Research Paper Physical Education

Pulmonary Functional Analysis of Indian Youth Elite Basketball Players

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ABSTRACT

The purpose of the this study was to analyze the body's pulmonary functions, such as vital capacity (VC), Forced Vital Capacity (FVC) and Maximum voluntary ventilation (MVV) of Indian Youth Elite Basketball players by using spirometer, with special reference to their playing positions. Sixty male basketball players (n=20 forwards, n=20 guards, n=20 centers; age = 17.4 ± 1.18 yrs.) representing in the 27th national youth basketball championship for boys & girls at Tiruchirappalli, Tamilnadu from 1st to 8th June 2010, were selected as subjects. Spiometric tests were conducted on them considering the parameters VC, FVC and MVV and the data were collected by using Jaeger Flow Screen Spirometer. To examine the mean differences of pulmonary functions on selected criterion variables with reference to playing positions, Analysis of Variance (ANOVA) was applied. The result reveals that there was a significant difference among playing positions on selected criterion variables. The forwards showed grater pulmonary functions in all the selected variables, followed by guards and then the centers.

Keywords : Vital capacity, Forced vital capacity, Maximum voluntary ventilation and Basketball

Introduction

The sport of basketball is a unique blend of anaerobic power and aerobic capacity. Basketball is a sport that consists of activities of short duration but high intensity during the course of the game. Due to rule changes, the modern basketball game becomes more anaerobic than aerobic in nature. The basketball players have to perform high intensity activities, (over 70 % of VO2max - which means that energy supplies are mainly from anaerobic sources CP, ATP and carbohydrates) during the game, have energy cost of more than 4000 Kcal during game, and, while practicing even more (over 5000 Kcal depending on resting metabolic rate, age, sex and initial level of preparedness). In this sport, players cover about 4500–5000m during a 40-min game with a variety of multidirectional movements such as running, dribbling, and shuffling at variable velocities and jumping (Maksud et al., 2005). Specifically speaking the role played by the player in relation to the position in which he played is different from others. Further on, Basketball is the game where size, shape and body composition play an important part in providing distinct advantage for specific playing positions.

Playing position in basketball is necessary to optimize the organisation of offense and defense and thus increase their efficiency. Three main playing positions are known in Indian basketball context: Guards (G), Forwards (F) and Centers (C). They differ in the game according to the position on the court and their playing role in the offensive and defensive team tactics. Lung function measurements among the basketball players with reference to their playing positions will facilitate better understanding of their roles and describing the lung for diagnostic purpose and subsequently in monitoring changes. The lung function tests used in clinical practice, are measures just a few of physiological variables of respiratory system. These variables are used because they can be measured reliably and tell us something about the functions of the respiratory system during work. This test varies from simple spirometry, which can now be done with hand held electronic devices, to complicated test which require sophisticated equipment and can only performed by the lung function laboratory. Spirometry is a measure of air flow and lung volumes during a forced expiratory maneuver from full inspiration. It is the simplest of all the respiratory function tests. It is fundamental to diagnosis, assessment of athlete's performance and disease.

Most lung functions are interpreted by comparing the results with predicted or normal values. More complicated tests should be reported by the lung function laboratories, along with the values predicted for athletes. A number of different prediction equations are available but, although there is a broad agreement between these equations, they are not identical. Most are based on surveys of European and American populations conducted several years ago using equipment no longer used today. Lung function varies with age, sex and height and these are taken into account, but also it differs to some extent with race/ethnicity and weight which are often not accounted for. The predicted values may not accurately represent your local population, and certainly will be inaccurate for certain individuals in any population (Mandigout, et.al., 2007). There is also poor standardization of the 'normal' range given on reports. Sometimes only predicted value is given. In short, cautious have to be taken when interpreting the test solely in relation to the predicted values, if the test does not fall into a disease pattern and care full if an athlete is from a different ethnic group to those used in the normal value surveys (Zavorsky, et.al., 2004). The purpose of the this study was to analyze the body's pulmonary functions, such as Vital Capacity (VC), Forced Vital Capacity (FVC) and Maximum Voluntary Ventilation (MVV) of Indian Youth Elite Basketball players by using spirometer, with special reference to their playing positions.

Methodology

Sixty male basketball players (n=20 forwards, n=20 guards, n=20 centers; age = 17.4 ± 1.18 yrs.) representing in the 27th national youth basketball championship for boys & girls at Tiruchirappalli, Tamilnadu from 1st to 8th June 2010, were selected as subjects. Spiometric tests were conducted on them by using Jaeger Flow Screen Spirometer. Subjects are made aware of the study, equipments and procedure to be performed. After preliminary explanations were made, informing the subjects of the hygienic and no risk factor of the test; and subject is asked to firm, gestural orders, synchronized with the inspiration and expiration with most efficient. For this study three parameters were collected VC, FVC and MVV and procedure includes, for VC – subject is asked to breathe slowly and completely for a few seconds into a spirometer. For FVC – subject is asked to expire into a spirometer completely and forcefully, following it force full inspiration. For

MVV – subject is asked to inhale and exhale forcefully into spirometer for 3-4 seconds. The scores of these measures are metric. To examine the mean differences of pulmonary functions on selected criterion variables with reference to playing positions, Analysis of Variance (ANOVA) was applied.

Analysis and Interpretation of Results

Table – 1 shows that the mean and standard deviation of Forced Vital Capacity (FVC), Vital Capacity (VC) and Maximum Voluntary Ventilation (MVV) among the Forward, Guard and Center players. General observation of players with reference to the positions played confirms that the forward players have superior in all the parameters followed by the guards and then the centers. The table – 2, reveals that there was a significant differences exists among the playing positions on all the selected criterion variables.

	fvc			vc			mvv		
	f	g	c	f	g	c	f	g	c
N	20	20	20	20	20	20	20	20	20
Mean	4.1915	4.1460	3.6890	3.8580	3.6880	2.9000	184.0405	171.7140	150.7540
Std. Deviation	.25887	.11445	.50669	.27995	.22135	.20191	13.34667	20.01587	6.77117

Table – 1. Mean and Standard Deviation (±) of FVC, VC and MVV among Playing Positions – Forward, Guard & Center Players

Table – 2. Analysis of Variance on FVC, VC and MVV among Playing Positions – Forward, Guard & Center Players

		Sum of Squares	df	Mean Square	F	Sig.
fvc	Between Groups	3.090	2	1.545	13.758	.000
	Within Groups	6.400	57	.112		
vc	Between Groups	10.451	2	5.225	93.233	.000
	Within Groups	3.195	57	.056		
mvv	Between Groups	11328.369	2	5664.184	27.205	.000
	Within Groups	11867.725	57	208.206		

Table – 3. Scheffe's Post hoc Test for Positional Groups: G, F & C

Scheffe

Dependent Variable	(I) g	(J) g	Mean Difference (I-J)
fvc	f	g	.04550
		c	.50250*
	g	f	-.04550
		c	.45700*
	c	f	-.50250*
		g	-.45700*
vc	f	g	.17000
		c	.95800*
	g	f	-.17000
		c	.78800*
	c	f	-.95800*
		g	-.78800*
mvv	f	g	12.32650*
		c	33.28650*
	g	f	-12.32650*
		c	20.96000*
	c	f	-33.28650*
		g	-20.96000*

*. The mean difference is significant at the .05 level.

Conclusions

The results reveal that there was significant difference among Indian youth elite basketball players pertain to their field positions namely guard, forward and centre on all selected pulmonary parameters namely Vital Capacity (VC), Forced Vital Capacity (FVC) and Maximum voluntary ventilation (MVV).

From the table - 3, it was observed that there was a best pair of mean difference exists between the C & F players (33.28), having the maximum values followed by C & G players (20.96) in MVV. In VC, it can be clearly noticed that there was greater pair of mean difference exists between the C & F (.95) and C&G (.78).

In FVC, it was noticed that the C & F players (.50), having the maximum values followed by C & G players (.45).

From Scheffe's post hoc test it was concluded that the best pair of mean deference was between center and forward players on Vital Capacity. On Forced vital capacity, had the minimal value when compared to other pair of mean difference with special reference to playing positions.

It was found that mean values of Indian youth elite basketball players of guard, forward and centre were compared, the forward players were superior in all the parameters followed by guard players and then the center players.

REFERENCES

Maksud, M.G., Coutts, K.D. and Hamilton, L.H. (2005) Oxygen uptake, ventilation, and heart rate: study in negro children during strenuous exercise. Archives Environmental Health 23, 23-28. | | Mandigout, S., Lecoq, A.M., ourteix, D., Guenon, P. and Obert, P. (2007) Effect of gender in response to an aerobic training programme in prepubertal children. Acta Paediatrica 90, 9-15. | | Zavorsky, G.S., Badra Quiron, K., Massarelli, P.S. and Lands, L.C. (2004) The relationship between single-breath diffusion capacity of the lung for nitric oxide and carbon monoxide during various exercise intensities. Chest 125, 1019-1027. |