

# Pulmonary Function: School Games Federation Boys Under-17 Players of Basketball, Handball and Netball (2015-16)

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**Abstract-** *The desirability of a minimum quality of strength has long been recognized in athletics. However the advantages of maximum levels of strength for all sports in which power is a factor were not recognized by physical educators, athletics or coaches until quite recently. In athletics, there are few sports in which endurance is not a factor, and in many sports all of the training and conditioning programs are directed towards this end. The need of flexibility varies with the athletic endeavor, but in some activities it is all important. Many coaches and physical education teachers work with the individuals between the age five and eighteen years. Children's interest and participation in competitive sports has increased dramatically in recent years. In the human organism, the vast majority of tissues are not in direct contact with the external environment, and for this reason a specialized respiratory system is necessary to provide O<sub>2</sub> for their metabolic demand. Hence, the present study was undertaken with a view to compare the Forced vital capacity and Forced expiratory volume among Basketball, Netball and Handball players. The collected data on FVC (l/min) and FEV<sub>1</sub> sec (l/min) was analyzed by one way ANOVA and, if the obtained 'F' is significant LSD Post hoc test was employed to find out the mean difference among the groups. It was concluded that Handball players are having better pulmonary function followed by Basketball players. Pulmonary functions are also included to identify the sportsman for specific sports like Handball and Basketball.*

**Keywords-** Forced Vital Capacity, Forced Expiratory Volume in one second, Adolescent.

## I. INTRODUCTION

Exercises performed regularly in any form are beneficial for health (Ward, 1994). Due to regular training, workouts and exercises the pulmonary capacity of an individual increases as compared to non-exercised individual. Breathing and exercise have always been closely linked in athletic training and keep fit propaganda and any physical effort is quite obviously dependent on efficient pulmonary ventilation (Stanley Miles, 1969). Breathing properly is necessary for an athlete as it increases lung capacity of athlete

which in turn helps to stay strong during physical activity and helps in the improvement of performance. The more an athlete has a lung capacity the more he feels energetic and feels more refreshed after every sports activity, and it also helps him in prevention of respiratory problems (Jeanne Rose, 2012).

Forced vital capacity (FVC) is the utmost amount of air a person can exhale from the lungs after a deepest breath he/she can take. Forced expiratory volume (FEV<sub>1</sub>) is the amount of air person can exhale in the first second deepest breath. Pulmonary functions are generally determined by respiratory muscle strength, compliance of the thoracic cavity, airway resistance and elastic recoil of the lungs (Cotes JE. 1975). It is generally assumed that physically active persons, in sports or at work, have higher vital capacities than physically inactive persons of the same sex, age, height, and weight (Rong et al., 2008). Hence, the present study was undertaken with a view to compare the Forced vital capacity and Forced expiratory volume among Basketball, Netball and Handball players.

## II. METHODOLOGY

The study was conducted for boys represented School Games Federation of India Competition 2015-2016 held at Rajnandgoan, Chhattisgarh (Basketball – 100), Durg, Chhattisgarh (Netball – 100) and Hyderabad, Telangana (Handball – 100) were selected as subjects (N=300) by adapting incidental sampling method, and their age ranged from 15 to 17 years as per the eligibility proforma. The dependent variable Forced Vital Capacity (FVC) and Forced Expiratory Volume in one second (FEV<sub>1</sub>sec) were measured by using Spiro 2000 Software (Computerized). The collected data on FVC (l/min) and FEV<sub>1</sub> sec (l/min) was analyzed by one way ANOVA and, if the obtained 'F' is significant LSD Post hoc test was employed to find out the mean difference among the groups. To test the significance the level of confidence is fixed at 0.05. All the statistical procedures were employed through SPSS 21Version.

III. RESULTS

Table – I: one way anova on fvc and fev1 sec of basketball netball and handball players

Variable	SOV	Sum of squares	df	Mean square	F	P. Value
FVC	Between	1.86	2	0.591	28.48	.000
	Within	6.157	297	0.021		
FEV <sub>1</sub> sec	Between	3.258	2	1.629	67.49	.000
	Within	7.168	297	0.024		

The table I clearly indicates that FVC and FEV1 sec was significantly differ among Basketball, Netball and Handball players. To find out the mean difference between groups LSD (Post hoc) test was employed and all the results are presented in Table – II

TABLE – II- lsd comparison of independent and dependent variables

Variable	Group	Mean difference	Significance (P-value)
FVC	Netball vs Basketball	0.10	.000 (S)
	Netball vs Handball	0.15	.000 (S)
	Basketball vs Handball	0.05	.000 (S)
FEV <sub>1</sub> sec	Netball vs Basketball	0.19	.000 (S)
	Netball vs Handball	0.25	.000 (S)
	Basketball vs Handball	0.06	.004 (NS)

The results of LSD stated that the Basketball and Handball players are having statistically better FVC than Netball players. And, further it reveals insignificant difference between Basketball and Handball players. The results of FEV1 sec shows, Handball players are significantly better than Basketball and Netball players. Further it reveals Basketball players are also better than Netball players. Hence, from the results it is clear that Handball players are having better FVC and FEV1 sec followed by Basketball players.

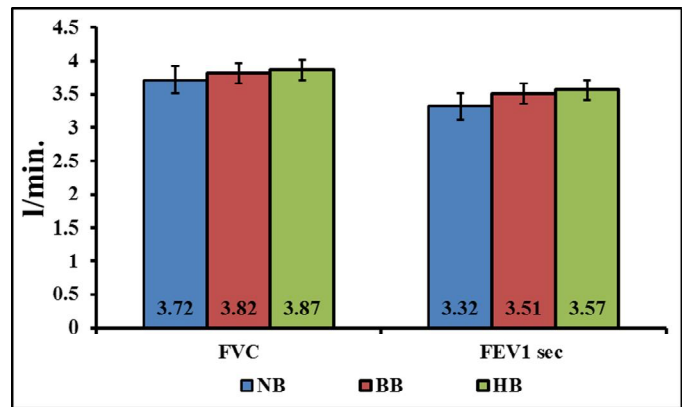


Fig-1:- mean and standard deviation of independent and dependent variables

IV. DISCUSSION

The research was intended to compare the FVC and FEV1 sec among Netball, Basketball and Handball players of School Games Federation of India Competition (2015-2016). The result reveals that the Handball and Basketball players are having better FVC and FEV1 sec than Netball players. And the Handball players are better than Basketball players on FEV1 sec. Hence it was concluded that Handball players are having better pulmonary function followed by Basketball players.

From the study it could be clear that players of Netball, Basketball and Handball are having different physiological characteristics in particular with pulmonary function. In team games or sports were size, shape, body composition, physiological functions, energy requirement and fitness all play an important part in providing distinct advantages for specific sports.

The primary role of a respiratory system is that of a support system for maintenance of cellular function. The changes in cardiovascular responses during the transition from rest to exercise are substantial, the accurate adaptations to the exercise for the respiratory system are even more remarkable. Respiratory rate has a four to five fold increase during exercise in comparison to resting conditions, tidal volume increases five to seven fold, and minute ventilation can increase 20-30 times over resting air flow values. The effect of respiratory system alternations is the maintenance of arterial oxygenation at or near pre-exercise levels, even in very long exercises.

The total volume of air ventilate din the respiratory system can vary from breath to breath, the maximal lung volume is relatively fixed, based on the anatomic constrains of the individual (Mc Ardle, 1996 and Wilmore, 1972). Tidal

volume and both inspiratory and expiratory reserve volumes exist in an inverse relation, such that as tidal volume increases, inspiratory and expiratory lung volume decrease, and vice versa (Jones, 1997). Although the respiratory systems response to the increased metabolic demand during exercise obviously necessitates the need for greater air flow, increases in residual volume also have been observed associated with exercise. Post exercise residual volume has been shown to increase immediately after exercise, and eventually it returns to pre-exercise level within 20 hours (Cordain,1994, Miles,1991 and Quindry,1997).

In fact, studies that have examined Wrestlers, Football layers, distance Runners and other types of athletes revealed no significant difference in pulmonary function responses to prolonged exercise when compared with controls matched for body weight, gender and age (Cordian,1990). On the other end of the physiologic continuum, in the elite, highly trained individual, with significant improvements from long term training to their cardiovascular and musculoskeletal system and minimal pulmonary adaptations, the respiratory system may become the rate limiting step in the O<sub>2</sub> consumption equation. In the healthy untrained and untrained individual, alveolar to arterial gas exchange appears to be maintained at or near normal levels, but the highly trained, elite individual exhibits a somewhat different response. In the elite athlete the rate limiting step may become the anatomic and physiologic constraints of the respiratory system, resulting in widening of the alveolar and arterial O<sub>2</sub> pressure, producing an exercise inducing hypoxemia (Dempsey,1990).

Some of the findings indicated that, handball players require more anaerobic power to excel (Pantelis, 2013) and elite Basketball players also need aerobic and anaerobic power (Serges, 2006). The elite players in the end of puberty showed higher absolute VO<sub>2</sub> values during match lay than the young elite players (Strøyer,2004). VO<sub>2</sub> and 30m sprint are higher for selected players than non-selected players (Itlias, 2009). The elite and non-elite Handball players possess different physical, physiological and psychological characteristics (Stijn, 2011).

## V. CONCLUSION

Among the three games, Handball players and Basketball players have better FVC and FEV<sub>1</sub> sec than Netball players. However, Handball players dominating pulmonary function than other two. Hence, it was concluded that the players, or individual having more FVC and FEV<sub>1</sub> sec may be more fit to play Basketball or Handball.

## VI. IMPLICATIONS

Along with other variables, pulmonary functions are also included to identify the sportsman for specific sports like Handball and Basketball.

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