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Full Length Research Paper

Relationships between bio-physiological parameters and speed performance of Nigerian FIFA referees

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The responsibilities of soccer referees are to control players' behaviour and implement the rules of the game during competitive football. This placed strenuous task on the referees' speed performance as well as bio-physiological functioning. The Nigerian soccer referees are always seen to have good speed performance when officiating in the national professional league competitions but were not seen at international level. This study aimed at determining if the relationship between their speed and bio-physiological fitness has bearing on their non-inclusion at international level of competition. Participants were sixty two Nigerian that obtained grade one referee in year 2008/2009 and within the age range of 17 to 41years. The ex-post facto quasi experimental research design was adopted. Data collected were analyzed using the mean score, standard deviation and analysis of variance to test for significant differences in the relationship among the bio-physiological parameters (age, blood pressures and heart rate) and speed performance. All hypotheses for the study were tested at the 95% confidence interval. Findings revealed that there is no significant relation between age, blood pressures, heart rate and speed performance ($p > 0.05$) of grade one Nigerian FIFA referees. Based on the findings, it was concluded that the speed performance of Nigerian FIFA referees cannot be judged based on their bio-physiological parameters alone which means that enlisting to officiate at international competitions involved many other issues.

Key words: Age, systolic blood pressure, diastolic blood pressure, heart rate, FIFA referees.

INTRODUCTION

Referee presides over soccer game and has the full authority to enforce the laws of the game in the match appointed and the referee's decisions regarding play are final. Sumiya et al. (2001) submitted that attempt for referees to carry out their functions demands for maturity in terms of age, a biological parameter. Age poses strenuous task on the cardiorespiratory functioning of any individual and mostly referees. Soccer referees must be reaching and maintaining a high level of fitness. Asagba (2004) established that officiating officials in soccer have some moments of robust runs and sudden stoppages, intermingled with uneven walks and shuttles in different directions. Aerobic ability cannot see a soccer referee through successfully in ball games because of these frequent changes of space and need for sudden sprints (Abass, 2005). There must therefore be a capacity to supply anaerobic energy from time to time as well as mature in officiating age.

FIFA initially allowed 50 to 55 years old referees to officiate matches but later pruned to 45 years. Article 4, paragraph 4 of FIFA regulations pinned soccer referees' age down at 25 to 45 and age limit for would be international referees now is anticipated by FIFA to be 38 years (www.Fifa.com/mm/document/affederation/administration/01/31/40/65/ circularno.1237-2011 fifalistinternationalreferees.pdf). This is because the demand of these games is getting higher in terms of physical conditioning and the age range of the players is greatly influencing nowadays. A soccer referee is supposed to be within 10 to 15 m range from the ball at any times during play (Asagba, 2004). Baumhakel et al (2007) agreed that referees should have good physical

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Table 1. Descriptive data of measured variables.

Measured variable	Mean	Standard deviation
Age (year)	25.16	4.63
Systolic blood pressure (mmHg)	123.48	11.24
Diastolic blood pressure (mmHg)	75.32	6.95
Heart rate (bpm)	65.68	5.68
Speed performance (s)	5.33	0.25

condition as requirements during a match.

Good physical condition/fitness is a function of expected age of at least 1 year ahead of the match players, normal blood pressure (60/110 mmHg), heart rate (50 to 65 bpm) and an average distance of about 12.000 m (Castagna and Abt, 2003). Castagna and Abt (2003) are of the opinion that approximately 1.800 m is therefore covered at high intensity of more than 18 km/h and in addition to about 1.000m backwards running. The average time without movement is 11 minutes during a match of 90 minutes (Castagna and Abt, 2003). Casajusa and Castagna (2006) confirmed that soccer refereeing is a physically challenging exercise mainly stressing physical and physiological functioning. Several recent studies have evaluated the locomotor activities and physiological demands of football referees and assistant referees (Krustrup and Bangsbo, 2001; Krustrup et al., 2002; Helsen and Buitynck, 2004; Castagna et al., 2005; Reilly and Gregson, 2006). During a competitive match, Krustrup and Bangsbo (2001) reported that elite-level soccer referees work at 68% of their VO_2 max when officiating friendly matches.

The physiological stresses imposed on the elite soccer referee are similar to that endured by mid-field soccer players (Weston and Brewer, 2002). Despite the irregular fluctuations in exercise intensity during match-play, the mean heart rate during a game can provide a reasonable estimate of the energy expended (Bangsbo, 1994; Reilly, 1997). Catterall et al. (1993) reported resting heart rates of 100 bpm in 71 English referees in the dressing room before going on to the pitch. Johnston and McNaughton (1994) reported 98 bpm for the Australian referees after light warm-up. Pluim et al. (1998) affirmed that the referee's mean heart rate during a game stood at 162 ± 2.0 bpm. Igbanugo (2001) opined that functional changes that occur with acute exercises are response which include rise in heart rate, blood pressure, ventilation and sweating rate.

MATERIALS AND METHODS

The design used in this study was the ex-post facto research design since the variables measured were not manipulated. The participants for this study comprised of all FIFA referees in southwestern Nigeria. The research examined the relationship between bio-physiological parameters and speed performance of 62 (male = 56, female = 6). Nigerian referees that obtained grade one (GRD 1) in the year 2008/2009, apparently healthy and were officiating national matches were participants in the study. The participants covered ten laps in endurance cooper test and ascertained passed by the Nigeria Football Federation prior the commencement of 2009/2010 professional league season. The purposive sampling technique was adopted to select the participants as sample for the study. The assessment for the study was carried out at the medical center and main bowl of the liberty stadium, Ibadan, Oyo State.

Measurements

Participants supplied their date of birth and this was subtracted from date of assessed irrespective of male or female. The obtained value was recorded as actual age in years. The resting heart rate of the participants was taken at the mitral area through auscultation in a sitting position. The researcher put on the headpiece of the stethoscope over the mitral area of the participants without too much pressure exerted and listened to the sound that was heard. The heart rate was determined by auscultation of heart sounds for 15 s. The counted numbers were multiplied by four to make 1 min count and recorded in line with the procedure of Purse measurement (2008) and Fitness Testing (2010). The cuff of the sphygmomanometer was wrapped evenly and snugly around the arm of the participants at 2.5 cm above the site of brachial pulsation. The pressure, at which the first sound was heard, was recorded as the systolic blood pressure. The researcher continued with the deflating of the cuff noting the point when the last sound was heard which was recorded as diastolic blood pressure both in mmHg. The researcher finally deflated the cuff and removed it from the participants' arm in accordance to Bickley et al. (2002) procedure. Participants sprinted 40 m as quickly as possible. Participants started from a crouched position with their hand on a starting line. The time started when their hand left the pad and finished when they broke the beam positioned at the finish line. The recorders record the time taken to finish to the nearest tenth of second in line with Cole's (2010) protocol. The descriptive statistics of mean and standard deviation were used in analyzing the data collected for the study. Analysis of variance (ANOVA) was computed on the obtained values to determine the relationships between bio-physiological variables and speed performance of the subjects. All variables were tested at 95% confidence.

RESULTS

Table 1 showed that the mean age of the participants was 25.16 ± 4.63 years. The systolic blood pressure and diastolic blood pressure had means of 123.48 ± 11.24 mmHg and 75.32 ± 6.95 mmHg, respectively. The heart rate was with a mean of 65.68 ± 5.68 bpm, followed by the speed performance with the mean of 5.33 ± 0.25 s. Table 2 shows regression statistics correlations between the study variables. Table 3 showed that there was no

Table 2. Summary of the relationship between bio-physiological parameters and speed performance.

Dependent variable	R	R^2	Adjusted R^2	Std. error of the estimate
Speed	0.179	0.032	-0.036	0.2532

Table 3. ANOVA result on the relationship between bio-physiological parameters and speed performance.

Source	SS	DF	MS	F-ratio	Sig
Regression	0.121	4	3.029	0.472	0.756
Residual	3.655	57	6.412		
Total	3.776	61			

Table 4. Relative relationship between bio-physiological parameters and speed performance**.**

Measured variable	Unstandardised coefficient		Standardised coefficient	t-value
	B	Std. error	Beta	
Age (year)	-8.089	0.007	-0.015	0.914
SBP (mmHg)	-3.148	0.004	-0.142	0.412
DBP(mmHg)	9.796	0.006	0.027	0.876
Heart rate (bpm)	8.543	0.007	0.195	0.238

significant relationship between bio-physiological parameters and speed performance of GRD 1 Nigeria referees. The F-ratio value (0.472; 0.756) was not significant at 5% confidence.

Table 4 revealed that b-value, which indicates the amount of contribution age has on speed performance of grade one Nigerian referees, was -8.089 with standard regression weight (beta), which shows the relationship between age and speed performance was -0.015, t-value was 0.914 ($p > 0.05$). The table showed that b-value of systolic blood pressure on speed performance was -3.148 with standard regression weight (beta), which shows the relationship between systolic blood pressure and speed performance was -0.142. T-value was 0.412 ($p > 0.05$). The b-value on the contribution of diastolic blood pressure to speed performance was 9.796 with standard regression weight (beta) of 0.027 and t-value was 0.876 ($p > 0.05$). B-value, which indicates the amount of contribution heart rate has on speed performance was 8.543 with standard regression weight (beta), which shows the relationship between heart rate and speed performance was 0.195, t-value was 0.238 ($p > 0.05$) and these were not significant at 5% confidence. Thus, the null hypothesis that there would be no significant relationship between bio-physiological parameter and speed performance of grade one (GRD 1) Nigerian FIFA referees agreed with the findings of the study.

DISCUSSION

The average age of the participants was 25.16 ± 4.63 years with resting systolic blood pressure and diastolic blood pressure of 123.48 ± 11.24 and 75.32 ± 6.95 mmHg, respectively. As active individuals they had normal heart rate mean of 65.68 ± 5.68 bpm, followed by the speed performance with the mean of 5.33 ± 0.25 s. Age, systolic blood pressure, diastolic blood pressure and heart rate were not significantly related to speed performance of soccer referees. This is in disagreement with studies that saw age as a predictor of speed performance (Nwankwo and Oladipo, 2003; Durakovic, et al., 2005; and Castagna, Impellizzeri, Rampinini and Breivik, 2010).

The outcome of this study, on age, is in agreement with the reports of Weston et al. (2010) in their study of professional soccer referees that are older than these participants (31 to 48 > 17 to 42 years). The finding on heart rate also supports the results of Mascarenhas et al. (2009), and Oladipo and Moses (2004), that there was no significant difference in the average heart rate between correct (mean = 165.5 bpm, s = 12.5 bpm) and incorrect decisions of soccer referees (mean = 165.6 bpm, s = 13.3 bpm; t (125) = 0.058, P = 0.9, Cohen's d = 0.01) on speed performance. That blood pressure has no significant relationship with speed performance does not mean that blood values are not high for some soccer

referees after the most intense periods of a game, but it clearly stresses that the lactic acid anaerobic energy turnover is of less importance for soccer referees than other ball games referees and assistants referees having average values of around 5 mmHg after games (Krustrup and Bangsbo, 2001 and Krusctrup, et al., 2002).

Conclusion

Considering the findings from this study, it can be concluded that bio-physiological factors should not be the solitary parameters for judging the speed and performance of Nigerian-Grade one FIFA referees as they are apparently healthy and have speed performance that can withstand international matches. FIFA should endeavour to contribute majorly to the development of the soccer league in Nigeria by exposing our referees to international officiating of matches for experience.

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