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Comparison of selected physiological variables among basketball, volleyball and handball

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Abstract

The purpose of the study was to compare the selected physiological variables namely; maximum oxygen consumption, vital capacity, resting heart rate and hemoglobin content among basketball, volleyball and handball players. Ten (10) male players of NCR region from Basketball, volleyball and Handball were selected as the subject for the study. Selected physiological variables such as maximum oxygen consumption, vital capacity, resting heart rate and hemoglobin content were presented to compare the players among basketball, volleyball and handball. To see the significant difference of selected physiological variables among basketball, volleyball and handball, the analysis of variance "F-ratio" was applied at 0.05 level of significance. For further analysis "Post-hoc Test" (LSD Test) was applied. The handball players had shown significantly different level of VO₂ max. (72.727) in comparison to volleyball (75.854) and basketball (77.094) players. However, the volleyball and basketball players had shown more or less same level of VO₂. Further basketball players had shown better efficiency of heart as its mean value (56.3) was lowest among all the three groups in relation to resting heart rate. On the other hand basketball, volleyball and handball players had shown more or less same vital capacity and hemoglobin content with a small range of variation.

Keywords: VO₂ Max., vital capacity, resting heart rate, hemoglobin

Introduction

The elements, of scientific basis of selection are being inducted in the procedure of selection of athletes at various levels in some of the advanced countries. The knowledge from many scientific disciplines is being used for improving criteria for the selection of talents. The physical educationists have designed test procedures for evaluating the fitness of young children. The structures of performance for different games and events are being worked out. The general physical fitness of top-ranking athletes has been evaluated. Human growth and performance is also an important field in this regard. The physiological factors limiting one's performance in sports are also well known. It is the understanding of interaction of all these factors that can help us in designing the way for selecting the children for appropriate game and training. Among all the factors, the physiological characteristics play an important role for the attainment of high level sports performance. Among the various physiological parameters, cardiovascular efficiency forms the basis to undertake sports efforts successfully. Cardiovascular efficiency reflects the capacity of an individual to undertake and continues physical efforts of sub-maximal nature for a relatively longer period of time. To measure cardiovascular efficiency, tests of physical works capacity and VO₂ max. have been developed to use in laboratory and field situations to assist the scientist, physical educators and coaches. If sophisticated instruments are not available making use of the aergometry certain indirect methods of estimation of VO₂ max. have been suggested. Austrian nomogram is one of such method. The performance of athletes is affected by different factors like physiological, psychological, motor traits etc. Many studies had been done in respect of physiological factor, psychological factor on the performance level and so on. So, the researcher is interested to compare the physiological variables among basketball, volleyball and handball players.

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Methodology

Subjects

The subjects were selected basketball, volleyball and handball players from the NCR region for this study. Ten (10) male players from each game namely basketball, volleyball and handball player groups were selected as the subject for the study. The comparison of each physiological variable such as VO₂ max was determined by the Rockport walking test. Maximum volume of air expired after forced inspiration corrected to 1/10th of a liter. It obtained by the help of dry Spiro meter. Resting heart rate was obtained by number of heart beats/minute during the resting condition. Hemoglobin content was assess by conducting the test in institute laboratory.

Statistical technique

To see the significant difference of selected physiological variables among basketball, volleyball and handball players, the analysis of variance “F-ratio” was applied at .05 level of significance. For further analysis “Post-Hoc Test” (LSD Test) was applied.

Finding

Findings pertaining to maximum oxygen consumption of players, which were subjected to one way analysis of variance and mean difference method, have been presented in the following tables:

Table 1: Analysis of Variance for Maximum Oxygen Consumption among Basketball, Volleyball and Handball Player

Sources of variance	d.f	S.S	M.S	F- value
(SS)b	2	101.286	50.643	8.487*
(SS)w	27	161.114	5.967	
Total	30			

*Significant at 0.05 level.
Tab0 .05(2, 27) = 3.35

The above table- 1 indicates that calculated F (8.487) is greater than Tabulated F (3.35). Hence, there were significant differences among basketball, volleyball and handball player in relation to maximum oxygen consumption. As F- ratio found to be significant, the data further analyzed with Post-hoc test (LSD test). The results pertaining to this are presented in Table 2.

Table 2: LSD Post Hoc Comparison for Maximum Oxygen Consumption among basketball, volleyball and handball player

Mean of different groups			Mean differences	Critical differences
Handball	volleyball	basketball	3.127*	2.234
72.727	75.854	77.094	4.367*	
72.727	75.854	77.094	1.24	

Above Table 2 indicates that there were significant differences in maximum oxygen consumption between handball (72.727) and volleyball (75.854) runners as well as handball (72.727) and basketball (77.094) players. However, there was no significant difference between basketball (77.094) and volleyball (75.854) players.

Findings pertaining to vital capacity of players, which were subjected to one way analysis of variance and mean difference method, have been presented in the following tables.

Table 3: Analysis of variance for vital capacity of players among basketball, volleyball and handball player

Sources of variance	Df	SS	MSS	F-ratio
(SS)b	2	104000	52000	0.228
(SS)w	27	6143000	227518.51	
Total	30			

*Significant at 0.05 level.
Tab F .05(2, 27) =3.35

The above table 3 indicates that calculated F (0.228) is less than the tabulated F (3.35). F-ratio found to be insignificant. Hence there were no significant differences among basketball, volleyball and handball player in relation to vital capacity. Findings pertaining to resting heart rate of players, which were subjected to one way analysis of variance and mean differences method, have been presented in the following table.

Table 4: Analysis of Variance for Resting Heart Rate among basketball, volleyball and handball player

Sources of variance	Df	SS	MSS	F-ratio
(SS)b	2	409.27	204.635	5.803*
(SS)w	27	952.2	35.26	
Total	30			

*Significant at 0.05 level.
Tab F .05(2, 27) = 3.35

The above table 4 indicates that calculated F (5.803) is greater than Tabulated F (3.35). Hence, there were significant differences among basketball, volleyball and handball player in relation to resting heart rate.

As F- ratio found to be significant, the data further analyzed with Post-hoc test (LSD test). The result pertaining to this are presented in table 5.

Table 5: LSD Post Hoc Comparison for Resting Heart Rate among basketball, volleyball and handball player

Means of different groups			Mean differences	Critical difference
Handball	Volleyball	Basketball	5.30	5.43
65.3	60.0	56.3	9.00*	
65.3	60.0	56.3	3.70	

Comparing the pair wise difference of means with critical difference, it is evident that there were no significant difference between the handball (65.3) - volleyball (60.0) groups and volleyball (60.0) - basketball (56.3) groups. Whereas there was significant difference between handball (65.3) and basketball (56.3). Thus, it may be concluded that basketball group (56.3) had the lowest resting heart rate i.e. basketball players had the efficient working of heart.

Findings pertaining to hemoglobin content of players, which were subjected one way analysis of variance and mean difference method, have been presented in the following tables.

Table 6: Analysis of Variance for Hemoglobin Content among basketball, volleyball and handball player

Sources of variance	Df	SS	MSS	F- ratio
(SS)b	2	6.2384	3.1192	2.26
(SS)w	27	37.2476	1.3795	
Total	30			

*Significant at 0.05 level.

Tab F .05(2, 27) = 3.35

The above table indicates that calculated F (2.26) is less than the tabulated F (3.35). F-ratio found to be insignificant. Hence there were no significant differences among basketball, volleyball and handball player in relation to hemoglobin content.

Discussion of finding

The analysis of data reveals that there is a significant difference in two physiological variables namely maximum oxygen consumption and resting heart rate among basketball, volleyball and handball player were found at the selected level of significance which establishes that basketball, volleyball and handball player, possesses different level of maximum oxygen consumption and resting heart rate. But in case of vital capacity and hemoglobin content it was noted that there were no significant differences among basketball, volleyball and handball player. After applying Post-hoc test in table – 2 it was found that there was no significant difference between volleyball (75.854) and basketball (77.094) players in their maximum oxygen consumption but, there were significant differences between handball (72.727) and volleyball (75.854) players and handball (72.727) and basketball (77.094) players. After applying Post-hoc test in table -6 it was found that there was no significant difference between the handball (65.3) - volleyball (60.0) groups and volleyball (60.0) - basketball (56.3) groups. Whereas there was significant difference between handball (65.3) and basketball (56.3). between first group (65.3) –second group (60.0) and second group (60.0) – third group (56.3) in their resting heart rate. However, there was significant difference between first group (65.3) and third group (56.3). As basketball had the lowest mean value in relation to resting heart rate, had the most efficient working of heart.

Summary and conclusion

The purpose of the study was to compare the selected physiological variables namely; maximum oxygen consumption, vital capacity, resting heart rate and hemoglobin content among Basketball, volleyball and Handball Players. The subjects were selected from the male Basketball, volleyball and Handball Players of NCR region for this study. Ten (10) male players from Basketball, volleyball and Handball Players were selected as the subject for the study. To see the significant difference of selected physiological variables among Basketball, volleyball and Handball Players, the analysis of variance “F-ratio” was applied at 0.05 level of significance. For further analysis “Post-Hoc Test” (LSD Test) was applied. The handball players had shown significantly different level of VO₂ max. (72.727) in comparison to handball players (75.854) and basketball (77.094) players. Further basketball player had shown better efficiency of heart as its mean value (56.3) was lowest among all the three groups in relation to resting heart rate. On the other hand basketball, volleyball and handball players had shown more or less same vital capacity and hemoglobin content with a small range of variation.

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