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Analysis of Physical Performance and Physiological Parameters of Futsal FIKK UNM Team

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Abstract

The game of futsal has an important role in improving the body's endurance system, because during the game, players are required to move with high intensity in various directions on the field continuously, which requires optimal physical condition. The FIKK UNM Makassar futsal team has experienced a significant decline in achievement in the past year, so an in-depth study is needed to maintain and improve team performance. This study aims to identify the physical condition of the futsal team based on the standards set by the Indonesian National Sports Committee (KONI). The research was conducted at the FIKK UNM Makassar field and the Laboratory of the Faculty of Sport and Health Sciences. The research sample consisted of all members of the futsal team, as many as 12 people, who participated voluntarily. The measurement instruments used include the Multistage Test to measure cardiorespiratory endurance, Leg Dynamometer to measure leg muscle strength, 50 meter run to measure speed, Shuttle Run Test to measure agility, and Vertical Jump to measure leg muscle explosive power. Data were analyzed using cumulative percentage. The results showed that aerobic endurance was in the good category (66.7%); leg muscle strength in the good category (58.3%); speed in the good category (66.7%); agility in the good category (58.3%); and leg muscle explosive power in the good category (75%). In conclusion, the overall physical condition of the FIKK UNM Makassar team is in the good category, although some physical components require improvement.

Keywords: Aerobic endurance, muscle strength, speed, agility, muscle power, futsal.

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A. Introduction

Futsal is an indoor soccer game. The game itself is played by five players per team, unlike soccer where there are eleven players per team. The size of the ball and the field is smaller than the size used in soccer. Meanwhile, futsal rules are made so strict by FIFA so that this game runs with fair play and also to avoid injuries that can occur. The rules are very strict, namely players are prohibited from tackling and sliding hard. To be able to achieve good performance, athletes need to have good physical fitness components. The main components of physical fitness of futsal players are muscle strength, muscle endurance, muscle strength, flexibility, and aerobic endurance, (Tanri A., et al, 2015) The game of putsal is an invasion game (invasion game) played by five against five people in a certain duration played on the field, goal, and, the ball is relatively small from the soccer game. Which requires speed of movement fun and safe to play and the winning team is the team that scores more goals against its opponent's goal (Agus Suworo D.M, et al 2009). This game also provides benefits for the body's endurance system because almost all the time game, a player will run in all directions across the field, almost without stopping. According to Andri Irawan (2009) there are several kinds of basic techniques in playing futsal, such as receiving (receiving the ball), shooting (kicking the ball into the goal), passing (feeding), chipping (feeding the stomach), heading (heading the ball), and dribbling (dribbling) Futsal games provide benefits for the body's endurance system because almost throughout the game, a player will run quickly in all directions of the field almost without stopping so that it requires excellent physical condition. Each player is required to have excellent individual techniques and strategic playing skills that must also be good. However, no less important is the physical aspect p-ISSN: 2442- 9511 e-ISSN: 2656-5862 which sometimes becomes a problem in the competition for the highest achievements in sports in Indonesia in general and futsal in particular. According to Justinus Lhaksana (2011), no matter how good a player is in terms of technique and tactics but without being realized by a good physical condition, the achievements achieved are not the same as players who have technical abilities, strategies, and of course good conditions. Achieving good performance, it is necessary for athletes to have a good physical condition. The dominant physical components of fitness for futsal players are muscle strength, muscle endurance, muscle power, flexibility, and aerobic endurance. (FIFA, 2012) Previous investigations from futsal experts and coaches (Green, 1992; Al-Hazzaa et al., 2001) have analyzed the ideal physiological and anthropometric profile for futsal players who are mostly successful from Western Europe and America. The dominant aspects of physical components such as, body composition, endurance, balance between anaerobic power and

aerobic power, are the most important in the evaluation of elite players (Shephard, 1999; Ostojić, & Zivanić, 2001; Ostojić, 2003a). In playing futsal it is required to have a good physical condition in order to achieve good performance (Ricardo A. B., et al 2016; Castagna C., et al 2006). In futsal matches oxidative phosphorylation is responsible for about 76% of all energy re-synthesized in the match with an average oxygen uptake of about 48, 6 mL kg -1-1, suggesting that aerobic metabolism may be an important factor in playing futsal; therefore, the development of this physical capacity is important for athletes to achieve high performance in the sport (Alvarez JC., et al 2009; Castagna C, D., 2009). Futsal is a sport that requires specific demands for good physical performance (Castagna C, et al, 2006., Oliveira RS, aet al, 2013)), where oxidative phosphorylation is responsible for supplying energy about 76% of all energy re-synthesized in a match with an average oxygen uptake of about 48.6 mL.kg-1-1 indicating that aerobic metabolism is an important factor that futsal athletes must have. Therefore, the development of this physical capacity is important for athletes in achieving high performance in sports (Alvarez JC, et al, 2009; Castagna C, et al 2009) Meanwhile, in futsal matches there are important moments that require intensity to be high with short duration (Barbero-Alvarez JC., et al, 2008; Gorostiaga EM, et al, 2009) Based on Castagna et al. (2009), key moments during the match showed a high performance of the anaerobic system with a running speed of 20-30 seconds, with an average lactate concentration of about 5.3 mmol Lmin and a peak of 80-85% of maximum performance (Soares-Caldeira LF, et al, 2014) Direct assessment in a futsal match VO2 needs players must be able to work at an intensity of 50-55 ml.kg-1.min-1 to play futsal professionally. (Bangsbo, J. et al., 1991. McInnes SE, et al, 1995) Previous studies have suggested the importance of high levels of aerobic power, to promote faster recovery (e.g. enhanced PCr recovery) between highly intensive efforts or even after fatigue. Tomlin DL, et al, 2002) However, according to time and age Pedro et al (2013) found that neither VO2max nor VO2 (at the same workload) differed between professional and semi-professional players. futsal The researchers also found that VO2max and VO2 in VT were not significantly different. In contrast, Alvarez et al. 15 compared VO2max, VT, and running economy of futsal players from different competitive levels to determine whether aerobic fitness is a discriminatory variable for futsal success. The study found that professional futsal players had significantly higher VO2max values (62.8 vs 55.2ml.kg-1 .min-1) and VO2 values than semi-professional temm. The professional futsal players showed significantly higher VO2 in VT than the semi-professional players. This finding p- ISSN: 2442-9511 e-ISSN: 2656-5862 attributed to the characteristics of futsal, a high-intensity intermittent sport that

is associated with a significant anaerobic component and most of the matches and training sessions of elite futsal players during competition sessions (Bangsbo J, et al, 191). Running speed in playing futsal requires higher VO2max professional futsal players compared to semi-professional players (Pedro RE., et al, 2013) This finding is the same as the results of research conducted by Ziogas et al. (2013) which shows running speed at the lactate threshold can distinguish the endurance characteristics of soccer players from different competitive levels more accurately than VO2max. These results indicate that speed related to S-VO2 max and VT (SVT) should also be considered in futsal players because it can reflect differences in competitive levels in matches (Ziogas et al. 2013) The decline in the achievements of the SMA 3 Matara futsal team in the last 7 months needs to be examined and received a serious study for the development of its future achievements. In an effort to improve achievement in futsal sports, the physical condition factor is very important. Good physical condition is needed by athletes in every sport to support the implementation of techniques and tactics when practicing or competing. Good physical condition is one way to achieve achievement. According to Sajoto (1988) physical condition is an indispensable prerequisite in efforts to improve the performance of an athlete, it can even be said to be a basic requirement that cannot be delayed or bargained for. The physical condition training program must be well planned and systematic and aimed at improving physical fitness and functional abilities of the body system so as to enable athletes to achieve higher achievements (Harsono, 1988).

B. Methods

This study aims to get a comprehensive picture of the level of physical performance of athletes through the measurement of specific components, such as VO2Max, leg muscle strength, speed, agility, and leg muscle explosiveness. The FIKK UNM Makassar futsal team, with a total of 12 players selected using purposive sampling technique and the selected players met the inclusion criteria, namely status as members of the FIKK UNM Makassar futsal team, willing to participate in this study voluntarily, and have good health records to take all physical performance tests. Multistage Test (Beep Test) to measure cardiorespiratory endurance. The player goes through a series of runs back and forth accompanied by beeps. Players must run at an ever-increasing beep speed until they are no longer able to keep up with the rhythm. The Leg Dynamometer is used to measure leg muscle strength. This instrument measures the maximum strength of the leg muscles when the player pulls the weight vertically. The 50 Meter running test is used to measure speed. Players are asked to run 50 meters in a marked track, and the time taken is recorded to analyze speed. The Shuttle

Run Test measures agility by having players run back and forth between two points 10 meters apart as many times as quickly as possible. The time recorded indicates the player's level of agility. Vertical Jump Used to measure the explosive power of leg muscles. Players jump as high as possible from a standing position with both feet, and the height of the jump is recorded to assess explosive power.

C. Result and Discussion

Description of physical performance data analyzed by the Futsal FIKK UNM team. Can be seen in the table below. After taking a series of tests including; Cardiac endurance using the test (Multistage Test.), Leg muscle strength using test (Leg Dynamometer), Speed using the test (50 meter run), Agility using the test (Shuttle Run Test), and Leg muscle explosiveness. using a test (Vertical Jump). Data utilizes a cumulative percentage with categories; Excellent, Good, Moderate, Less, and Very Less.

Table 1. Frequency Distribution of Futsal Player Preformance

No.	Component	Interval	Frequency	Percentage	Category
	Durability Heart Muscle	<24,9	0	0%	Less than Once
		25-33,9	0	0%	Less
		34-43,9	0	0%	Simply
		44-52,9	8	66,7%	Good
		>53	4	33,3%	Excellent
2	Power Muscles Limbs	<76	0	0	Less than Once
		77-145	2	16,7%	Less
		146-214	3	25%	Simply
		215-282	7	58,3%	Good
		>283	0	0%	Excellent
3	Speed	>7,9	0	0%	Less than Once
		6,8-7,8	0	0%	Less
		5,7-6,7	4	33,3%	Simply
		4,6-5,6	8	66,7%	Good
		<4,5	0	0%	Excellent
4	Agility	>12,1	0	0	Less than Once
		10,5-12	1	8,3%	Less
		10-10,4	4	33,3%	Simply
		9,5-9,9	7	58,3%	Good
		<9,4	0	0%	Excellent
		<20	0	0%	Less than Once
		2,1 - 3,3	0	0%	Less

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5	Power	34-48	0	0%	Good
		49-60	9	75%	Good
		>61	3	25%	Excellent

Bsed on the table above, it is explained that the **heart endurance** of the FIKK UNM futsal team is 4 players with the "Excellent" category (33.3%), and 8 players with the "Good" category (66.7%). **Leg Muscle Strength**; there are 7 players with the category "Good" (58.3%), 3 players with the category "Good" (66.7%). With the "Fair" category (25%), and 2 players with the "Deficient" category (16.7%). **Speed**; there are 8 players in the "Good" category (66.7%), and 4 players in the " Fair" category (33.3%). **Agility**; there are 7 players in the "Good" category (58.3%), 4 players in the "Good" category (58.3%). "Fair" category (33.3%), and 1 player in the "Poor" category (8.3%). **Leg muscle explosiveness**; there are 3 players in the "Excellent" category (25%), and 9 players in the "Good" category (75%).

The results of the VO2Max analysis of the Futsal FIKK UNM Team (66.7%) can be seen from the table above in the good category with an average VO2Max ability of 50.1, overall VO2Max ability of the team. FIKK UNM futsal can be said to be good. Cardiopulmonary endurance affects how long players are able to play in the field. Players who have good heart lung endurance are able to play for 40 minutes otherwise if a player has low heart lung endurance, they will quickly run out of energy before the match is over. In playing futsal, it is required to have good physical condition (Castagna, C, et al 2006) where oxidative phosphorylation is responsible for providing energy by 76% of the total energy used in the match with an average oxygen uptake of around 48.6 mL.kg-1-1, indicating that aerobic metabolism may be an important factor in playing futsal athletes to achieve high performance (Alvarez JC, et al 2009).

The results of the analysis of the leg muscle strength test of the FIKK UNM futsal team (58.3%) can be seen from the table above the data in the good category with an average leg muscle ability of 209.7, but there are also some players still in the less category and the sufficient category. This situation is still a challenge and the coach's hope that players have good overall leg muscle strength as futsal players. The cause of muscle strength training is very

lacking, because training sessions often prioritize technical and tactical training. Whereas leg muscle strength training can be done in a simple way, namely with lunges, squats, and other pliometric exercises. Players must be able to stand strong and balanced in performing extensive movements in the game. Good leg muscle strength encourages players to move and defend well during game time. Leg muscle strength affects running speed agility, shooting, and the ability to perform basic techniques with the ball. Leg muscles become the main foundation in futsal games (R. Muhammad et al, 2015).

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Furthermore, in general, the results of the speed test analysis of the FIKK UNM futsal

team (66.7%) can be seen from the table above in the good category with an average running speed of 5.4 seconds. In the match the ratio between running and walking in the futsal game is 1: 1 (Naser et al, 2017) The intensity in futsal matches has been shown to be higher than soccer players (BarberoAlvarez JC. et al, 2008). In professional futsal players included 13.7% of total intensity (speed ≥ 15 km. h-1 and 8.9% running (running speed ≤ 25 km.h-1) (Barbero Alvarez J, et al, 2004). Players perform 8.6% of activities per minute during a match (Barbero Alvarez J, et al, 2007). In addition, players made low-intensity efforts every 14 seconds, moderate-intensity efforts every 37 seconds, and high-intensity every 43 seconds, maximum-intensity efforts every 56 seconds, (Barbero-Alvarez JC. et al, 2004). The results of this study are in line with research conducted by Pedro RE, et al. (2013) Running speed at the ventilation threshold (VT) and VO2max were higher in professional futsal players compared to semi-professional players and these findings are also in line with those reported by Ziogas et al, (2011) which shows running speed at the lactate threshold can distinguish the endurance characteristics of futsal players from different competitive levels more accurately than VO2max.

The results of the agility test of the FIKK UNM futsal team (58.3%) can be seen from the table above the data in the good category with an average agility of 9.9 seconds. The form of training that can increase athlete agility is S-A-Q (Speed, Agility, Quickness). Besides being able to train speed, this form of exercise can also train the agility of an athlete. In line with the statement (Johnson & Bujjibabu, 2012) explaining that SAQ can improve the speed and agility abilities of an athlete. The form of agility training in SAQ is zig-zag running training (Soemardiawan, 2012 & Yundarwati, 2018). Agility is very necessary in futsal sports, especially when players dribble (Ni'mah, 2018). high agility can minimize the release of energy in a match. The factor that affects agility when dribbling is the ability to change movements. Unlike speed.

The results of data analysis of leg muscle power of the FIKK UNM futsal team (75%), seen from the table above in the good category with an average leg muscle power of 58.2. Leg muscle power is an important factor required for jumping and running in athletes (Naser et al, 2017). Maintaining or improving leg power may be important for futsal athletes who perform many repetitive sprints during matches that cause significant muscle fatigue. (Dogramaci SN, et al. 2011) Leg muscle power can be obtained indirectly from measuring the maximum height reached from a CMJ. Although there are fewer jumps that occur in futsal, because the game requires more ground passes than soccer, it is still a necessary part for success. (Silva et al. 2012) found that futsal players

had similar CMJ performance to soccer players soccer players while Gorostiaga et al (2009) observed lower jump heights in elite futsal players compared to elite soccer players.

D. Conclusion

Based on the results of the physical performance test, which involves 5 main physical test categories; cardiac endurance through a multistage test (bleep test), leg muscle strength through a leg dynamometer, speed through a 50 meter run, agility through a shuttle run test, and leg muscle explosiveness through a vertical jump test. The physical performance of the FIKK UNM futsal team is as follows: empirical data collected and analyzed using a cumulative percentage. Aerobic endurance (VO2Max) in the good category (66.7%); leg muscle strength in the good category (58.3%); speed in the medium category (66.7%); agility in the good category (58.3%); and leg muscle strength in the good category (75%). The results show that the FIKK UNM futsal team has good physical performance, but there are several components that are in the sufficient and deficient categories.

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F. Conflict of Interest

No conflict of interest

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