



COMPARISON OF SELECTED CARDIOVASCULAR PROFILES BETWEEN NOVICE AND TRAINED SOCCER PLAYERS

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ABSTRACT: The study was proposed to compare the selected cardiovascular profiles between novice and trained soccer players. To achieve this purpose of the study, thirty-seven (37) male soccer players from Malappuram district in Kerala state in the age group of 14 through 18 years were selected as subjects. The selected subjects were confined to the categorization made on the basis of training status (*novice and trained*). The cardiovascular profiles chosen as criterion variables were heart rate and stroke volume. Echocardiography was used to assess the selected criterion variables by adopting standardized procedures. The data thus collected were statistically examined by applying independent sample T test to find out the significant variation between groups. The α value of 0.05 was set for statistical significance. The outcome of the study demonstrates the existence of significant difference between novice and trained soccer players on heart rate and stroke volume, and thereby it implies that the training status has a statistically significant influence on heart rate and stroke volume.

Keywords: *cardiovascular profiles, heart rate, stroke volume, soccer players.*

Introduction

Endurance in sports can be defined as the ability to maintain exercise intensity over a long period of time and resistance to fatigue. It is well documented that during endurance sports, athletes must regulate their rate of work output in order to optimize their overall performance [1]. The exercise intensity fluctuates during competitions in sports that demands high aerobic capacity [2-4].

The athlete's heart is a physiological condition that can be defined as a morphological consequence of systematic training in athletes with the following features: increase in maximal cardiac output (CO), increase in stroke volume (SV), decrease in resting heart rate (HR) and electrocardiographic (ECG) changes in conduction and repolarisation.

Athlete's heart is a term used to describe the physiologically enlarged heart seen in



athletes, as a result from long term training. The size of the heart in athletes has been studied using several different modalities such as bi-planar chest x-rays, echocardiography, and CMR. The heart has been shown to adjust to long term training with increased ventricular volumes and mass. It has been suggested that there are two forms of hypertrophy as a result from intense training, termed eccentric hypertrophy and concentric hypertrophy. Eccentric hypertrophy is thought to be seen predominantly in endurance athletes. Theoretically, endurance exercise causes a large volume load on the heart which leads to an enlargement of the left ventricular diameter, and a proportional increase in wall thickness. In strength trained athletes, the increased pressure load on the heart when the athlete is lifting heavy weights is thought to stimulate hypertrophy of the myocardium without a concomitant increase in left ventricular internal diameter, causing concentric hypertrophy. These two kinds of hypertrophy were first suggested by Morganroth *et al.*, (1975) [5], and they have been both confirmed [6] and refuted [7,8]. However, due to the combination of endurance-and strength training performed by most elite athletes today, the concept of the endurance trained and the strength trained heart cannot be considered absolute but is rather relative.

Although earlier researches on the regulation of cardiovascular profiles among children, youth and adults were abundantly studied, there is a necessity to ascertain the influence of sport specific training status on cardiac functions among novice and trained sportsperson of a particular sport. Hence, an attempt was made to compare the selected cardiovascular profiles between novice and trained soccer players.

Methodology

For the purpose achieving the research objective thirty-seven (37) male soccer players from Malappuram district in Kerala state in the age group of 14 through 18 years were selected as subjects. The selected subjects were confined to the categorization made on the basis of training status (*novice and trained*), thereby the number of groups considered in this study were two, namely: Group-I Novice (N = 18) and Group II Trained (N = 19). The soccer players who competed at state and national levels in respective age categories with a mean training volume of 10 ± 2 hours a week and more than two years of continuous training were considered as trained soccer players, and those with less than a year of experience in practicing soccer skills and have not competed at state and national levels in respective age categories were considered as novice soccer players.

The subject characteristics namely: height, weight, and body surface area were as given in Table 1.

Table 1: Subject Characteristics

	Novice (N = 18)		Trained (N = 19)	
	Mean	Std. Deviation	Mean	Std. Deviation
Height (cm)	162.2778	5.97845	166.0000	5.33333
Weight (kg)	48.2222	6.21720	56.0526	8.82845
Body Surface Area (m ²)	1.4906	0.09938	1.6163	0.11696

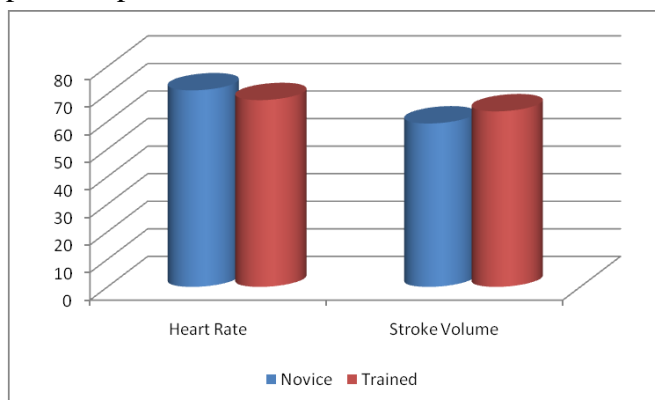
The cardiovascular profiles chosen as criterion variables for this study were heart rate and stroke volume. Echocardiography was used to assess the selected criterion variables by adopting standardized procedures.

The cross sectional research design involving stratified random sampling technique was employed in selecting the subjects of the study. The data thus collected were statistically examined by applying independent sample T test to find out the significant variation between groups. The α value of 0.05 was set for statistical significance.

Results

The data on heart rate, and stroke volume of novice and trained soccer players were graphically illustrated in Figure 1.

Figure 1: Graphical representation of data on heart rate and stroke volume



The computation of ‘t’ ratio on heart rate between novice and trained soccer players were statistically examined and presented in Table 2.



Table 2: Computation of Data on Heart Rate

Test	Mean	SD	DM	Std Error of DM	't' ratio	Sig.
Novice	71.33	4.86	3.54	1.507	2.351	.024
Trained	67.79	4.30				

The mean values of heart rate of novice and trained soccer players were 71.33 ± 4.86 and 67.79 ± 4.30 respectively. The obtained 't' ratio of 2.351 ($p = 0.024$) on heart rate was significant at 0.05 level of confidence. The result of the study showed that significant difference exist between novice and trained soccer players on resting heart rate, indicating that the training status has a statistically significant influence on heart rate.

The computation of 't' ratio on stroke volume between novice and trained soccer players were statistically examined and presented in Table 3.

Table 3: Computation of Data on Stroke Volume

Test	Mean	SD	DM	Std Error of DM	't' ratio	Sig.
Novice	59.31	1.64	4.40	0.683	6.440	.000
Trained	63.71	2.41				

The mean values of stroke volume of novice and trained soccer players were 59.31 ± 1.64 and 63.71 ± 2.41 respectively. The obtained 't' ratio of 6.440 ($p < 0.05$) on stroke volume was significant at 0.05 level of confidence. The result of the study showed that significant difference exist between novice and trained soccer players on stroke volume, indicating that the training status has a statistically significant influence on stroke volume.

Obert *et al.* (1998) [9] stated that increased stroke volume can occur in prepubertal children as a result of intensive endurance training. Stork *et al.* (1992) [10] suggested a better cardiac adaptation to physical stress and a better diastolic performance during exercise in endurance athletes with a higher training level. O'Toole (1989) [11] mentioned that the heart rate and blood pressure increases markedly as a result of increased total peripheral resistance. Dynamic exercise training results in cardiovascular adaptations both at rest and during exercise [12]. The observations made by earlier researches by some [9-11] were in line with findings of the present study, yet refuted the observations of Rowland *et al.* (1998) [13] that no significant differences in stroke volume between the trained male prepubertal distance runners and untrained control boys at rest.



Conclusions

The outcome of the study demonstrates the existence of significant difference between novice and trained soccer players on heart rate and stroke volume, and thereby it implies that the training status has a statistically significant influence on heart rate and stroke volume.

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