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RESEARCH ARTICLE

A COMPARATIVE STUDY OF SELECTED CARDIAC PARAMETERS BETWEEN TRAINED AND UNTRAINED BASKETBALL PLAYERS

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ABSTRACT

The purpose of this study to compare the selected cardiac parameters between trained and untrained basketball players. For the purpose of the study forty (N=40) male basketball players were selected as subjects from colleges affiliated to Guru Nanak Dev University Amritsar. The selected subjects were categorized on the basis of training status (trained: N_1=20, mean age is 21.15 ± 2.28 years; the mean height is 180.04 ± 10.62 cm; the mean weight is 71.00 ± 11.14 kg and mean BMI is 21.75 ± 2.36 and untrained: N_2=20, mean age is 21.15 ± 2.28years; the mean height is 177.40 ± 10.61 cm; the mean weight is 67.00 ± 11.14kg and the mean BMI is 21.22 ± 2.44). All the participants were assessed for height, weight and selected cardiac variables. The independent samples t-test was applied to assess the differences between trained and untrained basketball players. The level of significance was set at 0.05. The results of present study revealed There was slight increase in resting heart rate in untrained basketball players as compared to trained basketball players but not statistically significant There was statistically significant decrease in systolic blood pressure ($p< 0.05$) and diastolic blood pressure ($p< 0.05$) in trained basketball players as compared to untrained basketball players.

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INTRODUCTION

Cardiovascular capacity is an important factor in sport and physical activity. During exercise, the cardiovascular system serves as the body's mechanism for transportation of gases, nutrients and metabolic products (Shi, 2002). Exercise is the body's most common physiologic stress; it places major demands on the cardiopulmonary system (Myers 1996). Stork *et al.* (1992) suggested a better cardiac adaptation to physical stress and a better diastolic performance during exercise in endurance athletes with a higher training level. It is well documented that during endurance sports, athletes must regulate their rate of work output in order to optimize their overall performance (Abbiss and Laursen, 2008). During steady state of exercise, heart rate and blood pressure are maintained at reasonably constant levels (Rowell, 1986). Information about heart rate with exercise and rest is the most reliable of the cardiovascular variables.

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It is useful, to analyses cardiovascular responses to exercise with an examination of changes in maximal and sub maximal heart rate in young populations (Shi, 2002). O'Toole (1989) 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 (Chittibabu and Akilan 2013). Blood pressure is the pressure exerted by the blood on the blood vessels of the body. If blood pressure is too high, the heart has to work hard to overcome the pressure (Shi, 2002). Cardiovascular adaptations related to endurance training are well known among athletes. Endurance training may causes left ventricular enlargement due to higher blood volume and greater wall hypertrophy, as well as improved systolic emptying of the left ventricle (Ikaheimo *et al*., 1979; Giorgi *et al.,* 2000). Cardiac parameters may also be modified by training (John and Andersen, 1969). Some investigators have reported that at rest cardiac function parameters were similar for trained and untrained subjects (Rowland *et al.,* 1998; John and Andersen, 1969). Therefore, the purpose of this study to compare the selected cardiac parameters between trained and untrained basketball players.

MATERIALS AND METHODS

Subjects

For the purpose of the study forty (N=40) male basketball players were selected as subjects from colleges affiliated to

Guru Nanak Dev University Amritsar. The selected subjects were categorized on the basis of training status (trained: N_1=20, mean age is 21.15 ± 2.28 years; the mean height is 180.04 ± 10.62 cm; the mean weight is 71.00 ± 11.14 kg and mean BMI is 21.75 ± 2.36 and untrained: N_2=20, mean age is 21.15 ± 2.28years; the mean height is 177.40 ± 10.61 cm; the mean weight is 67.00 ± 11.14kg and the mean BMI is 21.22 ± 2.44). All the participants were informed about the aim and methodology of the study and they volunteered to participate in this study.

Methodology

The age of each subject was considered from the date of birth as recorded in the respective institute. Height measurements were taken by using the standard anthropometric rod to the nearest 0.5 cm. Body weight was measured with portable weighing machine to the nearest 0.5 kg. Body Mass Index (BMI) was calculated by the following formulae: BMI (Kg/m^2) = (Body mass in Kg)/(Stature in Meters)^2. Heart rate was measured by counting radial pulse for a minute while the player was in a complete resting state.

Blood pressure (Both systolic and diastolic) were measured in the morning with sphygmomanometer and stethoscope, three readings with one-minute interval were taken on the right arm with the subject in a seated position. The mean of the three readings was used for analysis.

Statistical Analyses

Values are presented as mean values and SD. Independent samples t tests were used to test if population means estimated by two independent samples differed significantly. Data was analyzed using SPSS Version 16.0.The level of significance was set at 0.05.

RESULTS

Table 2 depicts the physical characteristics of trained and untrained basketball players. On analyzing the physical characteristics of the 20 trained basketball players the mean age is 21.15 ± 2.28 years; the mean height is 180.04 ± 10.62 cm; the mean weight is 71.00 ± 11.14 kg and mean BMI is 21.75 ± 2.36. On analyzing the physical characteristics of the 20 untrained basketball players, the mean age is 21.15 ± 2.28 years; the mean height is 177.40 ± 10.61 cm; the mean weight is 67.00 ± 11.14kg and the mean BMI is 21.22 ± 2.44. Table3 depicts the comparison of resting heart rate, systolic blood pressure and diastolic blood pressure between trained and untrained basketball players.

Resting Heart Rate

In trained basketball players mean resting heart rate was 70.60±1.62 beat/min and 70.60±1.62 beat/min in untrained basketball players. There was slight increase in resting heart rate in untrained basketball players as compared to trained basketball players but not statistically significant.

Systolic Blood Pressure

In trained basketball players mean systolic blood pressure was 116.95±0.89 mmHg and 118.96±0.89 mmHg in untrained basketball players. There was statistically significant decrease in systolic blood pressure in trained basketball players as compared to untrained basketball players.

Table 1. Variables, Tools/ Equipments and measurement units

Variables	Tools/ Equipments	Measurement Unit
Height	Anthropometric Rod	Centimeters
Body Weight	Weighing Machine	Kilograms
Resting Heart Rate	Stethoscope and Stop Watch	(beat/min)
Systolic Blood Pressure	Sphygmomanometer and Stethoscope	(mmHg)
Diastolic Blood Pressure	Sphygmomanometer and Stethoscope	(mmHg)

Table 2. Physical Characteristics of Trained and Untrained Basketball Players

Variables	Trained Players (N=20)		Untrained Players (N=20)		Mean Difference	SEDM	t-value	Sig.
	Mean	SD	Mean	SD				
Age (yrs)	21.15	2.28	21.15	2.28	0.00	0.72	0.000	1.00
Height (cm)	180.40	10.62	177.40	10.61	3.00	3.36	0.893	0.377
Body weight (kg)	71.00	11.14	67.00	11.14	4.00	3.52	1.136	0.263
BMI (kg/m^2)	21.75	2.36	21.22	2.44	0.53	0.76	0.698	0.489

*Significant at 0.05 level

Table 3. Comparison of Resting Heart rate, Systolic Blood Pressure and Diastolic Blood Pressure between Trained and Untrained Basketball Players

Variables	Trained Players (N=20)		Untrained Players (N=20)		Mean Difference	SEDM	t-value	Sig.
	Mean	SD	Mean	SD				
Resting Heart Rate (beat/min)	70.60	1.62	71.60	1.62	1.00	0.51	1.951	0.058
Systolic Blood Pressure (mmHg)	116.95	0.89	118.96	0.89	2.00	0.28	7.114*	0.000*
Diastolic Blood Pressure (mmHg)	77.22	0.41	79.22	0.41	2.00	1.13	15.344*	0.000*

*Significant at 0.05 level

Diastolic Blood Pressure

In trained basketball players mean diastolic blood pressure was 77.22 ±0.41 mm Hg and 79.22 ±0.41 mm Hg in untrained basketball players. There was statistically significant decrease in diastolic blood pressure in trained basketball players as compared to untrained basketball players.

DISCUSSION

Among cardiac parameters, resting heart rate and blood pressure are adversely influenced by sport and physical activity. Resting heart rate is a good indicator of cardio-pulmonary efficiency of an individual (Singh *et al.,* 2011). In the present study no statistically significant difference were found between trained and untrained basketball players with regard to resting heart rate. The results are in line with the reports by (Rowland *et al.,* 1998; John and Andersen, 1969), they reported that at rest cardiac function parameters were similar for trained and untrained subjects. On the other hands, findings of the present revealed that there were statistically significant differences in both (systolic and diastolic) blood pressure between trained and untrained basketball players. Untrained basketball players had significantly more values in systolic and diastolic blood pressure as compared to trained basketball players.

These findings are in agreement with the study of Tasi *et al*. (2003), showed a decrease in systolic blood pressure and diastolic blood pressure by giving a 12 week training of an exercise programme. On the other hand, the work of John and Andersen (1969) showed that trained subjects demonstrated significantly higher maximal values for cardiac output and stroke volume during exercise than untrained subjects, with similar maximum heart rate. The finding of cardiovascular adaptations following training in adults has been reported in numerous studies (Ikaheimo *et al.,* 1979; Oakley, 1992; Potiron-Josse and Bourdon, 1989). It is suggested that the cardio-pulmonary efficiency is observed to be the best with lower value of systolic blood pressure and vice versa. Diastolic blood pressure, an indicator of resistance to flow of blood in blood vessels (Singh *et al.,* 2011).

Conclusion

There were no significant differences in resting heart rate between trained and untrained basketball players. There was statistically significant decrease in systolic and diastolic blood pressure in trained basketball players as compared to untrained basketball players.

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