A STUDY OF FORCE VITAL CAPACITY PROFILE OF KHO- KHO PLAYERS OF WASHIM DISTRICT

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Abstract
Kho-Kho ranks as one of the most popular traditional sports in India. The purpose of the present study was to assess and compare the force vital capacity (FVC) profile of Kho-Kho male and female players, one hundred twenty-six players (27 male and 45 female) and non-players (27 male and 27 female) aged 17 to 28 years were selected for the present study. FVC was consider as dependent variable whereas sports participation and gender considered as independent variable. Descriptive statistics and Analysis of variance (ANOVA) was used for analyzing the data. The level of significance was set at 0.05 level. The result of the present study showed males participants were significantly had higher FVC than female, statistically significant differences was observed between Kho-Kho players and control subject and significant interaction effects of gender and sports participation was observed on FVC.
Keywords: *force vital capacity (FVC), Kho Kho, Profile, Players, Spirometry*

Introduction:

Respiratory function tests are part of assessment of respiratory system. The tests can measure individual parts of the respiratory process and, therefore, need to be selected appropriately. Spirometry is the basic screening test for assessing mechanical load which is very important for sports person. There are many different respiratory function tests, each with strengths and weaknesses. Load assessment is best done with spirometry. This provides a written record of slow (VC) and/or forced vital capacity (FVC). The origin of Kho-Kho is difficult to trace, but many historians believe, that it is a modified form of 'Run Chase', which in its simplest form involves chasing and touching a person. With its origins in Maharashtra, Kho-Kho in ancient times, was played on 'Raths' or Chariots, and was known as Rathera. Like all Indian games, it is simple, inexpensive and enjoyable. It does, however, demand physical fitness, strength, speed and stamina. Dodging, feinting and bursts of controlled speed make this game quite thrilling. To catch by pursuit - to chase, rather than just run - is the capstone of Kho-Kho. Kho-Kho is played by 2 teams of 12, in a field that measures 27 m by 16 m, but only nine players take the field for a game or contest. Participation in Kho-Kho game leads to physiological adaptations like Cardio-respiratory endurance, which has an effect on performance of the player. Astrand (1998) reported some differences come into sight over time for the people who were active and non-active in their physical capacity and proper functioning of organs and systems, and these differences are always evolving in fewer of those who are active and participate in sports. Hoare (2000) reported anthropometric, physical and cardiorespiratory profiles contribute to selection procedures in different sports events. Spirometry is a physiological test which measures various lung functions. The primary indication calculated in spirometry may be volume or flow. The most important parameter of spirometry is the forced vital capacity (FVC), which is the volume delivered during an expiration made as forcefully and completely as possible starting from full inspiration**.** FVC is the maximal volume of air exhaled with maximally forced effort from a maximal inspiration, i.e. vital capacity performed with a maximally forced expiratory effort, expressed in litres at body temperature (American Thoracic Society 2005).

Methods

Subjects

One hundred twenty-six male and female subjects were selected for the present study. The sample consisting of 27 males and 45 female Kho-Kho players and fifty-four control group consisting of 27 males and 27 female non-players.

Variable:

In this study the FVC consider as dependent variable whereas sports participation and gender considered as independent variable.

Statistical Analysis:

In order to find out FVC profile of Kho-Kho players and non-player's descriptive statistics and Analysis of variance (ANOVA) was used. The level of significance was set at 0.05 level.

Collection of data:

Data was collected through Spirodoc Spirometer.

TABLE- 1
Descriptive statistics of FVC of Kho-Kho Players and Non- Players Unit

Male		Female		ANOVA	
Players	Non-Players	Players	Non-Players	F-value	Significance
3.84 ± 0.25	2.34 ± 0.36	2.28 ± 0.07	2.11 ± 0.12	9.98	p<0.01

Table 1: Shows Mean, Standard Error, Standard Deviation, Range, Minimum and Maximum the FVC (liter/Sec) for four groups. In case of male Kho-Kho players the observed values are 3.84 ± .02, 1.28, 5.32, 1.45 and 6.77 respectively for the measure of Mean, Standard Error, Standard Deviation, Range, Minimum and Maximum. The observed values of FVC Male Non-Players are 2.33 ± 0.35, 1.85, 8.13, 0.16 and 8.29 respectively. In case of FVC (liter/Sec) the average score found higher in male Kho-Kho players as compared to male Non-Players.

In case of Female Players, the observed values are 2.28 ± 0.06, 0.45, 2.1, 1.54 and 3.64 respectively for the measure of Mean, Standard Error, Standard Deviation, Range, Minimum and Maximum. The observed value of Female Non-Players is 2.11 ± 0.11, 0.61, 2.69, 1.12 and 3.18 respectively for the measure of Mean, Standard Error, Standard Deviation, Range, Minimum and Maximum. In case of FVC (liter/Sec) the average score found higher in female Kho-Kho players as compared to female Non-Players.

TABLE- 2
Comparison of means of FVC (liters) (Two Way ANOVA) among Kho-Kho Players and Non- Players

Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Gender	23.056	1	23.056	18.515	.000	.132
Participation	20.538	1	20.538	16.493	.000	.119
Gender * Participation	12.431	1	12.431	9.982	.002	.076
Error	151.920	122	1.245			
a. R Squared = .256 (Adjusted R Squared = .238)						

Table: 2 A two-way ANOVA was run on a sample of 126 participants to examine the effect of gender and sports participation on FVC. Simple main effects analysis showed that males participants were significantly had higher FVC than female F (1,126) =18,515, p < 0.001. Partial Eta squared of 0.132 shows that 13% variance in FVC depends on gender. Statistically significant differences between Kho-Kho players and control F (1,126) =16.493, p <0.000 was also observed. Partial Eta squared of 0.119 shows that 11% variance in FVC depends on participation.

There was a significant interaction between the effects of gender and sports participation on FVC, F (3,126) = 9,982, p = 0002. Partial Eta squared of 0.076 shows that 7.6% variance in FVC depends on the joint impact of gender & participation.

Discussion

The result of the present showed participation in Kho-Kho has positive effect on the important respiratory function FVC as it is well evident that the game of Kho-Kho stress cardio-respiratory system and lead to adaptive changes. The respiratory muscles which were composed of the diaphragm, external and internal intercostals, parasternal, sternomastoid, scalene, external and internal oblique and abdominal muscles were the crucial organ in mammals by which oxygen was delivered to the red blood cells and concomitantly carbon dioxide was removed and expelled into the environment and play important role during exercise (Ratnovsky et al., 2008; Amonette and Dupler, 2002). American Thoracic Society (1995) revealed that the highest FVC from tests of acceptable excellence were used for investigation. Holmen, Barrett-Connor, Clausen, Holmen and Bjermer (2002) reported larger lung capacity (FVC) independent of age and height in sportsmen with higher levels of physical work out. Above literature support the finding of the present study. However, Alpay B, Altug K, Hazar S (2008) revealed in their study that FVC values as 3.13±0.68 L for the children who engaged in sports and as 2.71±0.64 L for the children who not engaged in sports, and between the forced vital capacity of these 11 to 13 age groups they found a meaningful (p<0.01) difference. In the support of above study, we found FVC values as 3.84±0.24 L for the male Kho Kho players and 2.34±0.35 L for non players, and in case of female Kho Kho players the average values are 2.28±0.06 and as female non players the average values are 2.11±0.11.

Conclusion

Participation in Kho-Kho caused increase in FVC, as indicated through the significant difference in FVC between players and non-players, players showed higher FVC volume. It is also concluded that male had higher FVC as compared to female, significant interaction effects of gender and sports participation on FVC was also documented.

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