

Comparison of Shooting Accuracy between Dominant and Non-Dominant Leg among Indonesian Soccer School Players

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Keywords: Shooting, Accuracy, Dominant Leg, Soccer school.

Abstract: In this study, the comparison of shooting accuracy between dominant and non-dominant leg within resting state and fatigued state among Indonesian soccer school players was examined. Fifteen soccer school players from the Batik Soccer School, Jayapura, Indonesia, volunteered to participate in this study. The subjects had a mean age of 16.44 ± 0.86 (years), a mean height of 1.61 ± 0.042 (m) and a mean weight of 58.60 ± 3.81 (kg). The comparison research method and shooting target boards were applied. The results showed that the shooting accuracy score between dominant and non-dominant leg within resting state and fatigued state were of 3.49:2.26 and 3.36:1.87 respectively ($p < 0.05$). Significant differences between dominant and non-dominant leg indicated unbalanced muscle strength of both legs. The shooting skill among Indonesian soccer school players was found at a relatively low level. Furthermore, coaching method and curriculum in soccer school should be examined comprehensively.

1 INTRODUCTION

Soccer is known as the most popular sport in the world, including Indonesia. It involves more than 270 million practitioners in more than 200 countries (FIFA, 2016). This sport is played by both men and women, age ranging from children to adults, at various levels of ability. The huge number of participants led to the growth of soccer clubs at various levels, both professional and amateur, together with large numbers of tournaments and championships. However, the FIFA World Cup tournament is the highest level of soccer tournament in the world, and since its formation only listed 43 countries in the quarter finals and 8 countries as winners, namely Brazil, Germany, Italy, Argentina, Uruguay, France, England, and Spain (Stokkermans, 2015). The international successes of the former countries was largely considered due to their comprehensive talent identification and development systems, since those factors were regarded as the breeding ground for the next generation of top-level athletes (Holt, 2002). Soccer school was known as an organization or an independent legal entity whose primary objective is to provide players with long-term training through the provision of the necessary training facilities and infrastructure. For this reason, soccer school, a place where youth talent identification, coaching, and education begin in youth players, should be listed as one of the

determining factors in national team achievement. In Indonesia, soccer school is known well as an informal education institution, established for more than 10 years and spread all over the country. Unfortunately, very limited research has been conducted related to Indonesian soccer schools.

In soccer games, strategies and techniques must be developed in order to create an interesting game and a winning team. Basic techniques of soccer are divided into two: with and without the ball. Basic techniques with the ball are: shooting, passing, receiving, dribbling, keeping, heading, throwing-in, and some related to goalkeeper techniques. Basic techniques without the ball are running, jumping, and feinting (Carr, 2005). Since the main purpose in soccer games is to score as many goals as possible against the opposing team, shooting technique became the main basic technique and the most important aim of training programs in young players. These facts lead many researchers focused on shooting technique (Kellis and Katis, 2007; Bjelica, Popovi, and Petkovi, 2013; Mohammed and Kohl, 2016). Shooting quality is determined by power and accuracy (Shan et al., 2012). Shooting power is associated with the momentum of the leg while shooting accuracy means precision of the ball towards the target point, which is the goal. Accuracy is the decisive factor in scoring goals; hence practicing accuracy over power was more emphasized (Hargreaves and Bate, 2010). Carr

(2005) suggests that the best shooting accuracy can be achieved by using the instep. Instep position is an area on top of foot or one can say at the braided shoelaces area.

It has been known the importance of hand and leg dominance, where the second one has been given minimal attention (Spry, Zebas, and Visser, 1993). In the case of hand dominance, while one hand is being used the other has no significant roles. Contrarily, the notion of leg dominance should be viewed in a different perspective considering the roles of the legs in different tasks such as mobility and stability. While a leg is being used, such as to shoot a ball, the other leg has an important role of postural control and stability (Velotta et al., 2011). Numbers of research have been conducted on leg dominance, giving the fact that the characteristics of the dominant leg and non-dominant leg are generally different (Rahnama, Lees, and Bambaecichi, 2005; Spry, Zebas, and Visser, 1993; Velotta et al., 2011; Witkowski et al., 2011; Bjelica, Popovi, and Petkovi, 2013). Researchers generally make the assumption that the dominant leg is the preferred limb and the non-dominant leg is the non-preferred limb. In this study the dominant leg is identified as the preferred leg or the leg frequently used in shooting the ball (Velotta et al., 2011).

Soccer players, particularly junior players, tend to use the dominant leg only (Costa Silva et al., 2015). However, unbalanced use of one leg only induced asymmetries musculoskeletal (Maupas et al., 2002). Junior football players under-18 years old often at times experience muscle asymmetries (Capranica et al., 1992). For this reason, it is very important for the junior players to increase muscle strength balance in both legs. Although many studies exist with junior league players, limited research has been conducted with soccer school players. This study was also conducted in order to review the coaching method and curriculum in soccer school in Indonesia.

The aim of this study was to compare accuracy of shooting between dominant and non-dominant leg among Indonesian soccer school players. The comparison method was applied in two states: rest and fatigued state. This study was conducted as an evaluation model for the soccer school program. The question arises: to what degree is the difference of accuracy shooting between the dominant and non-dominant leg in soccer school players and how to enhance the balance performance of both legs?

2 METHODS

2.1 Participants

Fifteen soccer school players from the Batik Soccer School, Jayapura, Indonesia, volunteered to be subjects. The criteria for selecting players for the sample were as follows: being a student of the soccer school for two years, member of U-18's class, and having a good health condition. Research was conducted at Cigombong Soccer Field, Jayapura, Papua, Indonesia. Batik soccer school located in Jayapura city was chosen since Jayapura is known as one of the cities with a considerable source of talented players for the Indonesia national team.

2.2 Procedure

Data collecting procedures to measure the accuracy of shooting were as follows: warm-up, stretching, shooting trials, and finally shooting accuracy test. Each player was asked to shoot on target from the distance of 20 meters, with both dominant and non-dominant legs, within two different conditions: rest and fatigue. At rest condition, players had to shoot only if their heart rate was under 90 bpm (bit per minute), while fatigue condition means players had to complete ten squats before shooting. Those four variables were outlined in table 1.

Table 1: Shooting Test Variables.

Test Variables	Condition
DR: Shoot with dominant leg in rest state NR: Shoot with non-dominant leg in rest state	Rest state: player's heart rate under 90 bpm
DF: Shoot with dominant leg in fatigue state NF: Shoot with non-dominant leg in fatigue state	Fatigue state: player complete 10 squats before shoot.

Each player performed a total of ten shoots for each variable, using a standard soccer ball and a target board. The target board was adapted from the one previously developed by University of Montenegro (Bjelica, Popovi, and Petkovi, 2013) with simplified scaling system (1 – 10) for easy scoring. The midpoint of the target board was given the highest score of 10 and the edge of the target board was given a score of 1, while every failure to make contact with the board was given a score of 0.

2.3 Data Analysis

The obtained data was calculated using descriptive statistics; proceeded with the independent t-test calculation to determine whether there were significant differences of the four variables. The analysis provided the answers to the question of whether there were differences between shooting.

3 RESULTS AND DISCUSSION

From the descriptive analysis, it is known that the fifteen players who participated in this study have the following characteristics: age 16.44 ± 0.86 years, height 161.13 ± 4.17 cm, and weight 58.60 ± 3.81 kg. Descriptive statistics of the sample profiles and shooting scores are given in table 2.

Table 2: Descriptive statistics

	M	SD	SE	Min	Max	R	Ku	Sk
Age (years)	16.44	0.86	0.22	15.02	17.74	2.72	-1.11	-0.30
Height (cm)	161.13	4.17	1.08	153	166	13	-0.39	-0.80
Weight (kg)	58.6	3.81	0.98	50	65	15	0.59	-0.57
DR	3.49	0.86	0.22	1.7	5	3.3	0.11	-0.14
NR	2.26	0.90	0.23	0.5	3.4	2.9	-0.62	-0.63
DF	3.36	1.11	0.29	1.9	5.8	3.9	0.10	0.80
NF	1.87	0.89	0.23	0.4	3.7	3.3	-0.11	0.02

Legend: M – mean, SD –standard deviations, SE– standard errors, Min–minimum value, Max–maksimum value, R–range of value, Ku–Kurtosis, dan Sk–Skewness.

The result of independent t-test at a significant level of $p < 0.05$ was shown in table 3. It revealed significant differences of shooting accuracy between dominant and non-dominant legs both in rest and fatigued states. The value of this comparison is 7.30.

Table 3: Independent t-test calculation.

	DR	NR	DF
NR	*7.30		
DF	0.47	*-4.06	
NF	*6.56	1.60	*9.94
* $p < 0,05$			

Figure 1 shows the comparison of shooting accuracy score between dominant and non-dominant legs in a resting state. The shooting score comparison of 3.49:2.26 revealed a significant difference.

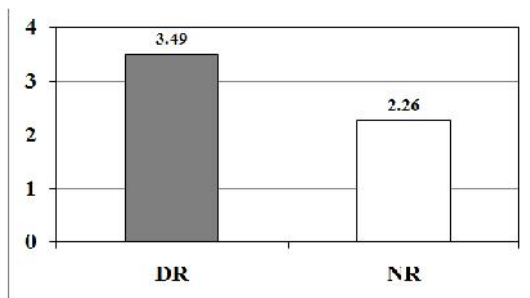


Figure 1: Comparison of shooting accuracy score between dominant and non-dominant leg in a resting state.

Furthermore, figure 2 shows the comparison of shooting accuracy score between dominant and non-dominant legs in a fatigued state. Like in a resting state, it also shows significant difference between these two variables. The value of this comparison is 9.94 with shooting score comparison of 3.36:1.87.

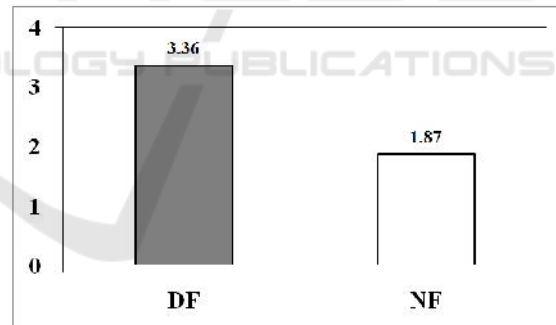


Figure 2: Comparison of shooting accuracy score between dominant and non-dominant leg in a fatigued state.

The previous study from Montenegro junior premier league revealed that the shooting score comparison in resting state of 5.86:4.76 and in fatigued state of 5.58:4.71 (values were normalized in 0-10 scale). We could notice that shooting quality of Batik soccer school students was lower than that of the junior premier league. This affirmed that the basic techniques learned and applied in the soccer school were not yet optimum, even though instep shooting together with dribbling is the most fundamental stage in the youth coaching curriculum (National Soccer Coaches Association of America,

2014). The players volunteering for this study had not even conducted shooting practice using target boards before. Wide range of shooting ability, peculiarly in a fatigue condition, indicated unbalanced muscle strength of both legs in players. This is noteworthy since the unbalanced use of one leg induced asymmetries musculoskeletal and may cause injury to the players in the future.

Low quality in shooting and unbalanced use of both legs among Indonesian soccer school soccer players indicated that the coaching method and soccer school curriculum should be examined comprehensively. Scheunemann et al. (2012) stated in their book about soccer school curriculum, that one of the most fundamental weaknesses in the youth player development system in Indonesia was the lack of focus of the soccer school organization. Soccer school mostly focuses on reaching the victory of the club rather than the player's competency, which are; technique, tactics, physical training and character. Cholid (2014) also analyzed the soccer school system and determined that generally soccer school in Indonesia still applies an internal curriculum instead of a national standard curriculum. All stakeholders in Indonesian soccer schools need to review the implementation of coaching standard and education of soccer school, in order to improve the quality of the youth talent development system, and eventually improve the national team performance to higher levels. Batik soccer school has been informed of the results revealed in this study and currently they are reviewing their curriculum.

4 CONCLUSIONS

The comparison of shooting accuracy between dominant and non-dominant leg within resting state and fatigued state among Indonesian soccer school players has been studied. Significant differences between dominant and non-dominant leg indicated unbalanced muscle strength of both legs. The shooting skill among Indonesian soccer school players was found to be at a relatively low level, and coaching method and curriculum in soccer school should be examined comprehensively.

ACKNOWLEDGEMENTS

Thanks to all players for their efforts, Batik Soccer School for the collaboration, and Herman Mayoseph for his assist in technical preparation and data collection of this study.

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