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Aerobic Fitness of Indian Soccer Players: Field Methods Analysis

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----------ABSTRACT----------

BACKGROUND: *In soccer anaerobic and aerobic fitness both are equally important.*

OBJECTIVE: *The objectives of the study were to observe the status of aerobic fitness of district level Indian soccer players and to compare mean difference in two different methods of measuring VO_{2max}.*

METHOD: *In the present study 18 Indian district level soccer players age between 18-25 years were conveniently selected from Birbhum district of West Bengal as subjects. To measure aerobic fitness, two different indirect methods of measuring VO_{2max} were employed; these were Queens College test and 12 minutes Run-Walk test (Cooper Test). The data were analyzed by applying independent t-test to determine the mean difference between two different methods of measuring aerobic fitness. The level of significance was set at 0.05.*

RESULT: *The mean VO_2 max value of Indian district level soccer players in Queens College step test and 12 minutes Run-Walk test were 41.48±4.70 and 51.31±5.17 $ml.kg^{-1}min^{-1}$ respectively. The t-value between two different methods of measuring aerobic fitness was 5.96 (<0.05). A significant difference between two different methods of measuring aerobic fitness was noted.*

CONCLUSION: *After comparing with the direct method it may be concluded that Queen's College test is more reliable for measuring VO_2 max in the field situation.*

KEY WORDS: *VO_2 max, Queens College test, 12 minute Run-Walk test.*

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I. INTRODUCTION:

Oxygen consumption (VO_2) is a measure of the volume of oxygen that is used by one's body to convert the energy from the food. VO_2 max (also maximal oxygen consumption, maximal oxygen uptake, peak oxygen uptake or maximal aerobic capacity) is the maximum rate of oxygen consumption as measured during incremental exercise/work. Maximal oxygen consumption (VO_2 max) reflects the aerobic fitness of an individual, and is an important determinant of endurance capacity during prolonged, sub-maximal exercise VO_2 and VO_2max are important in the context of exercise/sport because they are the measures of body's ability to generate ATP of an individual, and that ATPs are the energy source which allows muscles to continue working while playing game. In India, football (soccer) is gaining popularity in recent years. FIFA also selected this country as future focus. For the selection of soccer players, evaluating the development of performance and achievement in international level, Indian scientists were examining and searching the best methods of fitness measurements. Soccer is a game where anaerobic and aerobic capacity both is equally important. The activities of the game include short sprinting as well as casual recovery movements. As the players have to cover a big area in the ground during attack and defense therefore, the game demands for aerobic as well as anaerobic fitness (Reilly, 1996 & 2000)[4, 5]. Physical fitness level of an individual depends on the amount of oxygen, which can be transported by the body to the working muscles, and the efficiency of the muscles to use that oxygen (Choudhury, Choudhury, & Kulkarni, 2002)[1]. Aim: The aerobic fitness measurement and its data on soccer players in India are limited. Therefore, the present study may provide a useful database to the soccer professional in India and abroad.

Objectives of the Study:
The objectives of the study were as follows:

[1]. To observe volume of maximal oxygen capacity (VO_2 max) of district Indian soccer players in two different indirect measuring methods.

[2]. To compare these results with other indirect method of VO_2 max measurement.

II. METHODOLOGY

Selection of Subjects: To achieve the objectives of the study, eighteen (18) male Indian soccer players were taken conveniently as subjects for this study. The subjects were selected from Birbhum district of West Bengal and all of them were the member of district team. The age ranges of the subjects were 18-25 years.

Criteria measure: To measure the indirect field method of aerobic fitness, 12 minute run-walk test (Cooper Test) and Queens's College test were used. For 12 minute Run-walk test method research group placed markers at set intervals around the track to aid in measuring the completed distance. Participants completed 12 minutes, and the total distance (in kilometer) covered was recorded. The equation to estimate VO_{2max} (ml/kg/min) from the distance score was: VO_{2max} **(**ml/kg/min**)** = (22.351 x kilometers) - 11.28. For Queen's College test (with 24 cadence/minute in a 16.5 inch bench), pulse count is taken 5 second after the cessation of exercise (3 minute) 15 second in sitting position and multiplied by 4 to get sub maximal pulse rate. The equation was used to estimate VO_{2max} **(**ml/kg/min**)** = 111.33 - 0.42 x pulse rate (beats/minute). The tests were taken in two consecutive days at the same time (4-6 pm) (12 minute run/walk test) and two distinct sessions (morning & noon) (Queen's College test).

Statistical Techniques: To assess the level of aerobic fitness of the subjects, Descriptive Statistics (Mean and Standard Deviation) was used and compute the mean difference in two different methods to measuring VO_{2max}, independent t-test was used (Statistical Package for the Social Sciences, version 17.0, SPSS Inc, Chicago, IL, USA). The level of significance was set at 0.05 levels.

Results: The findings pertaining to descriptive statistics of aerobic fitness in different indirect methods of measuring VO_{2max} of district level Indian soccer players has been presented in Table I.

Table I: Mean, Standard Deviation of Two different methods of measuring Aerobic Fitness

Method of measuring VO_2max	**Mean (**ml/kg/min**)**	**Standard Deviation**	**Standard Error of Mean**
12 Minute Run/Walk Test	41.48	±4.70	1.11
Queen's College Step Test	51.31	±5.17	1.22

It was evident from Table I that mean scores in two different methods of measuring aerobic fitness were differing.
The graphical representation of means with one standard error for aerobic fitness of district level Indian soccer players has been presented in Figure I.

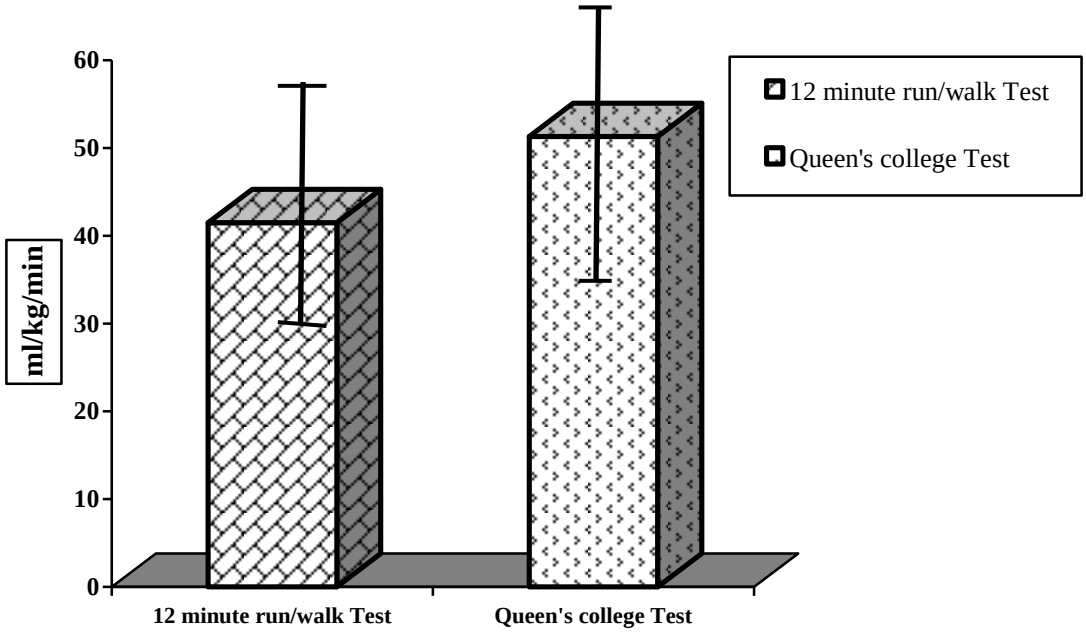

Figure I: Two different methods of measuring aerobic fitness (VO_{2max}) with one standard error of district level Indian soccer players

The mean difference between two different methods of measuring aerobic fitness of district level Indian soccer players has been presented in Table II.

Table II: Mean difference of Aerobic Fitness (VO_{2max}) in two different method

Method of measuring VO_2max	Mean (ml/kg/min)	Mean Difference	Std. Error Difference	t-value	p-value (2-tailed)
12 min Run-Walk	41.48	9.83	1.64	5.96*	0.001
Queens College	51.31				
*Significant at 0.05 level, (df = 34).					

Table II shows that the independent t-test value of two different methods of measuring aerobic fitness (VO_{2max}) was significant at 0.05 levels.

III. DISCUSSION:

The findings of the study revealed that mean aerobic fitness (VO_{2max}) of district level Indian soccer players in two different methods 12 minute run/walk test and Queens College test were 41.48 and 51.31 ml/kg/min respectively. The present study was supported by Gayen et al (2013), they found that there were difference in measuing VO_2 max with three different indirect methods [12 minute run/walk test (40.4 ml/kg/min); Queen's College test (44.92 ml/kg/min); beep test (49.45 ml/kg/min)]. Indian National club league footballer's VO_2 max was measured by indirect method were also similar to the present study (Dey et al, 2010). Whereas direct method of measurement, Krsmanovic et al. (2009) exposed the result of their study that the VO_2 max value (treadmill protocol) was 51.67 ml/kg/min. Also Sanchez-Urena et al (2009)[9] observed that the mean VO_2 max value was 57.71 ml/kg/min. In contrast Chamari et al (2005)[6] higher VO_2 max 65.3 ml/kg/min and Chatterjee et al (2006)[7] found lower VO_2 max 39.52±2.91 ml/kg/min after direct measurement.

For field test Queen's College method is better than 12 minutes run/walk test because the subjects can not avoid the cadence, time and height of the bench. Also they may be more motivated in 3 minute work than 12 minute

run/walk. Another cause of lesser VO_2 max result in 12 minutes run/walk test is to allow walking at the time test taken.

IV. CONCLUSION:

In light of the other findings, the present study may be concluded that indirect method of measuring aerobic fitness (VO_2 max), Queen's College test is more reliable field test than 12 minute run/walk test for soccer players.

REFERENCES:

[1]. Choudhury D, Choudhury S, Kulkarni V A. Physical Fitness: A Comparative Study between students of Residential and Non-residential School (Aged 12-14 years). Indian Journal of Physiology and Pharmacology. 2002; 46 (3): 328-332.
[2]. Gayen A, Bandopadhyay S, Mitra S. Estimation of VO2 Max by dirrerent exercise testing methods. International Journal of Health, Physical Education & Computer Science in Sports. 2013; 12 (1): 101-104.
[3]. Dey S K, Kar N, Debbray P. Anthropometric, Motor ability and Physiological profiles of Indian National Club Footballers: A Comparative Study. South African Journal for Research in Sport, Physical Education and Recreation. 2010; 32 (1): 43-56.
[4]. Reilly T, Bangsbo J, Ranks A. Anthropometric and Physiological predisposition for Elite Soccer. Journal of Sports Sciences. 2000; 18: 669-683.
[5]. Reilly T. Science and Soccer. E & FN Spoon. 1996.
[6]. Chamari K, Hachana Y, Kaouech F, Jeddi R, Moussa-Chamari I, Wisloff U. Endurance training and testing with the ball in young elite soccer players. British Journal of Sports Medicine. 2005; 39: 24-28.
[7]. Chatterjee S, Chatterjee P, Bandyopadhyay A. Prediction of Maximal Oxygen Consumption from Body mass, Height and Body surface area in Young sedentary subjects. Indian Journal of Physiology and Pharmacology. 2006; 50 (2): 181-186.
[8]. Krsmanovic B, Krulanovic R, Krismanovic T, Kolga M, Krsmanovic O. Aerobic and Anaerobic football players capacity is a basic of Scientific Training work. Journal of Sport Science. 2009; 2: 113-116.
[9]. Sanchez-Urena B, Salas-Cabrera J. Determination of Maximal Oxygen Consumption of Costa Rican first division Football players during 2008 Preseason. Journal of Revista MH Salud. 2009; 6 (2): 1-5.