Somatotype Study on Male National Throwers of Different Categories

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ABSTRACT

In sports, body composition measures are widely used to prescribe desirable body weights to optimize competitive performance and to assess the effects of training. Specific events require different body types and weights for maximal performance. In the present study, an attempt has been made to study the Somatotypic characteristics of different categories of throwers in India. Discus throwers shows maximum standard deviation of 1.6 in comparison with the Olympic throwers (2.3 to 3.2) (De Garry,1974); endomorphy was found more in present study throwers (4.32 to 6.39). It shows that our Indian throwers are found fattier with respect to Olympic throwers. On comparing with Olympic throwers (5.9 to 7.1) (De Garry, 1974); mesomorphy was investigated on lower side while in present study throwers it is (4.52 to 6.5). It shows that Olympic throwers are found having more muscular skeletal development with respect to Indian throwers. On comparing with Olympic throwers (1.1 to 2.2) (De Garry, 1974), ectomorphy was found more in the present study throwers (0.77 to 1.78). It shows that Indian throwers are found heavier and shorter with respect to Olympic throwers.

Key words

Somatotype, Endomorphy, Mesomorphy & Ectomorphy.

INTRODUCTION

Body composition plays a vital role to improve the throwing distance. Studies in this regard indicate that the athletes who were very lean but heavy because of a well-developed musculature were superior in certain sports i.e. Football, Weight-lifting and Throwing (Bullen, 1971). Studies on physique may be useful in choosing a suitable physical activity for an individual, whose main objective is competition. The throwers have been found heavier and taller, with long muscular arms and wide shoulders (Cureton, 1951; Parnell, 1951; Pere et al., 1954; Tanner, 1964; Hirata, 1966; Muthiah & Venketsvarlu, 1973). In throwing events, greater weight is useful; because, when the object is thrown forward and upwards, an equal and opposite reaction force is exerted on the athlete, pushing him backward and

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down. The effect is less if the athlete is heavier; more if he is lighter (Tanner, 1964).

The components of Kinanthropometry such as size, shape, physique and body composition have been shown to affect the ability and capacity of physical performance. Research studies have shown positive and significant relationships between physique and body composition with physical performance.

Tanner (1964) said, "Without the required physique, an athlete is unlikely to reach a high level of success". In a review of somatotypes of athletes, Carter (1970) considered that somatotype was an important selective factor for success in championship performance.

Malhotra et al (1972) Studied the functional capacity and body composition of the throwers, jumpers, sprinters and the middle and long distance runners. The trackmen and jumpers were found to have a higher lean body mass with less fat content than the throwers who were tall and heavy built. The middle and long distance runner had highest and the throwers, the lowest maximum oxygen intake capacity values in terms of body weight and lean body mass. Similarly, the trackmen had lowest maximum heart rate than the other groups of athletes. The jumper and thrower had stronger muscle power; however, the latter were strong in arm and shoulder muscle strength too.

Muthiah and Venketswarlu (1973) examined the Indian track and field athletes' anthropometric profile and recorded the thrower to be heavier, taller and older than other athletes. The jumpers and the hurdlers were taller and heavier than sprinters, but were shorter and lighter than thrower.

Sidhu and Wadhan (1974) studied on throwers who were found to be heavy and tall with relatively large limb circumferences and bicondylar diameters. They had better-developed lean tissue in the limbs associated with greater amount of fatty tissue.

In throwing events, greater weight is useful; because, when the object is thrown forwards and upwards, an equal and opposite reactive force is exerted on the athlete, pushing him backwards and down. The effect of this is less if the athlete is heavier; more, if he is lighter (Tanner, 1964). The height in them will be of further advantage by making the flight of the implement longer before it touches the ground. While throwing the Hammer, the speed of the hammer at the moment of releases is of prime importance in determining how far it will go, and for a given angular velocity (dependant on how fast the thrower does his turn) the speed is proportional to the length of the 'lever' throwing the hammer, i.e. the distance of the hammer head from the axis of thrower; hence the desirability of long and muscular arms. The purpose of the study is to assess the differences in somatotypic components of different categories of Male throwers.

METHODOLOGY

For the present study, a total number of 32 male throwers as shown below in Table-1, from the different places of India

(NIS PATIALA, Punjabi University campus, and National Competition at Coimbatore, Chennai) during the course of various coaching camps, training sessions they were attending, in connection with the national and international competitions, were selected as subjects for the study in 2016-17. The data collected on all throwers were grouped into four categories.

Throwing Categories

Category	*N*
Discus thrower	10
Hammer Thrower	4
Shot put thrower	6
Javelin Thrower	12
Total	**32**

Anthropometric measurements were taken on right side of body with standard instruments by following standard techniques of Ross et al, 1978. The Heath-Carter Anthropometric Somatotype Method was used for estimating the somatotype. The ten anthropometric measurements needed for obtaining the somatotype were tyaken viz. Height, Weight, Triceps Skinfold, Subscapular Skinfold, Supra-Spinale Skinfold, Calf Skinfold, Humerus Biepicondylar Diameter, Femur Biepicondylar Diameter, Upper arm normal girth, Upper arm Flex girth and Calf Girth.

Mean, Standard Deviation, ANOVA and Post-hoc analysis was applied for the computation of results, from the raw data:

RESULTS & DISCUSSION

The present study was conducted on somatotypic characteristics of Indian national throwers. It was investigated to obtain a body of knowledge pertaining to morphological characteristics which can be useful in improving the performance of Indian throwers. The findings of present research work have been presented as follows:

Height (cm)

Table 1 gives the mean and standard deviation values of height of different categories of throwers. It has been observed that both Shot-put and Discus throwers are found to be tallest followed by Javelin throwers (178.8 cm) and Hammer throwers (177.5cm). Body height for present study throwers has shown same trends as examined by Sodhi (1991) but De Garry et al (1974) study showed that throwers (186.1±5.6, Olympic throwers) are tall with respect to Indian throwers (both present study and Sodhi,1991 study, 182.3±6.7). As

per the present study, Javelin throwers are slightly taller with respect to Sodhi, (1991) study, but short with respect to Olympic Javelin throwers study of De Garry,1974.

Table-1 : Mean, SD and ANOVA F values for Body Height (cm) Among Different Categories of Throwers

Groups	*N*	*Mean (cm)*	*SD (cm)*	F Value
Discus thrower	10	182.9	8.36	1.32 NS
Hammer thrower	4	177.5	6.14	
Shot put thrower	6	183.0	6.54	
Javelin thrower	12	178.8	4.37	

*Significant at 5% level (2.95); NS: Non -Significant

Table1 shows the analysis of variance for body height between different categories of throwers. The F ratio between different categories of throwers has been found to be 1.32. However, analysis of variance shows no significance difference among all the groups.

Body Weight (kg)

Table 2 gives the mean and standard deviation values of body weight of different categories of throwers. It has been found that shot-put players are heaviest among all the groups (99.85kg), followed by Discus throwers (83.90kg.), Hammer (80.75kg) and Javelin throwers (78.46 kg). Body weight of present study throwers has shown the same trends as recorded by Sodhi,(1991), but De Garry et al (1974) studied throwers (102±12.2, Olympic throwers) are heavier with respect to Indian throwers (both present study and Sodhi,1991 study, 88.9±13.2). The present study Javelin throwers slightly heavier with respect to Sodhi, (1991) study (69.3±8.0) and Olympic Javelin throwers (76.7±7.3) of De Garry,1974.

Table-2 : Mean, SD and ANOVA F Values for Body Weight (cm) Among Different Categories of Throwers.

Groups	*N*	*Mean (kg)*	*SD (kg)*	*F Value*
Discus thrower	10	83.90	7.88	6.23*
Hammer thrower	4	80.75	10.31	
Shot put thrower	6	99.83	11.23	
Javelin thrower	12	78.46	11.08	

*Significant at 5% level (2.95); NS: Non-Significant

Table 2 shows the analysis of variance for body height between different categories of throwers. The F ratio between different categories of throwers has been found to be 6.23. In statistical terms, the F ratio is significant at 5% level. Therefore, the throwers differ in their body weight.

The Table 3 shows the post-hoc test of body weight in different categories of throwers. Discus, Hammer and Javelin throwers were found to be significantly lighter than Shot-put throwers. However, the differences between Discus and Hammer, Discus and Javelin, Hammer and Javelin throwers were non-significant.

Table-3: Post-hoc Test for body Weight (kg) Between Different Categories of Throwers.

Groups		*Groups*	*Post-hoc t values*
Discus throwers	Vs	Hammer throwers	0.82
Discus throwers	Vs	Shot put throwers	4.45*
Discus throwers	Vs	Javelin throwers	1.79
Hammer throwers	Vs	Shot put throwers	4.22*
Hammer throwers	Vs	Javelin throwers	0.64
Shot put throwers	Vs	Javelin throwers	6.34*

*Significant at 5% level

Endomorphy

First component of somatotype represents the degree of fatness. As shown in Table 6, Shot-put throwers were found to possess 6.39 endomorphy whereas Javelin throwers 4.32. The former have maximum endomorphy whereas the latter have minimum. Discus throwers show maximum standard deviation of 1.6 on comparing with Olympic throwers (2.3 to 3.2 by De Garry, 1974); endomorphy was found more in present study throwers (4.32 to 6.39). It shows that Indian throwers are found fattier with respect to Olympic throwers.

Table-4 : Mean, SD and ANOVA F values for Endomorphy Among Different Categories of Throwers

Groups	*N*	*Mean (mm)*	*SD (mm)*	*F Value*
Discus thrower	10	5.37	1.6	4.85*
Hammer thrower	4	5.25	0.54	
Shot put thrower	6	6.39	0.57	
Javelin thrower	12	4.32	0.90	

*Significant at 5% level (2.95)

Table 4 shows the Analysis of variance of Endomorphy between different categories of throwers. The F ratio had been found to be 4.85; thus, throwers differ in endomorphy

Table 5 shows the Post-hoc test for endomorphy between different categories of throwers. Discus throwers had significantly more endomorphy than the Javelin throwers, as indicated by post-hoc t test. Similarly, Shot-put throwers had significantly more endomorphic rating as compared to Javelin throwers.

Table-5: Post-hoc Test for Endomorphy Between Different Categories of Throwers

Groups		*Groups*	*Post-hoc t value*
Discus throwers	Vs	Hammer throwers	0.31
Discus throwers	Vs	Shot put throwers	2.58
Discus throwers	Vs	Javelin throwers	3.14*
Hammer throwers	Vs	Shot put throwers	2.30
Hammer throwers	Vs	Javelin throwers	2.35
Shot put throwers	Vs	Javelin throwers	5.58*

* Significant at 5% level

Mesomorphy

The second component of somatotype indicates the musculo-skeletal development per unit of height. Table 9 shows the mesomorphy of different categories of throwers. Shot-put throwers have maximum mesomorphy of 6.5; whereas, Hammer throwers have minimum 4, among all groups. Shot-put throwers have maximum standard deviation 1.82 in comparison with the Olympic throwers (5.9 to 7.1 by De Garry, 1974); mesomorphy was

investigated on lower side, in present study throwers (4.52 to 6.5). It shows that Olympic throwers are found more muscular skeletal development with respect to Indian throwers.

Table-6: Mean, SD and ANOVA F values for Mesomorphy of Different Categories of Throwers

Groups	*N*	*Mean*	*SD*	F- value
Discus thrower	10	4.52	1.16	2.45 NS
Hammer thrower	4	4.0	0.95	
Shot put thrower	6	6.5	1.82	
Javelin thrower	12	5.1	2.1	

*Significant at 5% level (2.95); NS-non significant

Table-6 shows the analysis of variance of Mesomorphy between different categories of throwers. As shown in the Table the F ratio 2.45 has been found to be non-significant. Thus, the throwers did not differ in mesomorphy.

Ectomorphy

The third component of ectomorphy indicates the linearity of physique. Table 11 shows the Ectomorphy of different categories throwers. Javelin throwers have maximum ectomorphy of 1.78 whereas Shot-putters have 0.77. Thus, Shot-put players were heaviest among thrower groups. On comparing with Olympic throwers (1.1 to 2.2 by De Garry, 1974); ectomorphy was found more in present study throwers (0.77 to 1.78). It shows that Indian throwers are found heavier and shorter with respect to Olympic throwers.

Table 7 : Mean, SD and ANOVA F values for Ectomorphy of Different Categories of Throwers

Groups	*N*	*Mean*	*SD*	*F value*
Discus thrower	10	1.73	0.52	3.48*
Hammer thrower	4	1.42	0.29	
Shot put thrower	6	0.77	0.55	
Javelin thrower	12	1.78	0.87	

*Significant at 5% level (2.95); NS-non significant

Table 7 shows the Analysis of variance of Ectomorphy between different categories of throwers. As shown in Table, the F ratio had been found to be 3.48; thus throwers differs significantly

Table-8 : Post -hoc Test for Ectomorphy Between Different Categories of Throwers

Groups		*Groups*	*Post-hoc t values*
Discus throwers	Vs	Hammer throwers	1.26
Discus throwers	Vs	Shot put throwers	4.08*
Discus throwers	Vs	Javelin throwser	0.23
Hammer throwers	Vs	Shot put throwers	2.16
Hammer throwers	Vs	Javelin throwers	1.54
Shot put throwers	Vs	Javelin throwers	4.53*

* Significant at 5% level

Table 8 shows the post-hoc test for Ectomorphy between different categories of throwers. As shown in the Table, Shot-put throwers possess significantly lesser ectomorphy than the Discus and Javelin throwers. However, Discus throwers did not differ than Javelin and Hammer throwers. Similarly, Hammer throwers and Javelin throwers did not differ in ectomorphy.

CONCLUSION

a) Shot-put and Discus throwers are found to be tallest followed by Javelin throwers (178.8 cm) and Hammer throwers (177.5cm). Shot-put players are found significantly heavier, among all the groups (99.85kg), followed by Discus throwers (83.90kg.), Hammer (80.75kg) and Javelin throwers (78.46 kg).

b) Shot-put throwers were found highest endomorphy whereas Javelin throwers have at lowest point. On comparing with Olympic throwers (range lies 2.3 to 3.2 by De Garry, 1974); endomorphy was investigated more in present study throwers (4.32 to 6.39). It shows that Indian throwers are found much fattier with respect to Olympic throwers.

c) The mesomorphy of Shot-put throwers were recorded as maximum; whereas Hammer throwers were noticed minimum, among all groups. On comparing with Olympic throwers (range lies 5.9 to 7.1 by De Garry, 1974); mesomorphy was investigated on lower side in present study throwers

(4.52 to 6.5). It shows that Olympic throwers are found more muscular skeletal development with respect to India throwers.

d) Javelin throwers have maximum ectomorphy; whereas, Shot-putters have minimum value. Thus, shot put players were heaviest among thrower groups. On comparing with Olympic throwers (range lies 1.1 to 2.2 by De Garry, 1974); ectomorphy was found more in present study throwers (0.77 to 1.78). It shows that Indian throwers are found heavier and shorter with respect to Olympic throwers.

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