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Study of selected respiratory parameters of baseball and softball players: A comparative approach array antenna

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Abstract
The purpose of the study was to compare the selected respiratory parameters of female baseball and softball Delhi State players. Total sample of forty (N=40) which includes twenty each, baseball (N =20, Mean ± SD: 20.72 ± 1.11 years,) and softball (N =20, mean ± SD: 20.98 ± 1.89 years) female players were selected randomly to investigate the result of the study. The selected participants have represented in Delhi State Championship. The age of the subjects ranged from 17-24 years. Selected respiratory parameters i.e. maximum inspiratory breath holding capacity and vital capacity were measured with "Med-Spiror" a computerized spirometer. All subjects were informed about the aim and methodology of the study and they volunteered to participate in this study. Statistical technique, the independent t-test was applied to assess the differences between baseball and softball players. The level of significance was set at 0.05. The results of study revealed that there was no significant difference found between female baseball and softball players with regard to maximum inspiratory breath holding capacity ($p > 0.05$) and vital capacity ($p > 0.05$) respectively.

Keywords: respiratory parameters, baseball, softball, spirometer, vital capacity, maximum breathe holding capacity

Introduction
Breathing and exercise have always been closely linked in athletic training and keep-fit propaganda and any physical effort is quite obviously dependent on an efficient pulmonary ventilation. In fit people exercising under normal conditions however it is not the respiratory capacity which limits maximum effort but rather the efficiency of the heart in producing an adequate cardiac output. Breathing is a continuing process in which air is either moving into the lungs or out of it at a rate which varies throughout the cycle. For example, in hard work it may vary from a peak flow of 100 litres per minute in mid-inspiration or mid-expiration to zero between these phases. This is an important fact to consider in design of breathing apparatus for such activities as mountain climbing, high altitude flying or underwater swimming.

Respiratory system is an important system of human body where gaseous exchange takes place with diffusion of enormous amounts of oxygen into the blood during physical activity (Khurana, 2005) [9].

By two minutes of exercise, the body responds to supply working muscles with oxygen. When oxygen is present, glucose can be completely broken down into carbon dioxide and water in a process called aerobic respiration. The glucose can come from three different places:

- Remaining glycogen supplies in the muscles
- Breakdown of the liver's glycogen into glucose, which gets to working muscle through the bloodstream
- Absorption of glucose from food in the intestine, which gets to working muscle through the bloodstream

Softball
Softball is played between two teams on a large field, with nine players from one team on the field at a time. The field is usually composed of a dirt or brick-dust infield that contains the quadrilateral shape and running areas, and a grass outfield. There are four bases on the infield (first base, second base, third base, and home plate); the bases are arranged in a square and are typically 45 to 65 feet (13,7 to 19,8 meters) apart. Near the center of this square is the pitcher's circle, and within the circle is the "rubber", a small flat rectangular piece of rubber about a foot and a half in length. The rubber can be 40 or 43 feet away from home plate, depending on age level and the league one is playing in.

The object of the game is to score more runs (points) than the other team by batting (hitting) a ball into play and running around the bases, touching each one in succession. The ball is a sphere of light material, covered with leather or synthetic material. It is 10 to 12 inches (or rarely, 16 inches (28 to 30.5 centimeters) in circumference.

The game is played in usually seven innings. Each inning is divided into a top half, in which the away team bats and tries to score runs, while the home team occupies the field and tries to record three outs; then a bottom half, when the teams' roles are reversed. Some leagues play with a reduced number of innings or with a time limit, rather than the traditional seven innings.

Baseball
Baseball is a bat-and-ball game played between two teams of

nine players each, who take turns batting and fielding. The batting team attempts to score runs by hitting a ball that is thrown by the opposing team's pitcher with a bat swung by the batter, then running counter-clockwise around a series of four bases: first, second, third, and home plate. A run is scored when a player advances around the bases and returns to home plate.

Players on the batting team take turns hitting against the pitcher of the fielding team, which tries to prevent runs by getting hitters out in any of several ways. A player on the batting team who reaches a base safely can later attempt to advance to subsequent bases during teammates' turns batting, such as on a hit or by other means. The teams switch between batting and fielding whenever the fielding team records three outs. One turn batting for both teams, beginning with the visiting team, constitutes an inning. A game is composed of nine innings, and the team with the greater number of runs at the end of the game wins. If scores are tied at the end of nine innings, extra innings are usually played. Baseball has no game clock, although almost all games end in the ninth inning.

Procedure

Material and methods

Subjects Selection

A sample of forty (N=40) female athletes, which includes twenty each, baseball (N =20, Mean ± SD: 20.72 ± 1.11 years,) and softball (N =20, mean ± SD: 20.98 ± 1.89 years) athletes who participated in Delhi State Competitions were volunteered to participate in this study. All the participants were informed about the aim and methodology of the study and they volunteered to participate in this study. The purposive sampling technique was used to select the subjects for the study.

Selection of Variables

The study was conducted on selected respiratory parameters i.e. vital capacity and maximum inspiratory breath holding capacity of baseball and softball players. The necessary data was collected by computerized spirometer "Med-Spiror" following the procedures and predicted values recommended by the American Thoracic Society.

Criterion Measures and Administration of Test

Respiratory functions were measured with a computerized spirometer "Med-Spiror" following the procedures and predicted values recommended by the American Thoracic Society. Before recording the respiratory function tests, subjects were shown a demonstration of the tests. Consequently, a minimum of three readings were recorded for each test of every subject and the best of the three was considered for having reproducibility and validity of the recorded test. The selected respiratory variables i.e. vital capacity, maximum inspiratory breath holding capacity.

Statistical Technique

As the values are presented as mean values and SD. Independent samples t- test was used in order to test if population means estimated by two independent samples differed significantly. Data was analyzed using SPSS Version 20.0 (Statistical Package for the Social Sciences, version 20.0, SPSS Inc, and Chicago, IL, USA). The level of significance was set at 0.05.

Results

Finding pertaining to the descriptive Statistics of the players from selected groups on the selected respiratory parameters has been presented in Table 1. The values of mean, standard deviation and standard error of mean for Baseball and Softball were shown in Table 1.

Table 1: Descriptive statistics of the players from selected groups on the selected respiratory variables

Group Statistics				
Respiratory Function Variables	**Sports**	**N**	**Mean**	**Std. Deviation**
Vital Capacity(liters)	Baseball	20	2.80	.32
	Softball	20	2.70	.29
Maximum Inspiratory Breath Holding capacity(sec)	Baseball	20	37.51	5.98
	Softball	20	34.50	5.07

The following interpretation could be made on the basis of results shown in above output

The value of mean and standard deviation for baseball and softball female players was given in table no 01

Table-1: shows the descriptive statistics of female baseball and softball players. The mean vital capacity of baseball players was 2.80 liters whereas softball player was 2.70 liters. The mean maximum inspiratory breath holding capacity of baseball players was 37.51 sec and softball players was 34.50 sec.

Table 2: t- table for selected respiratory parameters of baseball and softball players.

Independent Samples Test				
Respiratory Function Variables	**t-test for Equality of Means**			
	t	**df**	**Sig. (2-tailed)**	**Mean Difference**
vital capacity	1.05	38	0.265	0.03
Maximum inspiratory breath holding capacity	1.72	38	0.151	3.01

Hence, Table 2 presents the respiratory parameters of baseball and softball players. It was evident from the results that no significant differences were found among the baseball and softball players with regard to vital capacity (p> 0.05) and

Maximum inspiratory breath holding capacity (p> 0.05) respectively. While comparing the means, it can be revealed that there was no significant difference in the means of baseball and softball players which can conclude that baseball and softball players were similar on selected respiratory parameters because the baseball and softball players follow the same schedule .Therefore there was no significant difference found between the players.

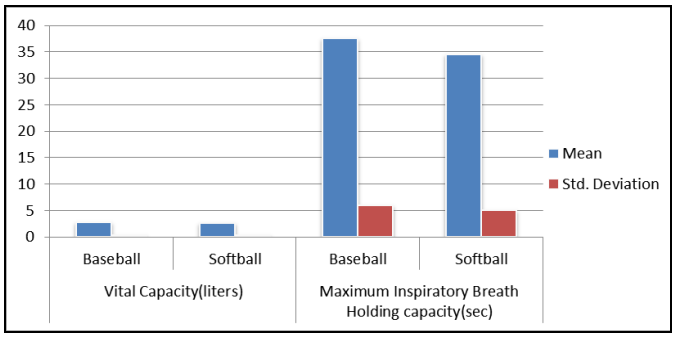

Fig 1: Graphical representation of mean and standard deviation between baseball and softball players on selected respiratory parameters

Discussion

The analysis of the data clearly shows that there was no significant difference between the selected respiratory parameters of baseball and softball players when compared with each other. On the basis of results shown, we can say that they were equal on selected respiratory parameters. These results were found due to the same nature of the games as both baseball and softball games are of same nature and the duration of the games are also similar, in both the games similar amount of physical fitness as well as physiological fitness was required and also the skills that are used in both the games are similar so we can say that baseball and softball players are equal on selected respiratory parameters and hence no significant difference were found.

Conclusion

Hence, no significant differences were found between baseball and softball players with regard to selected respiratory parameters. There was no difference in the means of baseball and softball players. So it means baseball and softball players are similar on selected respiratory parameters respectively.

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