VO_{2max} Status of Universiti Teknologi MARA Pahang Football Players (Pahang Tigers) during New Competitive Season 2013

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ABSTRACT

This study examined the Maximum Oxygen Consumption (VO_{2max}) during competitive season of Liga IPT 2013 Division 2. Measuring the VO_{2max} was an early fitness monitoring for the Universiti Teknologi MARA Pahang football team (Pahang Tigers) in their new division. The high level of aerobic capacity could give a positive effect during match performance. These covered the capability of more running distances and involvement with the ball in the matches. It has been suggested that midfielder have superior VO_{2max} than other positions due to requirement of controlling the ball and running distances as the key role in football. This study involved a total of 15 football players from the three different positions. The mean agewas 20.1 (± .64) years. The mean body weight and height (± SD) were 61.8 (± 2.65) kg and 170.6 (± 6.49) cm with an average trained 4 to 6 times per week.The estimation of VO_{2max} was measured through 20-m multistage shuttle run (bleep test). This fitness test based on the completion of repeated shuttle run between two lines apart, it refers to fitness requires running speed incremental and dictated from bleep test CD-audio player. Overall mean for VO_{2max} between 42.6 and 45.1 $ml{\cdot}kg^{-1}{\cdot}min^{-1}$ and it was slightly higher in midfielder.The mean and standard deviation of player's physical characteristics will be presented. Meanwhile, the main comparison of VO_{2max} among the players based on their position in the team, a one-way analysis of variance (ANOVA) has been used to determine the differences. The results will be a good indicator of major fitness requirement for the team while competing in the new division of Liga IPT 2013.

Keywords: *football, 20m shuttle run, VO_{2max}, Liga IPT 2013*

Introduction

Football is a famous and major team sport for most of the countries in this world and suitable for all ages and gender to play. Nature of this game consists of two equal periods of 45 minutes, with a fifteen minute break in between. Football can be classified as a high intensity team sport and interspersed with a period of lower-intensity exercise. According to Svensson and Drustet al.,(2005) football players require to competent in several aspects of fitness such as aerobic and anaerobic power, muscle strength, flexibility and agility. In the competitive match play, elite football players covered distance of 10-12 km at an average intensity with estimated aerobic metabolism provides 90% of the energy cost of football match play (Kavcic et al., 2012). As a result, all the players needed to have high aerobic endurance fitness.

The importance of VO_{2max} in football has been reflected by rank correlation of the most successful teams in the Hungarian 1st Division Championship reported by McMillan et al.,(2005). While, another study supported the top-ranked club had a higher mean measured VO_{2max} than another low-ranked club (Aziz et al.,2007).The higher level of correlation from the previous studies reported that the top team with greaterVO_{2max} and distance covered during match had an advantage to retain their champions in the competitive tournament (Kavcic et al., 2012; Aziz et al., 2007). However, the aerobic fitness differences could be found in every player based on the stature, playing positions and overall distances that have been covered (Bloomfield et al., 2005).Distance covered during match consists of walking, jogging and sprinting. VO_{2max}could influence one of the aspects above that is sprinting. Again, McMillan et al., (2005) mentioned the improvement the mean VO_{2max} of youth football players by 11%, 20% increase in total distance covered during competitive match play , 23% increase in involvements with the ball and 100% increase in the number of sprints

performed by each player. As a result, it shows that $VO_{2max}$is one of the factors that can enhance performance in football at the young age. The style of play involves dynamic work with large muscle utilization and becomes importance aspect for the development of youth football teams.

In order to compete at the highest standard, the players must meet the requirements of the game. In fact that physical capacity of top-class players could be an indication of the physiological demands of the game. Essentially, these demands are usually quantified by measuring players' physiological responses during match-play and from an indirect way, the overall pace at which the game is being played. The purpose of this study was to provide aerobic fitness status of UiTM Pahang (Pahang Tigers) in new competitive season. Predicted status of VO_{2max} was based on the field test procedure on standard protocol. The comparison result between three different positions could be the best fitness indicator in structuring new season training program.

Methods

A total of fifteen male players with combination of new and previousseason players participated in this study. All players are involved in the new season of Liga IPT 2013. On average the subjects were 20.1 (± .64) years. The mean body weight and height (± SD) were 61.8 (± 2.65) kg and 170.6 (± 6.49) cmthat on average trained 4 to 6 times per week. The height and weight were recorded by using the stadiometer and portable metric scale. The evaluation of VO_{2max} status was based on the field test result from multi-stage fitness test (20m shuttle run). This test was conducted in one day procedure with at least 2 hours after their last meal consumed. Consent form and terms must be read and agreed as a part of study procedures.In order to measure the estimation VO_{2max}, all players must complete the 20m shuttle run test.

Field test that are performed in the field enhance the specificity of the evaluation. The selected field test used to evaluate the aerobic fitness of football players was multi-stage fitness test (20m shuttle run) in order to estimate VO_{2max} scores. This test is based on the completion of repeated shuttle runs between two lines 20m apart. The running speed is incremental and dictated by audio signals from a tape recorder. The aim of the test is to complete as many as shuttle as possible (Aziz et al., 2007). In assessing the large group of players, field test could be the best method for less-time consuming needed by the evaluator. The test design consists of 20m running distance with 5m turning point. The running speed is increased by $0.5kmh^{-1}$ every minute and regulated by a sound signal emitting from prerecorded tape (Chan, 2004).When the subject could no longer maintain the prescribed pace, the score was taken as the last shuttle where the foot crossed the line prior to or at the same time as the signal. This score was recorded and used to predict the maximal oxygen uptake of the individual. As the subject ran, the tape informed the tester which level and shuttle the subject was on. The subjects received two warnings for not reaching the line at the time of the auditory signal. The test was ended on the third warning.

Table 1: Physical characteristics of UiTM football players

	N	Mean	Std. Deviation (SD)
Age (years)	15	20.13	0.64
Height (cm)	15	170.62	6.49
Weight (cm)	15	61.76	2.65

This study was divided the players into three different groups (positions). Descriptive statistics of each variable was measured from the playing positions in the team. (defender, midfielder, striker). One-way analysis of variance (ANOVA) was preferred in mean comparisons of VO_{2max} between group positions. The significance of alpha was set at 5% ($p<.05$).

Results

This study predict the maximal oxygen uptake ($VO_{2max}ml \cdot kg^{-1} \cdot min^{-1}$) among the UiTM Pahang football players (n= 15)based on three different positions in 20m shuttle run test. Thisparameterpresented the level of

aerobic fitness in the team. Table 1 shows the VO_{2max} data from the three positions. Striker mean $VO_{2max}$was 43.9 (± 3.6) $ml \cdot kg^{-1} \cdot min^{-1}$. The mean for midfielder (± SD) was 45.1(± 3.42) $ml \cdot kg^{-1} \cdot min^{-1}$and 42.6 (± 3.03) $ml \cdot kg^{-1} \cdot min^{-1}$ for the defender. The mean score midfielder was superior to other positions.

Table 1: VO_{2max}level based on three different playing positions in UiTM Pahang football team

	N	Mean	Std. Deviation (SD)
Striker	3	43.87	3.60
Midfielder	6	45.11	3.42
Defender	6	42.63	3.03

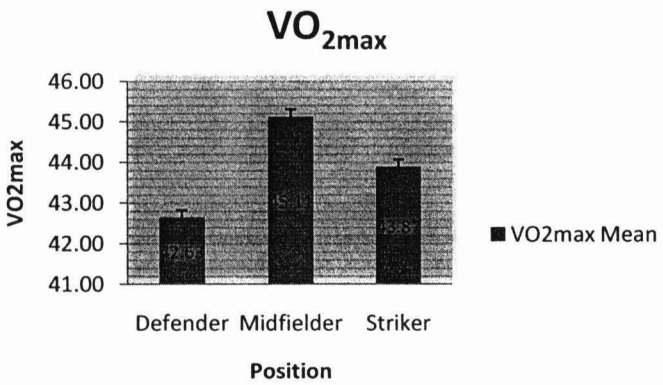

Figure 1: Means of VO_{2max}

A one-way ANOVA was conducted for the purpose of comparing VO_{2max} mean among the three difference playing positions in football. Table 3 showed the results of the one-way ANOVA.

Table 3: ANOVA of VO_{2max}

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	18.402	3	9.201	.848	.453
Within Groups	130.242	12	10.853		
Total	148.643	15			

The result in Table 3 did not demonstrate significant difference [df(3, 12) = .848, p = 0.453)] in the VO_{2max}between different positions of players in football.

Discussion

The purpose of the study was to report the possible differences ofVO_{2max}between three main positions among UiTM Pahang football team innew competitive season. The main finding of the study found that the midfielder has higher VO_{2max} but did not achieve statistical significance. The mean score for VO_{2max}between

42.6 and 45.1 $ml \cdot kg^{-1} \cdot min^{-1}$ and it was slightly higher in VO_{2max} for midfielder. This was supported by the previous findings which stated that midfield players covering the greatest overall distances during matches and time spent standing still (Bloomfield, et al. 2007). Meanwhile, as reported in previous study the estimated maximal oxygen uptake of National First Division League is $52.9 \pm 9.1 ml \cdot kg^{-1} \cdot min^{-1}$ was higher compared to UiTM Pahang VO_{2max} status recently (Ostojic, 2004).

The physiological demands of elite football match-play have been reviewed by various authors (Bloomfield, 2007; Chamari, 2005) and stated that male elite junior and senior players weighing 75 kg and average maximal oxygen intake of 55-65 $ml \cdot kg^{-1} \cdot min^{-1}$. The mean rate of energy expended approximates to a relative oxygen utilization of about 70%. In addition, VO_{2max} values may be influenced by differences in standards of play, training regimes and the phase of season. Thus, team with superior aerobic fitness would have the advantage when increasing the pace of playing.

Conclusion

The VO_{2max} valuebetween different playing positions in football is associated with their playing roles in the team.Midfielder covered more distance during football match and involved in many aspect of play should have greater VO_{2max}. However, this present study does not show any significant different between them. Lastly, the finding obtained from this study provided a good baseline and reference for the coaches in the team. Identifying ofof $VO_{2\ max}$ value within the group positions are the factors to be considered when selecting appropriate training programme forthe performance improvement.

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