Research Article

ANTHROPOMETRIC PARAMETERS AMONG NATIONAL LEVEL PLAYERS AT DELHI

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ABSTRACT

The significant requirement of anthropometric characteristics besides other factors which are required for specific body build for good performance in sports has been established fact in different research studies conducted. The sports performance of Indian players is progressing significantly and it could be due to various factors. Body somatotype and body composition (forty four male players national level players were studied at Sports Authority of India, Delhi. Average height and weight of the male players of the present research were 170.81 cm (± 7.45) and 59.36 kg (± 10.43) respectively with mean age of 15.30 yr (± 1.8). The height ranged between 158.0 cm and 188.0 cm whereas that of body mass was between 39.0 kg and 96 kg. The body fat% of 8.03 (SD ± 2.8, range 1.59 % - 13.05%) was seen for the national level players. On an average less mesomorph component was observed for the national level players (0.81±0.31 3.18±1.45 3.74±1.55). Anthropometric characteristics in terms of Somatotype of the Indian Players were poor compare to Olympians and other international players.

INTRODUCTION

Besides factors like physical fitness, physiological, psychological aspects, skills etc body composition and somatotype of a sportsperson plays a significant role in sports performance. Various studies support the fact that good performance in sports requires a specific physique (Carter, *et al*. 1990). A lot of studies had been conducted to relate performance level of players with body type and body composition (Bhatnagar, *et al*. 1984, Bayios *et al*. 2006, Artioli *et al*. 2009, Hagberg *et al*. 2011, Kim *et al*. 2011). Relationship between the anthropometric parameters and performance level at various stages of competition has been established by different studies (Kyriazis *et al*. 2010, Potteiger *et al*. 2010, Hagberg *et al*. 2011, Kim *et al*. 2011). There might be different reasons for poor performance of players but poor physical structure could be one of the major factor (Adhikari *et al*. 2014). Lack of anthropometric studies on Indian players could be one of the reasons for the failure to establish the influence of anthropometric characteristics on the performance level of the players. The present study aims to evaluate the anthropometric characteristics of the Indian national players.

METHOD

Subjects

The National level players with more than two years of training were selected. Forty four national level players were tested for their body somatotype and body composition as a part of their physical and morphological evaluation.

Anthropometric Measurements**:** The anthropometric measurements were measured with the International protocol as described in the International Society for The Advancement of Kinathropometry manual. Anthropometric set was used to measure all the parameters whereas, Standing height was measured with the help of stadiometer up to 1mm and body mass was measured with an electronic weighing machine. Skin fold thickness were measured with the help of a Harpenden Skinfold caliper. Anthropometric tape was used for measuring girth and sliding caliper was used to measure bone width.

Somatotype Heath: Heath Carter method was followed for Somatotype rating.(1990)

Endomorphy $= -0.7182 + 0.1451 \times \sum SF - 0.00068 \times \sum SF2 + 0.0000014 \times \sum SF3$

where, $\sum SF$ = (sum of triceps, subscapular and supraspinale skinfolds) multiplied by (170.18/height in cm). This is known as height-corrected endomorphy and is a preferred method for calculating endomorphy.

Mesomorphy $= 0.858 \times$ humerus breadth $+ 0.601 \times$ femur breadth $+ 0.188 \times$ corrected arm girth $+ 0.161 \times$ corrected calf girth $-$ height $\times 0.131 + 4.5$

where, Corrected arm girth = Bicep girth - Bicep skin fold, Corrected calf girth= Calf girth - Calf skin fold

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Three different equations are used to calculate **ectomorphy** according to the height -weight ratio (HWR):

If HWR is greater than or equal to 40.75 then, Ectomorphy = $0.732 \times$ HWR ─ 28.58.

If HWR is less than 40.75 and greater than 38.25 then, Ectomorphy = $0.463 \times$ HWR ─ 17.63.

If HWR is equal to or less than 38.25 then, Ectomorphy = 0.1

Body Fat%: Durnin and Womersley technique (1974) was followed for body density and Body fat % was derived from the equation of Brozek *et al*. (1963)

Statistics: The statistical analysis was done using SPSS software 17.1 version.

RESULT

In Table 1 shows the anthropometric parameters of National level players are shown, where the mean age was 15.30 years with a range between 12 years and 18 years. The mean stature of these players was 170.81cm (±7.45) with a range between 158cm and 188cm and the mean body weight of these players was 59.36 kg (±10.42) which varied from 39kg to 96kg. The mean fat percent was 8.03% whose range was from 1.8% to 13.05%. The mean endo-meso-ecto components were 0.8-3.17-3.74 with a standard deviation of 0.32-1.46-1.55. The WHR(Waist-Hip ratio) was found to range from 0.7 to 0.9 with a mean value of 0.8. The mean BMI of the players was found to be 20.36 (±3.66). Their somatype is Mesomorph- Ectomorph and is shown in Fig.1.

done on sportsperson for their morphological evaluation along with their morphological characters related to their performance (Sidhu *et al*.1975; Novak *et al*. 1978; Crreton *et al*. 1980, Bhatnagar *et al*. 1980, Slaughter *et al*. 1980; Carter 1984) . These studies revealed that specific anthropometric characters could play a momentous role in contributing to achievement in some sports as it offers certain type of natural advantages. This could be seen for some sports where contributing factor plays a very vital role as in, height could be useful (although certainly it is not the only factor and is not applicable in all cases) since in general it affects the control between muscle volume and bones depending on overall fitness, build and individual ability towards greater speed of movement and power (Adhikari, *et al*. 2014). However, there could also be noteworthy disadvantages posed by size and consequential mass that could substantiate to be a impediment to success (Adhikari, *et al*. 2014).

In the present study, the players were very young and most of them fall under adolescent and teenage group (Junior and sub-junior level). The average height of the players were comparatively less than their international counterparts (Nande, *et al*. 2009) however it was moderate when compared with the Indian counterparts (Agarwal, *et al*. 1996). According to a study conducted in North India, an average Indian possessed an average height of 170.8 cm with a standard deviation of 4.9 with an average weight of 72.2kg (SD ±11.3) (Kesavachandran, *et al*. 2010).There exist a negative relationship between sports performance and adiposity in terms of Body Fat% and it had been discovered by different studies

Table 1 Descriptive statistics of the above compiled data.

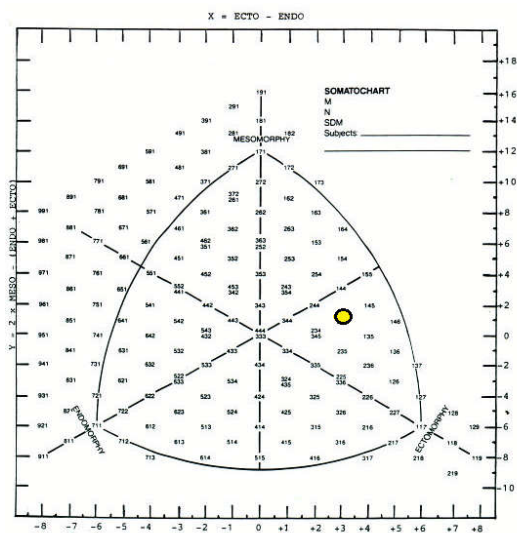| Variables	Age	Height	Weight	BMI	Endo	Meso	Ecto	WHR	FAT % (Brozel, 1963)
Valid	44	44	44	44	44	44	44	44	44
Mean	15.30	170.81	59.36	20.369	.807	3.178	3.743	.816	8.035
Std. Deviation	1.825	7.451	10.427	3.662	.323	1.469	1.554	.046	2.683
Minimum	12	158	39	13.0	.230	.270	.100	.715	1.837
Maximum	18	188	96	37.1	1.448	8.049	8.872	.957	13.045

Fig. 1 Somatochart showing the physique of national level players at SAI.

DISCUSSION

Besides mental ability and personal skill physical characteristics of a sportsperson has a remarkable influence on the performance level and a wide range of studies had been

(Kyriazis, *et al*. 2010). Although there are studies showing a reduced amount of relationship of body fat% with performance level of players (Adhikari, *et al*. 2014). However, the range for body fat percent is between 3.3% and 18.4 % as reported for male players, which includes Soccer, Basketball, Track athletes, Football and Field athletes, Wrestling, Ice Hockey, Body building, Baseball, Cross Country skiing, Power lifting and Tennis. Nevertheless, field and track athletes have as low as 3.3% body fat for the marathon runners whereas the discus throwers and male sprinters show higher value of 16.4%. (Aitken, *et al*. 1980, Franchini, *et al*. 2011). For the National players an average value of 8.03% was observed which seemed to be satisfactory when it was compared to other international counterparts. Topical studies on body mass index (BMI), reflects superior muscle mass rather than superior adiposity, is the critical factor allied with best performance for the world-class players. Studies have also revealed that in field and track athletes, the reciprocal ponderal index (RPI) was a noteworthy indicator of best presentation with tall and lean body type. In spite of this the study supported the decade long premise for encouraging the ectomorphic mesomorph body type for the of players with higher reciprocal Ponderal index (Adhiraki, *et al*. 2014). There have been other studies which also show that

mesomorphic component is a major characteristic of somatotype for athletes compare to other two components (Adhikari, *et al.* 2014).

In the present study, the national players were mesomorphic-ectomorph and most of the national level players were poor in muscularity, with less than 4, signifying poor muscularity for the Indian players, irrespective of the event they participated. In a study conducted on Bangladeshi athletes, showed that the somatotype of these players were 1.5- 4.1-3.0 with a standard deviation of 0.4-1.1-1.1 (Adhikari, *et al.* 2014). Another study conducted on Indian players by Bhatnagar and Grewal in 1984, observed that the somatotype of the Indian players were 2.6-3.3-3.4. Again, in another compiled study by Carter, observed that the Olympic players on an average showed a somatotype of 1.8-5.0-3.0 with a standard deviation of 0.5-0.9-0.8. In the present study, the somatotype of the Indian players match with that of the neighboring country players from Bangladesh.

The performance level of Indian Players was only moderate compare to other countries. Most of the players in India are from low socioeconomic status and this meager socio economic standing of the people which causes unavailability of apposite nutrition required for the proper growth and development during their adolescent stage. Dearth of proper nutrition hinders physical characteristics along with the growth and improvement of muscle. Thus, good performance in the events could be hampered by the poor physical condition of the players.

As to the somatotype, it was seen that the endomorphy was well-correlated to the body fat while the mesomorphy had a feeble relationship to the slim and brawny mass and the ectomorphy was not an self-regulating factor, and it showed very strong negative relationship with BMI and WHR. At last, it could be concluded that anthropometrical characteristics is one of main influential factors for determining good physique which could be dexterous in a better performances of the player besides other physiological characteristics.

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How to cite this article:

Jayashree Mazumder *et al*.2016, Anthropometric Parameters Among National Level Players At Delhi. *Int J Recent Sci Res.* 7(10), pp. 13919-13922.