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I. INTRODUCTION

The lungs, heart and blood vessels perform a vital function as the body's supply system. They supply the muscles with the necessary fuels and oxygen, and carry away waste products such as carbon-dioxide (co₂) and lactic acid. Consequently, the cardio-respiratory system in the athlete needs to be developed to match the muscles which it supplies and cleanses. It is believed that bigger the lungs and heart size greater will be the cardio-respiratory efficiency. Hence the Research Scholar undertook the present study to determine the relationship among the selected variables as well to find out the difference among the Football, Volleyball and Handball.

a) *Statement of the problem*

The research scholar was interested to undertake the study stated as "An Analytical Study of Chest Girth, Vital Capacity and Respiratory Rate of Intercollegiate Players of Selected Ball Games".

b) *Purpose of the study*

1. The main purpose of the study was to find out the relationship among selected variables i.e. the Chest girth, Vital capacity and Respiratory rate of intercollegiate players of selected ball games.
2. The other purpose of the study was to determine the difference in Chest girth, Vital capacity and Respiratory rate among the players of three selected ball games.

c) *Significance of the study*

1. The findings of the study would be helpful to the physical education teachers, coaches and players to know the relationship among the chest girth, vital capacity and respiratory rate.
2. The result of the study would help for diagnostic purpose.

3. The findings might help to know which sportsmen possess greater vital capacity and strong respiratory rate hence suitable training programme may be advised accordingly.

d) *Hypothesis*

1. On the basis of literature, discussion with the experts and scholar's own understanding it was hypothesized that there will be positive co-relation among the selected variables.
2. It was further hypothesized that there will be significance differences in chest girth, vital capacity and respiratory rate among the intercollegiate players of selected ball games.

e) *Delimitations*

The present study was restricted to the following aspects:-

1. 30 male inter collegiate players were selected from Pt. R.S. University, Raipur.
2. The age of the subjects was ranging from 18 to 28 years.
3. The study was further delimited to the following selected variables: Chest girth, vital Capacity and respiratory rate.
4. The study also delimited to Football, Handball and Volleyball players only.

f) *Limitations*

1. Coaching and physical education background of the subjects were unknown to the research scholar.
2. The social and economical statuses of the subjects were not known.
3. Diet of the subjects was unknown.
4. Daily routine activities of the subjects were also unknown to the scholar.

II. OPERATIONAL DEFINITION OF THE TERMINOLOGIES

a) *Chest girth*

Chest girth is the circumference of chest at the level of the nipples in front sub scapular region at the back and is measured at the end of a normal expiration.

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b) *Vital capacity*

It can be defined as the total volume of air that can be forcibly expire after a complete inspiration.

c) *Respiratory rate*

Number of breaths taken in a minute or number of inspiration/expiration in a minute.

III. DESIGN OF THE STUDY

In this chapter selection of subjects, sources of data, selection of tests and criterion measures, administration of test and collection of data are described.

a) *Sources of Data*

For the present study intercollegiate male players of Physical Education were the sources of data.

b) *Selection of Subjects*

30 male intercollegiate players of Pt. R.S. University, Raipur, 10 from each selected sports were selected as subjects for the purpose of the study. The age of the subjects was ranging from 18 to 28 years.

c) *Sampling Procedure*

Simple random sampling method was adopted for the present study.

d) *Criterion Measures*

The criterion measures chosen for the present study were as under -

1. Chest girth was measured by using non stretchable steel tape, and the score was recorded in cm.
2. Vital capacity was measured by using wet spirometer, and the score was recorded in litre.
3. The respiratory rate was counted by using stop watch, and the score was recorded in numbers of exhalation or inhalation in one minute.

e) *Collection of Data*

The data pertaining to the study were collected by applying the selected above mentioned tests following the under described procedures.

f) *Administration of Tests*

i. *Chest girth*

Purpose:- to measure the chest circumference of the subjects.

Equipment:- non stretchable steel tape.

Scoring:- the average of the three measurements was recorded in cm.

ii. *Vital capacity*

Purpose:- to measure the volume of air in the lungs at the end of maximal inspiration.

Equipment:- Wet spirometer

Scoring:- the tester observed the indicator closely to note when it had reached the highest point. The score was recorded in litres.

iii. *Respiratory rate*

Purpose:- To measure the inhalation and exhalation of the subjects.

Equipment:- stop watch and mat.

Scoring:- The total number of exhalation or inhalation per minute was recorded for each subject.

IV. ANALYSIS AND INTERPRETATION

a) *Finding*

The data collected on chest girth, vital capacity and respiratory rate of football, volleyball and handball players were computed by using Pearson's Product Moment co-efficient correlation and one way analysis of variance (F- ratio) statistical techniques. The result pertaining to these have been presented in the following tables.

Table 1: Relationship of Chest Girth, Vital Capacity and Respiratory Rate of Intercollegiate Players of Selected Ball Games

GAME	VARIABLES CORRELATED	CO – EFFICIENT OF CORRELATION
Football	Chest Girth and Vital capacity	0.655*
	Chest Girth and Respiratory rare	- 0.772*
	Vital capacity and Respiratory rate	- 0.419
Volleyball	Chest Girth and Vital capacity	0.86*
	Chest Girth and Respiratory rate	- 0.88*
	Vital capacity and Respiratory rate	- 0.08
Handball	Chest Girth and Vital capacity	0.86*
	Chest Girth and Respiratory rate	- 0.71*
	Vital capacity and Respiratory rate	- 0.73*

An analysis of data of football players in Table- 1 reveals that there is significant positive correlation in

between chest girth and vital capacity as the calculated r – value of 0.655 is higher than the tabulated r –value of

0.632 at 0.05 level for 8 degrees of freedom, there is also significant negative correlation in between chest girth and respiratory rate as the calculated r- value of 0.772 is higher than the tabulated r- value of 0.632 but there is no significant correlation between vital capacity and respiratory rate as the calculated r- value of 0.419 is lesser than the tabulated r- value of 0.632 at 0.05 level for 8 degrees of freedom.

For analysis of data of volleyball players, there is significant positive correlation in between chest girth and vital capacity as the calculated r- value of 0.86 is higher than the tabulate r- value 0.632, there is also significant negative correlation in between chest girth and respiratory rate as the calculated r- value of 0.88 is higher than the tabulated r- value 0.632, but there is no

significant correlation between vital capacity and respiratory rate as r-value of 0.08 is lesser than the tabulated r- value of 0.632 at 0.05 level for 8 degrees of freedom.

For analysis of data of handball players, there is significant positive correlation in between chest girth and vital capacity as the calculated r- value of 0.86 is higher than the tabulated r- value of 0.632, there is also significant negative correlation in between chest girth and respiratory rate as the calculated r- value of 0.71 is higher than tabulated r- value of 0.632, and also significant negative correlation in between vital capacity and respiratory rate as the calculate r- value of 0.73 is higher than the tabulate r- value of 0.632 at 0.05 level for 8 degrees of freedom.

Table 2: Comparison of chest girth, vital capacity and respiratory rate among the Intercollegiate male players of Football, Volleyball and Handball

VARIABLE	SOURCE OF VARIATION	DEGREE OF FREEDOM	SUM SQUARE	MEAN SUM OF SQUARE	F-- RATIO
Chest girth	Between the groups	k-1 = 3-1 =2	34.4	34.4/2=17.2	17.2/38.8 = 0.44
	Within the groups	N-K = 30- 3 = 27	1047.6	1047.6/27 = 38.8	
Vital capacity	Between the groups	k-1 = 3-1 =2	2.74	2.74/2=1.37	1.37/0.40 =3.42*
	Within the groups	N-K = 30-3 =27	10.83	10.83/27=0.40	
Respiratory rate	Between the groups	k-1 = 3-1 =2	6.07	6.07/2=3.04	3.04/3.92 =0.78
	Within the groups	N-K = 30-3 =27	105.8	105.8/27 =3.92	

Table-2 reveals that there are significant difference of vital capacity among the intercollegiate players of selected three ball games as the calculated 'F' value of 3.42 is higher than the tabulated 'F' value of 3.35 at 0.05 level for (2,27) degree of freedom. But there are no significant difference of chest girth and respiratory rate among the intercollegiate players of selected three ball

games as the calculated 'F' values, respectively 0.44 and 0.78 are lesser than the tabulated 'F' value of 3.35 at 0.05 level for (2,27) degree of freedom.

Since the obtained F- ratio was found to be significant, the Least Significant Difference Post Hoc Test was applied to determine the paired mean difference among the selected groups has been shown in Table-3.

Table 3: Paired mean difference of vital capacity among football, volleyball and handball players

MEAN OF			MEAN DIFFERENCE	CRITICAL DIFFERENCE
FOOT BALL	VOLLEY BALL	HAND BALL		
4.07	3.49		0.58*	0.57
4.07		4.18	0.11	0.57
	3.49	4.18	0.69*	0.57

The findings of table-3 reveals that there is significant difference of vital capacity in between the football and volleyball players and also volleyball and handball players as the mean difference of 0.58 and 0.69 respectively are higher than the critical difference of 0.57

at 0.05 level. But there is no significant difference of vital capacity in between the football and handball games players at 0.05 level as means difference of 0.11 is lesser than the critical value of 0.57.

The difference of mean values has been picturesquely depicted in Fig -1

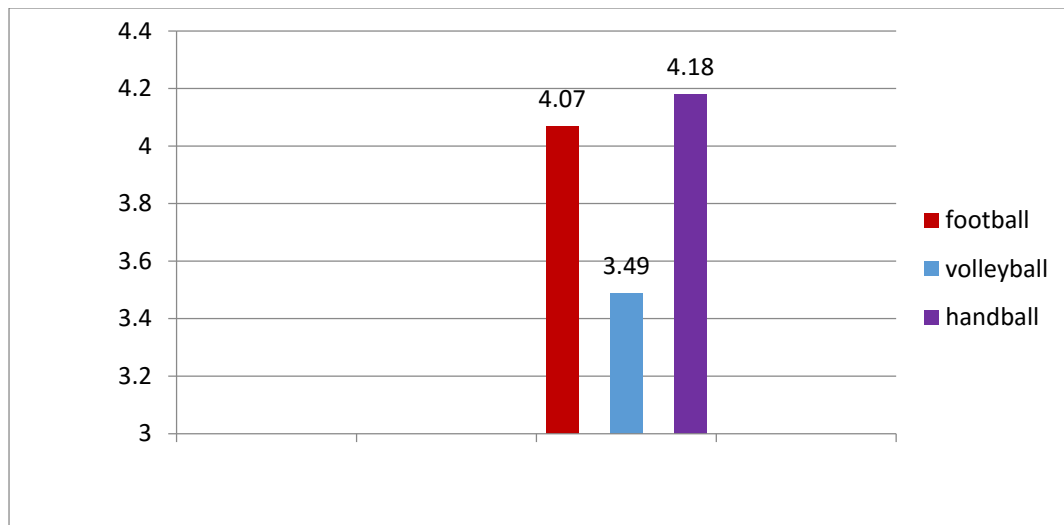


Fig. 1

• Discussion on Findings

It is learnt from the findings of Table -1 that there are significant positive correlation in between chest girth and vital capacity ($r=0.655, 0.86$ and 0.86) of Football, Volleyball and Handball players respectively. The significant positive correlation might have occurred may be attributed to the fact that greater vital capacity depends upon the size of lungs and efficiency of the intercostals muscles which are attached to the ribs of the chest cavity, hence such results occurred in this study.

The findings of Table-1 reveals that there are negatively significant correlation in between chest girth and respiratory rate ($r= - 0.772, - 0.88$ and $- 0.71$) of Football, Volleyball and Handball players it may be because less respiratory rate is the product of bigger chest cavity and efficient lungs function, hence this results occur.

Significant relationship also shown in between respiratory rate and vital capacity ($r= - 0.73$) of Handball players it may probably be due to optimal improvement of lungs efficiency.

Findings of Table-3 showed that there are significant mean difference in vital capacity between the Football and Volleyball players ($MD= 0.69$), the significant mean difference occur may be one of the fastest game in the world and completely combination of Aerobic and Anaerobic nature of activity hence they need to improve the vital capacity, according larger vital capacity was shown by the handball players in comparison to volleyball and football players.

V. CONCLUSION

Under the limitation of the study and on the basis of statistical findings it concluded that there are significant positive correlations in between chest girth

and vital capacity and negatively significant correlations in between suggested that to improve vital capacity and develop respiratory rate need to pay due attention for improvement of the chest girth. It is also concluded that handball players showed higher vital capacity than the football and volleyball players, hence due importance to be given while construct a training schedule for the handball players.

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