal Academy students aged 7-10 years. This study uses a quantitative method. This type of research is observational and test. To collect data on student anthropometric measurements that are to be known include a) height, b) weight, c) skin fat, and d) BMI. The subjects in this study were Kuantanamo futsal academy students aged 7-10 years, totaling 20 students. The anthropometric measurements of Kuantanamo Futsal Academy students obtained the following average: height 145.8, weight 41.24, skin fat 14.85, categorized as underfoot (mild level), BMI 19.3, classified as ideal. This can be a reference for coaches to determine what programs should be carried out so that students get treatment appropriate to their body condition.

Keywords: Measurement; Anthropometry; Futsal.

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A. Introduction

The sports development system cannot be implemented instantly or in a short period. Implementing sports coaching requires commitment and totality to get good results; a sound coaching process is expected to get good results or achievements. Sports achievements are visible and measurable, showing that sports coaching is carried out scientifically and that an approach is structured and recorded, starting from talent scouting, the coaching process, and the results obtained (Firdaus, 2011). Sports coaching does not only involve regional and central parent organizations; sports coaching must involve communities or associations of people involved in sports coaching and, of course, must be supported by tiered and sustainable competitions with a good and correct ecosystem. In addition, there is also a need for the sports science discipline to be the leading formulation in early childhood coaching to maintain the quality and coaching process in Indonesia. Sports science is one of the fields of sports science that can help sports develop and coach each athlete. Sports science can be interpreted in many different ways.

On the one hand, it can be the collection and transmission of scientific findings to coaches and athletes. On the other hand, it can be an athlete evaluation in the laboratory intended to provide coaches with a broad view of the current status and progress of athletes toward training targets (Lucia et al., 2006). Phenomena and problems that occur during the training process in the field can be solved by applying sports science based on scientifically obtained data; these data records assist coaches in determining and providing the proper method for their athletes. One way to use sports science in the field is by measuring the anthropometry of Kuantanamo Futsal Academy students.

The researcher intends to measure the anthropometric characteristics of students at the Kuantanamo Futsal Academy; anthropometric characteristics include height, weight, skin fat, and BMI. Anthropometry is a technique for measuring the physical characteristics (body size, shape of particular body parts, and proportions) of living things, including humans. Anthropometry has been widely applied in various disciplines, such as ergonomics and health sciences (Kagawa, 2017). Anthropometry has also been used to understand athletes' physical characteristics in sports science, which aims to improve athlete performance (Ray & Peter, 2010). Futsal games, identical to fast and dynamic games, require players to have physical abilities related to body

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weight and height. However, it is not the only factor that determines players' physical abilities; the advantages of physical skills also play a role in futsal matches. The player's physical condition must also be consistent with the body structure because a player will have difficulty competing with other players without the support of an ideal and good body structure size.

Based on observations and interviews with the coaching team at the Kuantanamo Futsal Academy, it was found that anthropometric tests and measurements had never been carried out on Kuantanamo Futsal Academy students. The ideal composition of futsal players must be considered from an early age to positively impact the child's growth and development process, which is expected to maintain the talents of these players properly and correctly. The ideal body composition of a player will impact the player's performance on the field; not only that, but the child's psychomotor development will also contribute to the development (Eristikamaya & Irsyada, 2019). Based on the background of the problems that have been described, a solution is needed through research entitled "Evaluation of Anthropometric Measurements for Physical Development of Early Age Futsal

Players: A Case Study of Kuantanamo Futsal Academy" The purpose of this study was to determine and examine anthropometric measurements in Kuantanamo futsal academy students aged 7-10.

B. Methods

This study uses quantitative methods. This type of research is observational and tests; this study aims for an answer or solution to the problems. The object of this study is the anthropometric measurement of Kuantanamo Futsal Academy students. The study subjects were 20 Kuantanamo futsal academy students aged 7-10 years. Research data was obtained through tests and measurements on each variable. The tests that will be used to see the results of anthropometric measurements on Kuantanamo Futsal Academy students consist of (1) Height test, (2) Weight test, (3) Skin fat test, and (4) BMI test. The data analysis technique used in this study is quantitative descriptive; the researcher will analyze the quantitative research data first, then describe the results and produce qualitative data. After the raw data from each anthropometric component is obtained, it is converted to the assessment norms of each test. The next step is converting raw data from each test

component into a T-Score value. According to (Arikunto, 2006), the T-Score formula is as follows:

$$T - score = 50 + \left(\frac{X - M}{SD}\right) 10$$

Description:

T = T-Score Value

M = Average value of raw data

X = value of raw data

SD = Standard Deviation

BMI Measurement Test

BMI measurement determines body composition by height (TB) and weight (BB). There are five categories in this case, namely thin/underweight, average/ideal, overweight/lightweight, fat, and very fat. In calculating BMI, the following formula can be used:

$$\text{Body Mass Index} = \frac{\text{Weight (kg)}}{\text{Height (m)}^2}$$

Table 2. BMI Measurement Test Norm

No.	BMI Value	Category
1	< 18,4	Underweight
2	18,5-24,9	Normal Weight
3	25-29,9	Overweight
4	30-39,9	Obesity (Class I & II)
5	> 40	Obesity (Class III)

Source: (Fukuda, 2019)

Skinfold Measurement Test

Measurements to determine the level of body fat thickness are intended to estimate and monitor growth, development, maturity, and changes in body composition. The thickness and concentration of fat deposits also affect freedom of movement. The procedure for carrying out the test is as follows: (a) The skin at the measured location is pinched with the left hand so that only the skin fold and Fat are squeezed, without including the muscle layer underneath; (2) The right hand holds the skinfold caliper to pinch the skin layer pinched with the left hand. With the skin layer and subcutaneous Fat pinched, the scale on the skinfold caliper can read how many millimeters thick the fat is; (3) All measurements are taken on the right side of the body and should be taken before the athlete engages in physical activity. The tools used are skinfold calipers.

Table 3. Skinfold Measurement Test Norms

No.	Category	Norm (mm)
1	Fat Deficiency (severe degree)	<11.3
2	Fat Deficiency (mild degree)	11.3-29.8 18
3	Normal	29.9-48.4 4
4	Excess Fat (mild degree)	48.5-67.1 0
5	Excess Fat (severe degree)	>67.1

Source: (Apriyanto & Syafi'i, 2020)

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C. Results and Discussion

Result

1) Results of Weight, Height, and BMI Measurement Tests

Anthropometric measurements of students at Kuantanamo Futsal Academy were conducted to determine their physical characteristics, primarily related to weight, height, and body mass index (BMI). This data is essential to evaluate whether students have a body composition by the ideal category for ages 7-10 years. The results of weight and height measurements are used to calculate BMI, which is then classified into several categories, namely underweight, ideal, overweight, obese, and very obese. This classification provides an overview of the nutritional status of students. It can be used as a reference in designing an exercise program based on their physical condition. The results of these measurements are presented in Table 4 below.

Table 4. Percentage of Weight, Height, and BMI Measurement Test

Category	Frequency	Percentage
Underweight	10	50%
Normal Weight	7	35%
Overweight	3	15%
Obesity (Class I & II)	-	-
Obesity (Class III)	-	-

Based on Table 4's presentation, 10 students are in the underweight category with a 50 percent percentage, 7 students are in the ideal category with a 35 percent percentage, and 3 students are in the overweight category with a 15 percent percentage.

2) Skin Fat Measurement Test Results

Skin fat measurement aims to determine the distribution and thickness of subcutaneous Fat in Kuantanamo Futsal Academy students. This data is critical in evaluating body composition that affects physical performance, especially in futsal sports that require speed and agility. Measurements are carried out using skinfold calipers on several body parts, such as the triceps, biceps, and abdomen. The category of skin fat thickness, ranging from severe fat deficiency to severe fat excess, provides a more detailed picture of the student's body condition. The results of these measurements are the basis for coaches to adjust training programs and diets that support students' physical development. The percentage of students' skin fat measurement results is presented in Table 5 below.

Table 5. Percentage of Skin Fat Measurement Test Results

Category	Frequency	Percentage
Fat Deficiency (severe degree)	13	65%
Fat Deficiency (mild degree)	6	30%
Normal	-	-
Excess Fat (mild degree)	1	5%
Excess Fat (severe degree)	-	-

Based on the presentation of Table 5, students with the category of underweight (severe level) numbered 13 people with a percentage of 65 percent, students with the category of underweight (mild level) numbered 6 people with a percentage of 30 percent, students with the category of overweight (mild level) numbered 1 person with a percentage of 5 percent.

Discussion

Based on the results of the BMI study conducted with 20 Kuantanamo Futsal Academy students, the results obtained were 10 students in the underweight category, 7 students in the ideal category, and 3 students in the overweight category. This can undoubtedly be used as a measuring tool to determine and assess the body mass index of Kuantanamo Futsal Academy students. (Bhattacharya et al., 2019) BMI measurements can show nutritional status related to body weight and height. BMI measurement is part of anthropometry, which is associated with the structure of an individual's body, which is essential in supporting achievement.

According to (Tangkudung et al., 2020), BMI contributes to physical condition, especially in terms of strength, because it makes it easier for students to move when running, so they are faster. Having an ideal BMI certainly benefits futsal students; this is also in line with research conducted (Bryantara, 2017) hat there is a relationship between physical condition and BMI. A similar thing was also expressed (Pradana & Bulqini, 2018) Players with a normal BMI will have an ideal body that will make it easier to carry out activities and widen their movement abilities. BMI status is a balance between the body's need for nutrients and the intake of food that enters the body for its metabolism. Nutritional intake will increase BMI, which is suitable for students because it impacts their physical condition and fitness.

The skinfold test of Kuantanamo Futsal Academy students showed an average of 14.85 mm, categorized as a mild fat deficiency. Body weight describes the amount of protein, Fat, water, and minerals. Fat significantly affects body

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weight, which is a part of body anthropometry and is very easy to change. According to (Toruan, 2017) , excess fat levels will have a terrible impact on the physical abilities of futsal players, especially the physical components of speed and agility. Measuring fat thickness is a specific way to determine body condition, more dominantly containing muscle or fat (Setiawan & Mulasiwi, 2021). This measurement is carried out on body parts containing a lot of Fat, including triceps, biceps, subscapular, abdominal, front thigh, and medial calf (Apriyanto & Syafi'i, 2020). Special training and diet regulation need to be provided for students with excess fat levels to maintain fat levels and support the physical abilities of Kuantanamo Futsal Academy students.

D. Conclusion

Based on the analysis of anthropometric measurements conducted on Kuantanamo Futsal Academy students, it can be concluded that measurements need to be undertaken to determine the level of students' anthropometry. This can be a reference for coaches to decide what programs should be carried out so that students get treatment appropriate to their body condition.

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