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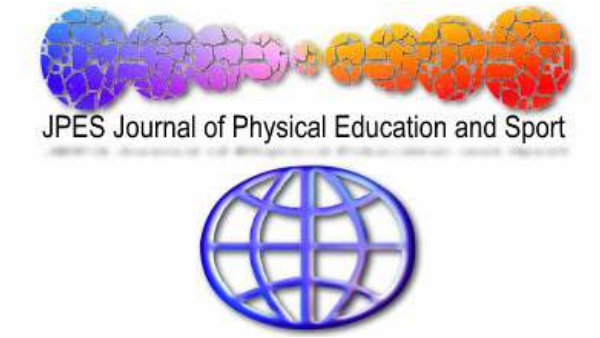

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ORIGINAL RESEARCH

COMPARISON OF SELECTED PHYSIOLOGICAL VARIABLES OF PLAYERS BELONGING TO VARIOUS DISTANCE RUNNERS

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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 various distance runners. The subjects were selected from the male athlete's of Gwalior district of various distance runners i.e. short, middle and long distance runners for this study. Ten (10) male athletes from each groups namely short, middle and long distance groups 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 belonging to various distance runners namely short, middle and long distance. To see the significant difference of selected physiological variables among the players belonging to various distance runners the analysis of variance "F-ratio" was applied at.05 level of significance. For further analysis "Post-Hoc Test" (LSD Test) was applied. The short distance runners had shown significantly different level of VO2 max (72.727) in comparison to middle distance (75.854) and long distance (77.094) runners. However, the middle and long distance runners had shown more or less same level of VO2. Further long distance runners 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 long, middle and short distance runners had shown more or less same vital capacity and hemoglobin content with a small range of variation.
Keywords: *VO2, Vital capacity, Resting heart rate, Hemoglobin, Distance runners*

INTRODUCTION

With all round advancement in the science of sports the new disciplines are emerging with micro-specialization. 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

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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. Cardio-vascular 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 cardio-vascular efficiency, tests of physical works capacity and VO_2 max. have been developed to use in laboratory and field situations to assists the scientist, physical educators and coaches. [1]

If sophisticated instruments are not available making use of the aergometry certain indirect methods of estimation of VO_2 max. have been suggested. Austrian nomogram is one of such method.[3] 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 the various distance runners. [2]

STUDY AIM

To compare the selected physiological variables of players belonging to various distance runners

METHODS

SUBJECTS

The subjects were selected from the male athlete's of Gwalior district out of various distance runners i.e. short, middle and long distance runners for this study. Ten (10) male athletes from each groups namely short, middle and long distance groups were selected as the subject for the study.

CRITERION MEASURE AND RELIABILITY OF DATA

Criterion measure for this study was to compare the Physiological variables such as Maximum oxygen consumption (VO_2 max), Vital capacity, Resting heart rate, Hemoglobin contents between the various distance runners i.e. short, middle and long distance runners. The reliability of data was ensured by establishing the instrument reliability and testers competence. Thirty male distance runners were selected by random method throughout district of Gwalior. In order to determine the consistency of measurements such as VO2 max., vital capacity, resting heart rate, hemoglobin content which were taken two times and reading were correlated to ascertain consistency in measurements, In case of selected physiological variables the test retest were employed. Retesting was done after one day gap. The attempt to conducting the test was under similar condition to those on the first day. The scores of first day test and retest were correlated to establish reliability of scores by using product moment correlation method. The statistical analysis of data pertaining to this presented in table-1.

Table-1
RELIABILITY CO-EFFICIENTS OF PHYSIOLOGICAL VARIABLES

Variables	Coefficient of correlation
Maximum oxygen consumption	**0.89**
Vital capacity	**0.88**
Resting heart rate	**0.90**
Hemoglobin content	**0.91**

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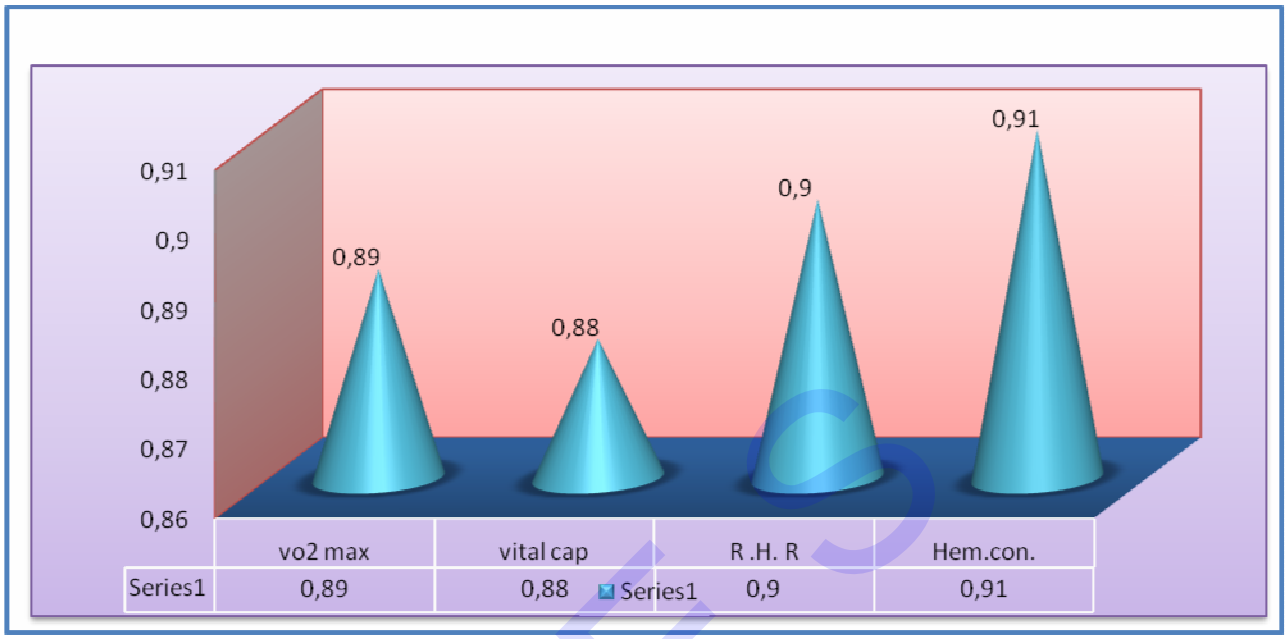
Figure-1
RELIABILITY CO-EFFICIENTS OF PHYSIOLOGICAL VARIABLES



PROCEDURE FOR COLLECTION OF DATA

The comparison of each physiological variables such as VO_2 max. was determined by the Rockport walking test. Maximum volume of air expired after forced inspiration corrected to $1/10^{th}$ 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 assessed by conducting the test in institute laboratory.

PROCEDURE FOR ADMINISTRATION OF TEST

The procedure for administration of the test for maximum oxygen consumption (vo_2 max) the subjects walking as fast as possible for one4 mile and then measuring the exercise heart rate and one mile time at the end of the walk. To measure maximum oxygen consumption the formula was as follows:-VO2 max. = 132.85-(.0769) x wt- (.3877) x age + (6.315) x gv- (3.2469) x 1ml walk time- (.1565) x heart rate.

For administration of vital capacity all subjects were stands at the beginning of the test. The mouth piece of dry spirometer was disinfected by an antiseptic solution used by each subjects. The subject was asked to take a deep breath before the test. Then after the fullest possible inhalation the subject exhaled slowly and steadily bending forward, till all the air within his control, was expelled. Care were taken to prevent air from escaping either through the nose or around the edge of the mouth –piece and it was also ensured that a second breath were not be taken by the subjects during the test. In case of doubt the test was re- recorded. The resting heart rate was taken early in the morning. Two minutes before taking the heart rate, the subjects were asked to rest in supine lying position on the bench. The tester used a stopwatch for taking the heart rate. The total number of heart beat per minute for each subject was recorded. A sample of blood was taken from each of the athletes. It was assess by conducting the test in institute laboratory by skilful and specialized experts with use of highly technological instruments.

STATISTICAL TECHNIQUE EMPLOYED FOR ANALYSIS

To see the significant difference of selected physiological variables among the players belonging to various distance runners 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 belonging to various distance runners which were subjected to one way analysis of variance and mean difference method have been presented in the following tables:

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Table- 2
COMPARISON OF MAXIMUM OXYGEN CONSUMPTION OF PLAYERS BELONGING TO VARIOUS DISTANCE RUNNERS.

Sources of variance	D.f	S.S	M.S	F- value
(SS)b (SS)w Total	r-1 =2 N-r =27 30	101.286 161.114	50.643 5.967	8.487

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

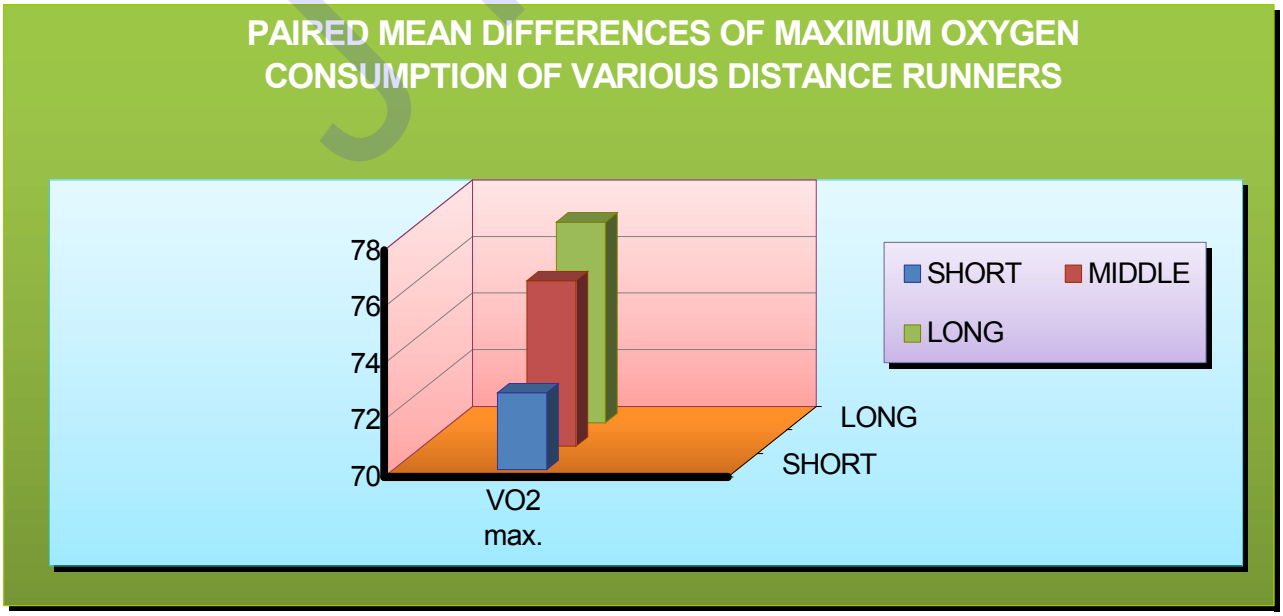
The above table- 2 indicates that calculated F (8.487) is greater than Tabulated F (3.35). Hence, there were significant differences between various distance runners in relation to maximum oxygen consumption. As F- ratio found to be significant, the data further analyzed with Post-hoc test (LSD test). The results pertaining to this are presented in Table. 3

Table-3
PAIRED MEAN DIFFERENCES OF MAXIMUM OXYGEN CONSUMPTION OF VARIOUS DISTANCE RUNNERS.

Mean of different groups			Mean differences	Critical differences
I	II	III		
72.727	75.854		3.127	
72.727		77.094	4.367	2.234
	75.854	77.094	1.24	

Above Table 3 indicates that there were significant differences in maximum oxygen consumption between short distance (72.727) and middle distance (75.854) runners as well as short distance (72.727) and long distance (77.094) runners. However, there was no significant difference between long distance (77.094) and middle distance (75.854) runners.

Figure.3



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

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Table-4
COMPARISON OF VITAL CAPACITY OF PLAYERS BELONGING TO VARIOUS DISTANCE RUNNERS.

Sources of variance	Df	SS	MSS	F-ratio
(SS)b (SS)w Total	r-1 = 2 N-r = 27 30	104000 6143000	52000 227518.51	0.228

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 between various distance runners in relation to vital capacity.

Findings pertaining to resting heart rate of players belonging to various distance runners which were subjected to one way analysis of variance and mean differences method have been presented in the following tables:

Figure-4
COMPARISON OF VITAL CAPACITY OF PLAYERS BELONGING TO VARIOUS DISTANCE RUNNERS.

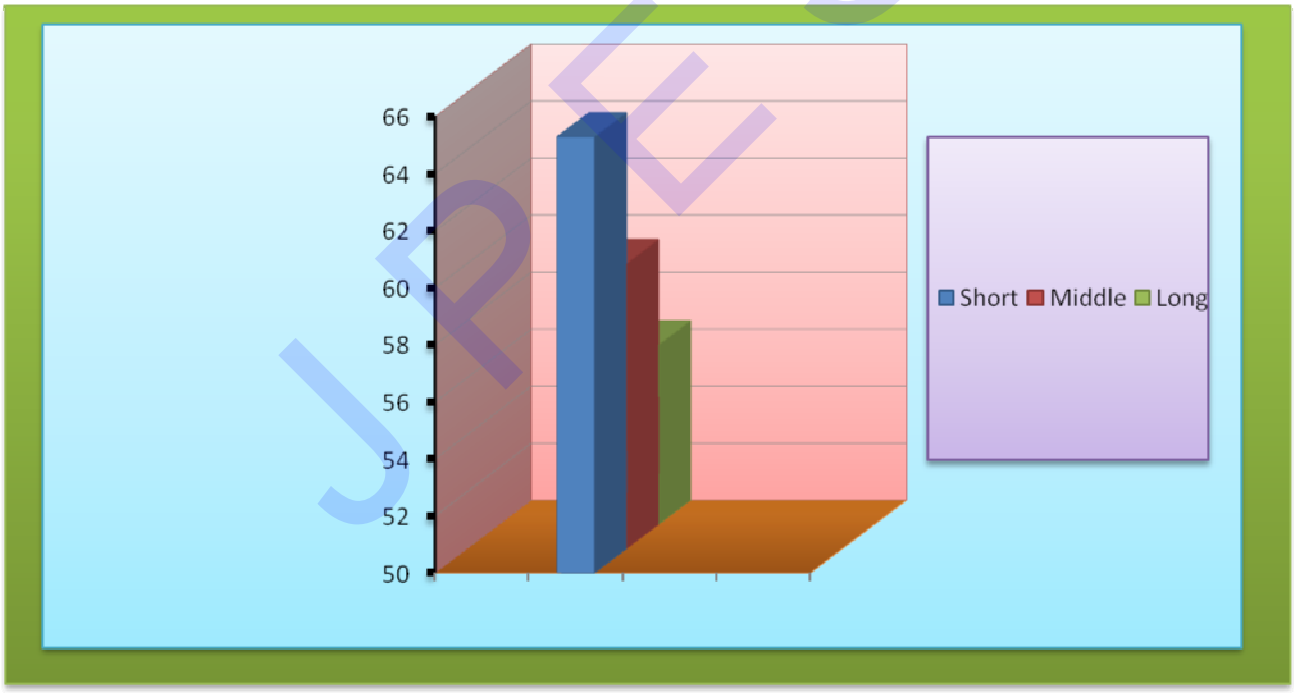

Table-5
COMPARISON OF RESTING HEART RATE OF PLAYERS BELONGING TO VARIOUS DISTANCE RUNNERS.

Sources of variance	Df	SS	MSS	F-ratio
(SS)b (SS)w Total	r-1= 2 N-r= 27 30	409.27 952.2	204.635 35.26	5.803

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 between various distance runners in relation to resting heart rate.

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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 6.

Table-6
PAIRED MEAN DIFFERENCES OF RESTING HEART RATE OF VARIOUS DISTANCE RUNNERS.

Means of different groups			Mean differences	Critical difference
I	II	III		
65.3	60.0		5.30	
65.3		56.3	9.00	5.43
	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 first (65.3) - second (60.0) groups and second (60.0) - third (56.3) groups. Where as there was significant difference between first group (65.3) and third group (56.3). Thus, it may be concluded that third group (56.3) had the lowest resting heart rate i.e. long-distance runners had the efficient working of heart.

Findings pertaining to hemoglobin content of players belonging to various distance runners which were subjected one way analysis of variance and mean difference method have been presented in the following tables:

Table – 7
COMPARISON OF HEMOGLOBIN CONTENT OF PLAYERS BELONGING TO VARIOUS DISTANCE RUNNERS.

Sources of variance	Df	SS	MSS	F- ratio
(SS)b	r- 1= 2	6.2384	3.1192	
(SS)w	N-r= 27	37.2476	1.3795	2.26
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 between various distance runners 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 of various distance runners were found at the selected level of significance which establishes that various distance runners 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 the various distance runners. After applying Post-hoc test in table – 2 it was found that there was no significant difference between middle distance (75.854) and long distance (77.094) runners in their maximum oxygen consumption but, there were significant differences between short distance (72.727) and middle distance (75.854) runners and short (72.727) and long(77.094) distance runners. After applying Post-hoc test in table -5 it was found that there was no significant difference 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 third group had the lowest mean value in relation to resting heart rate, had the most efficient working of heart.

The significant differences in some variables of distance runners were probably due to the different nature of training and pre-requisite components for athletes. Such results may be due to small size of sample and other factors such as different body type, difference in the body composition etc.

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 various distance runners. The subjects were selected from the male athlete's of Gwalior district of various distance runners i.e. short,

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middle and long distance runners for this study. Ten (10) male athletes from each groups namely short, middle and long distance groups were selected as the subject for the study. To see the significant difference of selected physiological variables among the players belonging to various distance runners the analysis of variance "F-ratio" was applied at.05 level of significance. For further analysis "Post-Hoc Test" (LSD Test) was applied. The short distance runners had shown significantly different level of VO2 max. (72.727)in comparison to middle distance (75.854) and long distance (77.094) runners. However, the middle and long distance runners had shown more or less same level of VO2. Further long distance runners 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 long, middle and short distance runners had shown more or less same vital capacity and hemoglobin content with a small range of variation.

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