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PHYSIOLOGICAL VARIABLES OF HOCKEY, HANDBALL AND VOLLEYBALL PLAYERS – A COMPARATIVE ANALYSIS

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Short Profile

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ABSTRACT:
The purpose of the study was to compare the selected physiological variables among Hockey, Handball and Volleyball players. For the purpose of the study, 60 athletes (20 from each group) of age 20±2 years were chosen from Lakshmibai National Institute of Physical Education, Gwalior (M.P). All the athletes were selected for the purpose of the study were in regular practice. The variables which had been tested were vital capacity (VC), Peak expiratory flow rate (PEFR) and resting pulse rate (RPR). One way ANOVA was employed to compare the selected physiological variables among selected players. One way ANOVA was found significant in case of PEFR. Post Hoc test on PEFR reveals that all the selected games and sports players were having different PEFR.

KEYWORDS
Hockey, Handball, Volleyball, Physiological variables.

INTRODUCTION:

Hockey, Handball and Volleyball has progressed to be a worldwide game which are internationally popular and universally accepted. The complex mingle of cooperative and individual skills, flexible enough to accommodate the fire works of personal duties yet remaining essentially a team sport, is a unique attraction. Team games are the games where shape, size, body composition and fitness all play an important part in providing distinct advantage for specific playing positions particularly at the higher level, where there is a high degree of player specialization (Dey, Kar & Debray, 2010). Volleyball has been described as an 'interval' sport with both anaerobic and aerobic components. At the higher skill levels, technical performance may be limited by physical characteristics as well as physical fitness, and performance characteristics such as speed and vertical jump (Smith D.J, 1992). Successful, participation in these sports requires from each player a high level of technical and tactical skills, and physical & physiological fitness with suitable anthropometric characteristics. Players may not need to have an extraordinary capacity within any of the areas of physical performance but must possess a reasonably high level within all areas. This explains why there are marked individual differences in anthropometric and physiological characteristics among top players. Till now, various measurements have been used to evaluate specific aspects of the physical performance of both youth and adult soccer players. The positional role of a player is related to his or her physiological capacities. A range of relevant anthropometric and physiological factors can be considered which are subject to strong genetic influences (e.g. stature and maximal oxygen intake) or are largely environmentally determined and susceptible to training effects (T. Reilly, et al., 2000). The purpose of the present study was to compare the selected physiological variables among Hockey, Handball and Volleyball players.

METHODS

Selections of the subjects:

A total of sixty male athletes (twenty from each group) were selected purposively from Lakshmibai National Institute of Physical Education, Gwalior (M.P.). The groups of athletes which were selected for the purpose of the study were Hockey, Handball and Volleyball Players. The average age of the subjects was 20±2 years. The subjects were approximately undergoing through a similar kind of schedule off the ground in terms of diet, lifestyle, studies, daily activities like sleeping hours etc.

Selection of Variables and Criterion Measures

The purpose of the study was elaborated to the subjects before testing them on all the selected variables. All variables were measured and obtained scores on each player individually during rest hours with the help of standard scientific instruments.

The physiological variables on which the data was collected were VC, RRR, RPR and PEFR.

Vital capacity: VC is the maximum amount of air a person can expel from the lungs after a maximum inhalation. It is equal to the inspiratory reserve volume plus the tidal volume plus the expiratory reserve volume. Maximal volume forcefully expired after maximal inspiration was measured with the help of dry Spiro-meter in cubic centimeters.

Resting pulse rate: RPR of each of the subject was recorded in the morning on their bed, just after the sound sleep. It was recorded through the radial artery.

Peak expiratory flow rate: PEFR is the maximum flow rate generated during a forceful exhalation, starting from full lung inflation. Peak flow rate primarily reflects large airway flow and depends on the voluntary effort and muscular strength of the patient. The PEFR of the subjects was measured with peak flow meter. It was recorded in liters per minute.

RESULTS

Finding pertaining to the descriptive Statistics of the players from selected groups on the selected physiological variables has been presented in table 1.

TABLE 1
DESCRIPTIVE STATISTICS OF THE HOCKEY, HANDBALL AND VOLLEYBALL PLAYERS ON SELECTED PHYSIOLOGICAL VARIABLES

		N	Mean	Std. Deviation	Std. Error
Resting Pulse Rate	Hockey	20	50.05	3.10	.69
	Handball	20	50.65	3.31	.74
	Volleyball	20	50.15	3.89	.87
	Total	60	50.28	3.40	.43
Vital Capacity	Hockey	20	4050.0	345.64	77.28
	Handball	20	3920.0	305.39	68.28
	Volleyball	20	3970.0	283.02	63.28
	Total	60	3980.0	311.80	40.25
Peak expiratory flow rate	Hockey	20	611.5	44.16	9.87
	Handball	20	649.0	31.93	7.14
	Volleyball	20	573.0	39.88	8.91
	Total	60	611.1	49.47	6.38

Descriptive Statistics of the Hockey, Handball and Volleyball Players on the selected variables i.e. RRR, RPR, VC and PEFR is presented in the table 1. To test the homogeneity of the variances of all the selected groups on the selected variables, Levene's Test was employed. Levene's test for all the variables is shown below in the Table 2.

TABLE 2
TEST OF HOMOGENEITY OF VARIANCES

	Levene Statistic	df1	df2	Sig.
Resting Pulse Rate	2.234	2	57	.116
Vital Capacity	.081	2	57	.922
Peak expiratory flow rate	1.672	2	57	.197

*Significant at 0.05 level of significance

Table 2 reveals that the Levene's statistic was found insignificant in all the cases. Homogeneity of variance is an assumption for applying Analysis of Variance which must be fulfilled before applying ANOVA.

After this, one- way analysis of variance was employed by the researcher for the comparison of means of selected groups on the dependent variables i.e. RPR, VC and PEFR. The table of ANOVA has been presented underneath.

TABLE 3
ANOVA TABLE FOR THE SELECTED GROUPS ON RPR, VC AND PEFR

		Sum of Squares	df	Mean Square	F	Sig.
Resting Pulse Rate	Between Groups	4.13	2	2.06	.17	.841
	Within Groups	680.0	57	11.93		
	Total	684.1	59			
Vital Capacity	Between Groups	172000.0	2	86000.0	.88	.420
	Within Groups	5564000.0	57	97614.0		
	Total	5736000.0	59			
Peak expiratory flow rate	Between Groups	57763.3	2	28881.6	18.99	.000
	Within Groups	86655.0	57	1520.2		
	Total	144418.3	59			

*Significant at 0.05 level of significance

It is evident from the Anova table that the RPR and VC were found insignificant as the significance value is more than 0.05. But, in case of PEFR, it was found significant as the significance value is less than 0.05.

From these results it may be concluded that the players in the selected groups were same on the RPR and VC but, they have difference in PEFR.

To compare the critical differences in PEFR, the data on PEFR was analyzed by employing Post Hoc Test. The table for the post hoc on PEFR has been shown below.

TABLE 4
POST HOC TEST FOR THE PEFR ON SELECTED GROUPS

LSD

Dependent Variable	(I) sport	(J) sport	Mean Difference (I-J)	Std. Error	Sig.
Peak expiratory flow rate	Hockey	Handball	-37.50*	12.32	.004
		Volleyball	38.50*	12.32	.003
	Handball	Hockey	37.50*	12.32	.004
		Volleyball	76.00*	12.32	.000
	Volleyball	Hockey	-38.50*	12.32	.003
		Handball	-76.00*	12.32	.000

*. The mean difference is significant at the 0.05 level.

Table 4 reveals that the PEFR was found significant in all the comparisons.

The graphical representation of all the selected physiological variables among selected groups of players has been presented below.

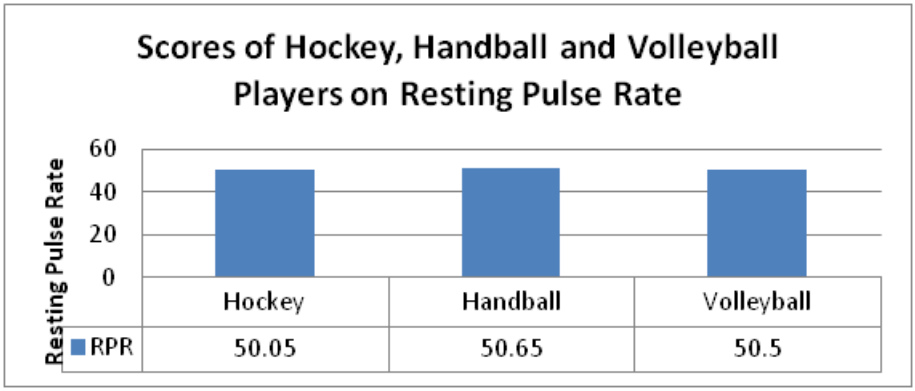

FIGURE 1 : Graphical Representation of the Scores of Resting Pulse Rate Among Hockey, Handball and Volleyball Players

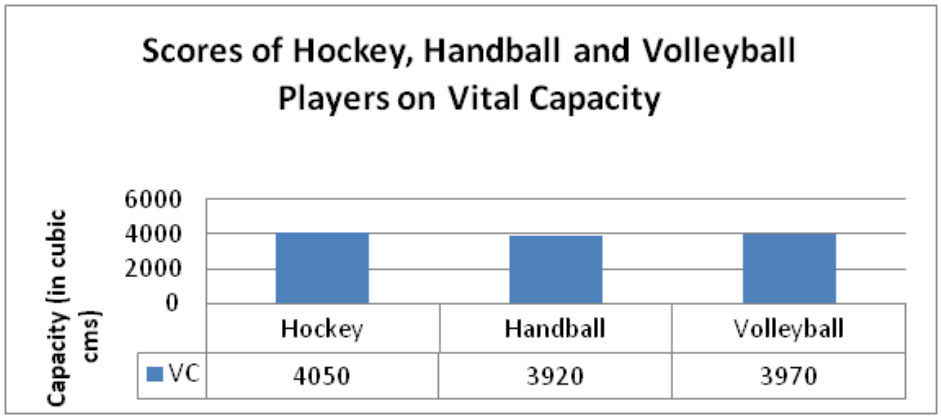

FIGURE 2 : Graphical Representation of the Scores of Vital Capacity Among Hockey, Handball and Volleyball Players

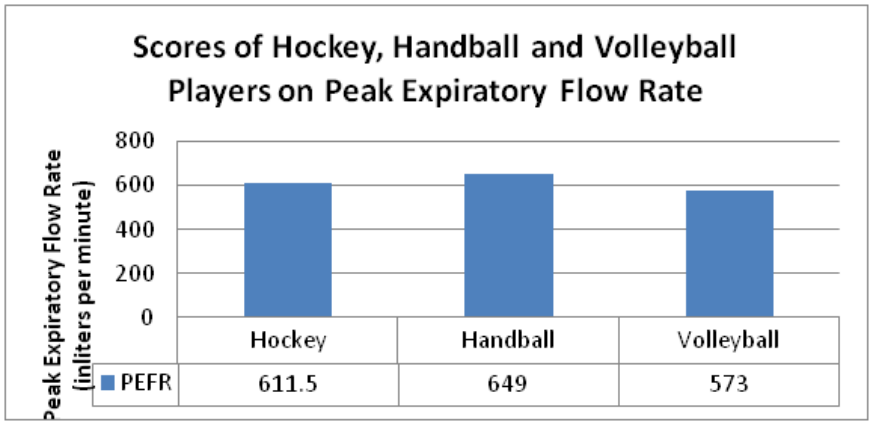

FIGURE 3 : Graphical Representation of the Scores of Peak Expiratory Flow Rate Among Hockey, Handball and Volleyball Players

DISCUSSION

Result of the study has shown that the hockey, handball and volleyball players are same on the resting pulse rate and vital capacity. But, they are different on the peak expiratory flow rate. Volleyball players were found to be at the bottom in comparison to other game players. Whereas, Handball players were found at the top in peak expiratory flow rate scores. A decrease in PEFR could be attributed to disease conditions in the bronchial passages associated with damage to the elastic component of the alveolar walls and decrease in the contraction of the chest cavity. In the game of Handball, all the players are supposed to be in action with a high speed and agility. As it is a very fast game, the PEFR may be more in comparison to the other games and sports.

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