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## RESPIRATORY FUNCTION VARIABLES OF BASKETBALL PLAYERS ACCORDING TO PLAYING POSITIONS

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**Abstract:**-The respiratory function variables among male basketball players in relation to different playing positions i.e. guards, centers and forwards. The present study was conducted on a sample of sixty (N=60) male basketball players (mean  $\pm$  SD: age  $20.67 \pm 1.64$  years, height  $1.80 \pm 5.23$  m, weight  $72.67 \pm 5.03$  kg, BMI  $22.18 \pm 1.62$ ), which includes twenty each guards, centers and forwards, who participated in inter-college competitions of Nanak Dev University, Amritsar, India. All the participants were informed about aim and methodology of the study and they All the participants were assessed for height, weight and selected respiratory function variables. The height of the subjects was measured with anthropometric rod to the nearest 0.5 cm. The weight of subjects was measured by using portable weighing machine to the nearest 0.5 kg. Respiratory function variables i.e. vital capacity, forced vital capacity and maximum voluntary ventilation were measured with "Med-Spiror" a computerized spirometer. selected respiratory function variables among basketball players of different playing positions. Scheffe's post-hoc test (SPHT) was applied to see the direction and significance of differences where 'F' value found statistically significant. Results revealed significant differences among male with regard to vital capacity ( $p < 0.05$ ) and forced vital capacity ( $p < 0.05$ ) but insignificant on maximum voluntary ventilation ( $p > 0.05$ ). While comparing the means, it revealed that forwards were found taller and having significantly better vital capacity and forced vital capacity than their counterparts; guards and centers, whereas guards were found heavier and have least vital capacity and forced vital capacity than their counterparts; centers and forwards.

**Keywords:** Basketball, vital capacity, forced vital capacity, maximum voluntary ventilation.

### INTRODUCTION

Basketball is one of the complex technical team games and differences in performance between players of different region and varying ability levels are quit nature. In basketball, players generally are to cover about 4500-5000m distance during the 40-min game which requires a variety of multidirectional movements, e.g. running, dribbling, shuffling of positions and jumping

(Crisafulli et al.,2002).The game of basketball requires the application of variety of different abilities (Angyan, et al., 2003; Jelcic, et al., 2002; Viswanathan & Chandrasekaran, 2011). Basketball is a game (Hughes & Bartlett 2002; Ziv & Lidor, 2009)guards, centers and forwards, and each has its own characteristics and role in the game. It is generally necessary to determine the specific physiological profiles of players. The physiological variables and other external factors (Apostolidis et al., 2004; Gocentas et al., 2005; Sallet et al., 2005; Metaxas et al., 2009; Narazaki et al., 2009; Ziv & Lidor,2009). physiological and anthropometric characteristics of basketball players by playing positions (Sallet et al., 2005; Ostojic et al., 2006; Abdelkrim et al., 2010; Viswanathan & Chandrasekaran, 2011). However, the respiratory function study of the basketball players remains largely unreported. Hence, the respiratory function variables of male

## MATERIALS AND METHODS

### Subjects:

A sample of sixty (N=60) male basketball players (mean  $\pm$  SD: age  $20.67 \pm 1.64$  years, height  $1.80 \pm 5.23$  m, weight  $72.67 \pm 5.03$  kg, BMI  $22.18 \pm 1.62$ ), which includes twenty each guards, centers and forwards, actually participated in inter-college competitions of was selected. All the participants were informed about aim and methodology of the study and they

### METHODOLOGY:

#### Height and Weight:

Height measurements were taken by using the standard anthropometric rod to the nearest 0.5 cm. Full attentions given make sure that players body was fully upright and their mandible was parallel to the ground. Taken values recorded as cm. The subject's weights were measured with portable weighing machine to the nearest 0.5 kg. During measurements players were on bare feet and with underwear and measurements recorded as kg.

#### Body Mass Index (BMI):

BMI was calculated by the formula of; Body Mass Index = Weight/Height.

#### Measurements of Respiratory Function variables:

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 (VC), Forced vital capacity (FVC) and Maximum voluntary ventilation (MVV) were taken into consideration for this study.

#### Statistical Analysis:

The Statistical Package for the Social Sciences (SPSS) version 16.0 was used for all the analyses. respiratory function variables among i.e. guards, centers and forwards. Scheffe's post-hoc test (SPHT) was applied to see the direction and significance of differences where 'F' value found statistically significant. The level

RESULTS

**Table: 1. Demographic Characteristics of Male Basketball Players of different Playing Positions.**

| Sports Groups | Age (yrs)    |             | Height (m)  |             | Weight (Kg)  |             | BMI          |             |
|---------------|--------------|-------------|-------------|-------------|--------------|-------------|--------------|-------------|
|               | Mean         | SD          | Mean        | SD          | Mean         | SD          | Mean         | SD          |
| Guards        | 21.20        | 1.73        | 1.80        | 5.51        | 79.05        | 5.89        | 24.30        | 2.10        |
| Centers       | 20.50        | 1.60        | 1.75        | 5.96        | 63.10        | 5.72        | 20.42        | 1.47        |
| Forwards      | 20.30        | 1.59        | 1.86        | 4.22        | 75.85        | 3.47        | 21.82        | 1.28        |
| <b>Total</b>  | <b>20.67</b> | <b>1.64</b> | <b>1.80</b> | <b>5.23</b> | <b>72.67</b> | <b>5.03</b> | <b>22.18</b> | <b>1.62</b> |

**Table: 2. Mean and SD values of Respiratory Function Variables of Male Basketball Players of different Playing Positions.**

| Variables                           | Playing Positions |      |         |      |          |      |
|-------------------------------------|-------------------|------|---------|------|----------|------|
|                                     | Guards            |      | Centers |      | Forwards |      |
|                                     | Mean              | SD   | Mean    | SD   | Mean     | SD   |
| Vital Capacity (VC)                 | 4.64              | 0.19 | 4.84    | 0.35 | 4.96     | 0.15 |
| Forced Vital Capacity (FVC)         | 4.94              | 0.19 | 5.15    | 0.32 | 5.16     | 0.21 |
| Maximum Voluntary Ventilation (MVV) | 137.13            | 1.76 | 137.08  | 1.68 | 137.97   | 1.69 |

Table 1 depicts the demographic characteristics of male basketball players of different Playing Positions. Table 2 showed the Mean and SD values of respiratory variables i.e. Vital capacity (VC), Forced vital capacity (FVC) and Maximum voluntary ventilation (MVV) of Male Basketball Players of different Playing Positions. While comparing the means, it revealed that forwards had better vital capacity and forced vital capacity than their counterparts; guards and centers. However, basketball players of different playing positions have exhibited almost same on Maximum voluntary ventilation.

**Table: 3. Analysis of Variance (ANOVA) among Male Basketball Players of different Playing Positions with regard to Respiratory Function Variables.**

| Variables                           | Source of variance | Sum of Squares | df | Mean Square | F-value       | Sig.  |
|-------------------------------------|--------------------|----------------|----|-------------|---------------|-------|
| Vital capacity (VC)                 | Between Groups     | 1.087          | 2  | 0.593       | <b>8.876*</b> | 0.000 |
|                                     | Within Groups      | 3.489          | 57 | 0.061       |               |       |
|                                     | Total              | 4.575          | 59 |             |               |       |
| Forced Vital Capacity (FVC)         | Between Groups     | 0.671          | 2  | 0.335       | <b>5.396*</b> | 0.007 |
|                                     | Within Groups      | 3.543          | 57 | 0.062       |               |       |
|                                     | Total              | 4.214          | 59 |             |               |       |
| Maximum Voluntary Ventilation (MVV) | Between Groups     | 9.903          | 2  | 4.952       | <b>1.774</b>  | 0.179 |
|                                     | Within Groups      | 159.130        | 57 | 2.792       |               |       |
|                                     | Total              | 169.033        | 59 |             |               |       |

\*Significant at .05 level of Confidence

$$F_{.05} (2, 57) = 3.16$$

It is evident from table-3 of that significant differences were found among male with vital capacity ( $p < 0.05$ ) and forced vital capacity ( $p < 0.05$ ) but insignificant on maximum voluntary

ventilation ( $p > 0.05$ ). Since the obtained therefore, the Post-hoc test (Scheffe's) was applied to see the direction and significance of difference between paired means basketball players of different playing positions with regards to vital capacity and forced vital capacity. The results of Post-hoc test (Scheffe's) have been presented in table-4 below.

**Table: 4. Comparison of Mean Values of Post-Hoc Test (Scheffe's) among Male Basketball Players of different Playing Positions with regard to Respiratory Function Variables.**

| Variables                   | Playing Positions |         |          | Mean Difference | Sig. |
|-----------------------------|-------------------|---------|----------|-----------------|------|
|                             | Guards            | Centers | Forwards |                 |      |
| Vital capacity (VC)         | 4.64              | 4.84    |          | 0.42*           | 0.04 |
|                             | 4.64              |         | 4.96     | 0.32*           | 0.00 |
|                             |                   | 4.84    | 4.96     | 0.12            | 0.27 |
| Forced Vital Capacity (FVC) | 4.94              | 5.15    |          | 0.21*           | 0.02 |
|                             | 4.94              |         | 5.16     | 0.22*           | 0.02 |
|                             |                   | 5.15    | 5.16     | 0.01            | 0.99 |

\*Significant at .05 level of Confidence

A glance at table-4 showed that guards have exhibited statistically significant ( $p < 0.05$ ) differences with centers and forwards on respiratory function variables i.e. vital capacity and forced vital capacity. However, centers have shown statistically insignificant ( $p > 0.05$ ) differences with forwards on respiratory functions i.e. vital capacity and forced vital capacity.

#### DISCUSSION

The physiological variables involved in sports performance have long been of interest to players, coaches, sport physiologists and sports scientists. From a physiological point of view, the lung function tests, like other physiological tests must be of the utmost importance for measuring the fitness of an athlete (Astrand & Rodahl, 1970). 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). The results of the present study revealed significant differences among male basketball players of different paying positions with regard to vital capacity and forced vital capacity but insignificant on maximum voluntary ventilation. Results revealed that forwards had better vital capacity and forced vital capacity than their counterparts; guards and centers. Physically fit athletes possess superior respiratory functions relative to less fit or sedentary subjects (Johnson et al., 1981; Johnson et al., 1991). Abdelkrim et al. (2007), they

Significant differences have been observed among male basketball players of different playing positions i.e. guards, centers and forwards with regard to the selected respiratory function variables. The observed results of the present study are in agreement with the study of Trninic et al. (1999), they analyzed the difference between the guards, forwards and centers on some anthropometric characteristics. The results of discriminate analysis showed that anthropometric status is different players per position. Also, Jelcic et al. (2002) confirmed differences of anthropometric characteristics of elite junior basketball players that play at different team positions. Further investigations are needed on the above studied variables along with physiological variables to assess relationships among them and with performances in basketball.

#### CONCLUSIONS

It is concluded that forwards were found taller and had better vital capacity and forced vital capacity than their counterparts; guards and centers, whereas guards were found heavier and had least vital capacity and forced vital capacity than their counterparts; centers and forwards.

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