

Analysis Of Anthropometry And Dominant Physical Conditions In Futsal Playing Skills In Futsal Extracurricular Activities AT 7th Senior High School, Banda Aceh

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Abstract

Futsal is a dynamic and fast game, and the transition from defense to attack must be balanced. Therefore, to improve futsal playing performance, it is necessary to improve anthropometric and bio motor components including agility, speed, strength, leg muscle power, cardiopulmonary endurance, and skills. By this, this study aims to analyze the relationship between anthropometry and dominant physical conditions with futsal playing skills. This research is a type of descriptive research with a quantitative approach. The population in this study were futsal players at SMA Negeri 7 Banda Aceh who were members of the Futsal Extracurricular Class for the Academic Year of 2021/2022, totaling 28 people. As the population is rather small in number, all the population is included in the research sample (total sampling). Data processing was conducted using a simple correlation analysis formula and multiple correlations. The results of this research are as follows; (1) Anthropometric descriptions of futsal players in extracurricular futsal activities at SMA Negeri 7 Banda Aceh are as follows: the average height is 168.01 cm, bodyweight is 61.54 kg, leg length is 96.36 cm, and an average foot length of 24.23 cm. Height only contributes 16.81% to futsal playing skills, while bodyweight is 19.36%. Moreover, leg length only contributed 15.21% and foot length contributed 27.04% to the futsal playing skill. The four anthropometric components only contributed 28.09% to futsal playing skills. (2) The dominant physical condition of futsal players in futsal extracurricular activities at SMA Negeri 7 Banda Aceh are as follows: the agility has an average of 17.93 seconds, speed is 3.51 seconds, leg muscle power is 56.25 cm, leg muscle endurance is 81.25 times, and heart and lung endurance of 13.90 minutes. Agility contributes 56.25% to futsal playing skills, speed contributes 39.69%, leg muscle power contributes 43.56%, leg muscle endurance contributes 64.32% and cardiopulmonary endurance provides a contribution of 68.89% to futsal playing skills. The five components of the dominant physical condition contributed 73.96% to futsal playing skills. (3) The skill level of futsal players in Futsal Extracurricular activities at SMA Negeri 7 Banda Aceh is 54.22 on average. The skill level of playing futsal is influenced by anthropometric factors accounted for 28.09% and by the dominant physical condition, which accounted for 73.96%.

Keywords: *Analysis, anthropometric, dominant physical condition, futsal playing skill*

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I. Background

Futsal is an established sport and has been competed internationally since 1965 in Prague. Futsal is a popular sport in the world, nowadays, because it has slightly different rules compared to football. Futsal is played only by 5 players including the goalkeeper. Futsal is also played indoors or we are familiar with the term field (indoor). The futsal field is smaller than a football field. The base of the futsal field uses woods or plastic robbers while the football field uses real grass. The rules of the futsal game have been regulated by Federation International de Football Association (FIFA) to uphold the value of fair play, thus futsal has become a professional sport recognized by FIFA. FIFA has started to organize futsal championships since 1989. Since then futsal has become famous in the world and is loved by many people of the world.

In professional futsal, an athlete is required to master good futsal playing techniques, this is essential to support and develop the athlete's ability to play futsal. Futsal games require skill and ball control techniques. Therefore, without adequate ball control skills, the basic techniques and goals of futsal will not be achieved (Tenang, 2008:67). Futsal players must have good basic techniques, such as passing, controlling, chipping, dribbling, shooting, and heading (Irawan, 2009: 22). Mulyono (2017:26) added that "The basic futsal techniques consist of passing, control, chipping, dribbling, shooting, toe kicks, headings, ball catching, and ball throwing techniques. Furthermore, Prastyo, Sugiyanto, & Doewes (2017:15) stated that "to be able to play futsal with a good rhythm and win the game, a player must master basic techniques".

The mastery of the futsal playing basic techniques cannot be separated from the support of good physical conditions. Physical condition in principle is an ability that is born by every human being. Physical conditions which consist of several components have an important role in supporting basic technical skills in playing futsal. Furqon (2002:32) stated that The components of basic movement physical conditions consist of speed, strength, endurance, agility, flexibility, reaction time, energy, coordination, etc.

The elements of physical training given are in accordance with the characteristics of the futsal sport developed and in accordance with the conditions of the athletes themselves. Of the ten physical components, the author will only explain the dominant physical conditions related to the game of futsal. When playing futsal, it takes physical exercises that support athletes in playing futsal, namely speed, leg muscle explosive power, agility, heart and lung endurance, and leg muscle endurance. Athletes generally display maximum or submaximal effort and perform short sprints for about 1-7 seconds. Speed is one of the most important motor features for many sports. Therefore, it must be developed from an early age (Bradley, et al. 2009 and Polat, 2009 in Kartal, R. 2016:47). Speed is defined as the ability of an athlete to move from one place to another with maximum speed or to perform movements with maximum speed. The maximum heart rate generally reaches up to 90% level in a futsal match. Therefore, sprint is one of the most important motor characteristics for futsal players (Nascimento et al., 2014:198). High-speed action during soccer competition is categorized by dividing it into moves requiring acceleration, maximum speed, or agility (Little and Williams, 2005:78).

Agility is one's ability to quickly change direction while moving without losing balance. Agility is also a basic component that determines the movement qualities of soccer players such as changing direction at high speed, sudden acceleration, and stopping. When compared to the general population, it is the distinguishing trait of elite sportsmen according to other field tests such as strength, power, and flexibility (Hazir et al., 2010:150). Agility is an important physical component required for successful performance in futsal as in many other sports. In the game of futsal, the fact that the one-on-one tactical space is generally narrow and the ball is heavier, develops defense and attack techniques and allows players to make decisions more quickly (Burns, 2003:67). A player realizes 146 tactical movements in a narrow space in playing football, while in a futsal game there are 536 movements. It can be argued that this numerical difference is because forwards must have control of the ball and break the symmetry of angles and distances between defense players to impose positional and scoring advantages in Futsal (Alvurdu, 2013: 108). Therefore, the level of agility is more important in futsal players compared to football players (Milanović et al., 2011:56). Futsal players also need leg muscle explosive power at a very high level to move in a match. Ismaryati (2008:59) defines that: "Power or explosive power is also referred to as explosive power. Power concerns the strength and speed of dynamic and explosive muscle contractions and involves the expenditure of maximum muscle strength in the fastest possible time. Leg muscle power affects the performance of futsal athletes in both skill practice and competitions. Thus it can be said that good leg muscle power is a requirement to achieve maximum performance in futsal.

Futsal matches also require athletes to have good endurance. Widiastuti (2015:14) explains: "Cardiopulmonary endurance is the ability of the heart, lungs and blood vessels to function optimally when carrying out daily activities, for a long period of time without experiencing significant fatigue." Every sports activity that requires maximum intensity in a short time always requires an anaerobic energy source. In futsal, the endurance required is leg muscle endurance, because the leg muscles move continuously during futsal matches (Sukadiyanto, 2011:5). Good physical conditions in playing futsal can be achieved with the support of several factors. Factors that can support good physical conditions in futsal players include the anthropometric

factor of the players. In playing futsal, there is an anthropometric factor that dominantly affects speed, agility, power, and endurance.

The anthropometric factor is an inseparable factor in terms of sports achievement. Sajoto (2012:11) states, "One aspect of achievement in sports is the biological aspect which includes the structure and posture of the body, namely: (1) height and leg length, (2) size, width and weight, (3) somatotype (body shape)." It means that each sport requires a different body shape. For instance, the body shape required in futsal is different from the body shape required in swimming, athletics, and gymnastics. The human body consists of muscles, lipids, and bones in different ratios and densities. These components affect performance in different ratios depending on the sport. An effective test program shows whether a player is physically fit for a particular sport or not. Therefore, sports scientists are very focused on studying the body composition and physical profile of the players as well as their physiological profile (Albay et al, 2008:5). Anthropometric and physiological examinations contribute to the preferences of players and the training model to be selected and applied while forming foresight in achieving the targeted success. Nowadays, athletes are required to be faster, more skilled, higher quality in terms of anthropometric and physiological capacities in all sports (Ersöz et al., 1996:3). Anthropometric characteristics can be a determinant in improving or determining the performance and level of ability of an athlete (Reilly et al., 2000:674). Speed, agility, anaerobic strength, and anthropometric structure are some of the most important characteristics of players in sports such as futsal which are generally played in an intensive tempo with a sudden change in acceleration and direction. The above problems illustrate that anthropometric factors greatly influence and determine a person's physical condition and skills in playing futsal. How does anthropometry contribute to the dominant physical condition of futsal players and how does it contribute to futsal playing skills. These questions are required to be studied and examined further, both theoretically and practically through anthropometric tests, measurements of physical condition and futsal playing skills carried out on high school students who are members of futsal extracurricular activities.

Extracurricular activities are curricular activities carried out by students outside of learning hours for extracurricular activities and co-curricular activities, under the guidance and supervision of the education unit, aiming to develop the potential, talents, interests, abilities, personality, cooperation, and independence of students optimally to support the achievement of educational goals. (Ministry of Education and Culture Regulation, Number 62 the Year 2014).

One of the goals in extracurricular activities is to develop student's skills and interests in sports. The extracurricular sport is a sports activity carried out outside of the regular school hours which aims to broaden horizons, abilities, increase and apply the value of knowledge and ability of sports. Sport extracurricular activities are also expected to be able to improve students' physical fitness so that students are always fit and excited and active in every learning process at school. In a fit state, the ongoing learning process can be achieved properly and according to the expected learning objectives.

II. Research Procedures

Research design is defined as a process of collecting and analyzing the research data. The research design is a measuring instrument model as follows:

1. Body Height Measurement

Height measurement technique was performed using GEA ZT-120 Health Scale as the tools to measure the height which can be explained as follows:

- a. The test was measured barefoot.
- b. Stand straight with the back to the measuring device.
- c. The chin is slightly bent down. The meter bar (stature meter) is placed or pressed horizontally above the head of the measurement participant. The pressure on the head of the participant should not be too hard which can cause the position of the participant to change.
- d. The recorded results are the results listed on the measuring device and recorded in centimeters (cm).

2. Bodyweight Measurement

The bodyweight measurement technique was performed using GEA ZT-120 Health Scale, as follows:

- a. Place the scale on a flat surface
- b. The participants are weighed barefoot and shirtless. The participants are allowed to wear shorts only and all accessories are required to be removed from the participant's body.
- c. The participant stood on the scales with a position facing forward, straight view, right hand and left hand are placed beside the body and relaxed position with less movement.
- d. The results recorded are the numbers shown on the scales.

3. Leg Length Measurement

According to Fenanlampir, et al. (2015:33), "Leg length measurements are carried out using the test participant standing in an anatomical position on a flat floor without wearing footwear. Leg length is measured from the bottom of the spine or from the trochanter to the floor.

4. Foot Length Measurement

The length of the sole in this study is the length of the sole of the foot measured from the acropodium (the tip of the longest finger, either the first finger or the bone of the second finger) to the pternion (heel). To measure the length of the soles of the feet, use a ruler affixed to the wall with the test participants sitting in a straight position with the soles of the feet attached to the ruler. Figures obtained from the measurement results are in centimeters (cm). (Utomo, 2017:61).

5. Agility Measurement

The procedures for carrying out the agility test using the *Illinois Agility Run Test* instrument are as follows: the field is arranged with 4 cones that form the agility area. On command, the test participants sprint a 9.20m, turned, and returned to the starting line according to the directions in Figure 7 below. Upon returning to the starting line, the participants swerved in and out of 4 markers, completing two 9.20m sprints to complete the agility test. Test results are recorded using an electronic timing system or stopwatch. The best test results from 3 trials were recorded for statistical analysis purposes.

6. Speed Measurement

According to EA Sports BCSPL Fitness Testing (2012:4), the Standard Operating Procedure (SOP) for the 20-meter Acceleration Test is as follows:

- a. The purpose of this test is to measure the ability to run fast.
- b. The equipment needed and used are tape meters, whistles, cones, and stopwatches.
- c. The test participant prepared at the starting line and started with a standing start.
- d. With a count of one to three and then the tester blew the whistle, immediately the participants ran up to a distance of 20 meters at maximum speed.
- e. Record the results of the participant speed in seconds.
- f. The test was carried out 2 times after the other athletes had done it.
- g. The test results are recorded and the results accepted are the best test results from 2 trials.

7. Measurement of Limb Muscle Explosion

The technique for carrying out the leg muscle explosive power test using a vertical jump test kit, as stated by Fenanlampir, et al, (2015:141) are as follows:

- a. The purpose of this test is to measure leg power in the vertical direction.
- b. Test participants stood sideways to the wall, both feet together, soles of feet fully on the floor, fingertips that are close to the wall powdered with chalk or flour.
- c. One hand of the participants that is close to the wall reaches up as high as possible, the foot remains on the floor, note the height of the reach on the imprint of the tip of the middle finger.
- d. Test participants jump up as high as possible and touch the board. Do three jumps. Record the height of the jump on the tip of the middle finger.
- e. The initial position when jumping is the soles of the feet still on the floor, knees bent, arms straight slightly behind the body.
- f. Prefixes are not allowed to be performed when going to jump to the top.

8. Measurement of Limb Muscle Endurance

Measurement of muscle endurance in this study uses a squat jump test. The implementation of this test can be explained as follows:

- a. Stand with feet shoulder-width apart,
- b. Place both hands behind the head with elbows facing out
- c. Bend the knees until the thighs are parallel to the floor,
- d. Lift your body and jump as high as you can by pushing your toes into the floor,
- e. Land slowly with a squat position,
- f. Do it repeatedly and as much as possible according to the ability of the test participants.
- g. Record the maximum number of squat jumps that the test participant is able to do.

9. Measurement of Cardiac and Lung Endurance

In this study, the measurement of heart and lung endurance technique used a 2.4 running test (Nasrullah, 2012: 3). Implementation of the test is as follows: the goal of this test is to complete a run in a 400-meter track as fast as possible with a total of 6 laps. The test participants are at the starting line, when there is a signal "Yes" the stopwatch is started and the participants start running according to the speed determined by each participant. Even though walking is allowed, it is not recommended. Scoring: the time to complete a 2.4 km run are recorded.

10. Futsal Playing Skill Test

This study uses the instrument "Futsal Test FIK Jogja" which was developed from the Futsal Playing Skills Test (Susworo, et al. 2009:144-155).

The instructions for carrying out the test are: On the "ready" signal, the test participant stands outside box number 1 (post 1) with the ball placed in the box. On the "yes" signal, when it is executed, the test participant starts dribbling the ball straight as fast as possible towards box number 2 (post 2). Until post 2, the test participant performed the passing without controlling to the wall 10 times with a distance of 2 m from the wall. When finished, from post 2 to post 3 by doing dribbling around, i.e. turning to the left and turning to the right on the cone that has been provided or dribbling as if making a number 8. Until post 3, the test participant performed the passing with controlling 10 times with the right and left feet alternately on 2 sides of the wall with a distance of 2.5 m. Right foot to the left-side wall and left foot to the right-side wall. After 10 times of passing with controlling, the ball was stopped in box number 3 (post 3), followed by shooting at the goal. Shooting to the goal must be done with 1 left foot and 1 right foot and the ball goes into the goal from the opportunity of 5 balls. If 2 balls have entered with 1 right foot and 1 left foot, then shooting is complete. But if the test participants have not been able to score 2 balls, the test participants are still allowed to score up to 5 balls.

The population in this study is the Futsal Players of SMA Negeri 7 Banda Aceh who are members of the Futsal Extracurricular Activities for the 2021/2022 Academic Year. The total population in this study was 28 people. Meanwhile, Sugiyono (2018:117) states that: the population is a generalization area consisting of objects or subjects that have certain qualities and characteristics that are applied by researchers to be studied and then drawn conclusions from.

According to Arikunto (2006:131), the sample is part or representative of the total population studied. Sugiyono (2018:118) added that: "The sample is part of the number and characteristics possessed by the population, while the sampling technique is called the sampling technique. The sampling technique in this research is total sampling.

III. Results

The results of the analysis on the anthropometric measurement data showed that the average body height of the futsal player of the futsal extracurricular activity in SMA N 7 Banda Aceh is 168.01cm. Body height contributes about 16.81% toward the futsal playing skill, while the other 83.19% are the contribution of other factors. The average body weight is 61.54kg and it contributes about 19.36% to futsal playing skill (Y) and other factors that affect futsal playing skills are 80.64%. The average leg length is 96.36 cm. Leg length contributes about 15.21% to futsal playing skills and the rest of 84.79% are affected by other factors. The average foot length is 24.23 cm. Foot length contributes 27.04% to futsal playing skills and the remaining 72.96% is influenced by other factors.

Data analysis on the results of the dominant physical condition test obtained that the average agility value of futsal players in futsal extracurricular activities at SMA Negeri 7 Banda Aceh is 17.93 seconds, agility contributes 56.25% to futsal playing skills and the remaining 43.75% are influenced by other factors. The average 20-meter running acceleration speed is 3.51 seconds, and speed contributes 39.69% to futsal playing skills, and 60.31% are influenced by other factors. The average leg muscle power is 56.25 cm, and leg muscle power contributes 43.56% to futsal playing skills and the other 56.44% are influenced by other factors. The average leg muscle endurance is 81.25 times, leg muscle endurance contributes 64.32% to futsal playing skills and the remaining 35.67% is influenced by other factors. The average endurance of the heart and lungs is 13.90 minutes. Cardiovascular endurance contributes 68.89% to futsal playing skills and the remaining 31.11% are influenced by other factors.

IV. Conclusions

Based on the results of the analysis of anthropometric variables (X_1), dominant physical condition (X_2), and futsal playing skills (Y), it can be concluded that:

1. The anthropometric description of futsal players of the futsal extracurricular activities at SMA N 7 Banda Aceh is that the average height of the players is 168.01 cm. Height contributes 16.81% to futsal playing

skills. The average body weight is 61.54kg and it contributes 19.36% to futsal playing skills. The average leg length of the futsal players of futsal extracurricular activities in SMA N 7 Banda Aceh is 96.36cm. Leg length contributes 15.21% to futsal playing skills. The average foot length is 24.23 cm and the contribution of the foot length to futsal playing skills is 27.04%. Anthropometric components consisting of height, weight, leg length, and foot length only contribute 28.09% to futsal playing skills while the remaining 71.91% are determined by other factors. Anthropometric factors still have a very important role and influence the achievement and skill of playing futsal and contribute to the dominant physical condition of a futsal player. The results of this study also show that anthropometric characteristics contribute 34.81% to the dominant physical condition.

2. The description of the dominant physical condition of futsal players in futsal extracurricular activities at SMA Negeri 7 Banda Aceh is that agility which has an average of 17.93 seconds, agility contributes 56.25% to futsal playing skills. The average speed is 3.51 seconds and speeds contribute 39.69% to futsal playing skills. The average leg muscle power is 56.25 cm, and leg muscle power contributes 43.56% to futsal playing skills. The average leg muscle endurance is 81.25 times, and the leg muscle endurance contributes 64.32% to futsal playing skills. The average endurance of the heart and lungs is 13.90 minutes. Cardiopulmonary endurance contributed 68.89% to futsal playing skills. The dominant physical condition contributes 73.96% to futsal playing skills and only 26.04% is influenced by other factors. This shows that the ability of agility, speed, leg muscle power, leg muscle endurance, and heart and lung endurance both contribute positively and significantly to futsal playing skills. This proves that the five variables are correlated to one another. Futsal is a dynamic, fast game, and the transition from defense to attack must be balanced. To improve futsal playing performance, it is necessary to increase the dominant physical condition components such as agility, speed, strength, leg muscle endurance and cardiopulmonary endurance, as well as skills. A futsal player with good agility, speed, leg muscle power, leg muscle endurance, and heart and lung endurance, will have a better and more consistent performance in the field.

3. The description of the futsal players skill level in Futsal Extracurricular activities at SMA N 7 Banda Aceh on average is 54.22. About 28.09% of the futsal playing skill level is influenced by anthropometric factors consisting of height, weight, leg length, and foot length. Futsal playing skills are strongly influenced by the dominant physical condition component of a player with a contribution presentation of 73.96%.

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