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Comparison of kinanthropometric parameters and body composition between sprinters and throwers

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Abstract

An attempt has been made in the present study to find out the comparative assessment of the selected kinanthropometric parameters and body composition measurements between sprinters and throwers. The research was conducted on North Indian male national level and all India university level 30 sprinters and 30 throwers of their age range 17-28 years. Thirty one kinanthropometric and body composition measurements were evaluated of each subject. SPSS (11.5) computer software was used to analyze the data and it revealed that the weight and linear measurements i.e. height, arm length, hand breadth, body diameters i.e. shoulder and knee diameters, girth measurements i.e. chest, hip and thigh girth, skin fold measurements i.e. triceps, subscapular skin folds and body composition variables i.e. body density, percent fat, fat weight have been found highly significant difference between sprinters and throwers at one percent level.

Keywords: Kinanthropometry, body composition, sprinters and throwers

Introduction

A good physique of the players plays a vital role in all games. It is an asset in different athletic events that players must have optimum weight and height to do both jumping and throwing activities effectively. Height has the potential placement and preferable pre-requisites in the performance excellence in many sports and games. Leg length has definite decisive advantage in jumping and running events. Longer strides are possible with longer leg length and it will be helpful to run fast from starting to finishing line and to execute jump easily. Like leg length and arm length are helpful for the players in throwing events. Bigger size of palm and fingers are useful to hold the instruments firmly without slipping or jerking while executing throw.

Physical activities are performed by the body as a whole, but specific activities require specific body structure and composition to perform the activity. It is, therefore, emphasized that body structure, its segments and their ratios correlate with the performances of the various activities. De. Garay, *et al.*, (1974) ^[1] studied that sports events are classified on the basis of the dominant characteristics of each type of event required or developed. Therefore, participants in different games and sports activities possess or require different characteristics to be successful in that particular event. Novak *et al.* (1972) worked on 28 track runners and marathon runners. They observed that 400 m runners and 800 m runners had significantly higher skin folds at triceps and subscapular sites than the marathon runners. When the sum of triceps, subscapular, iliocrest, umbilical, thigh and calf were calculated from the mean, the values declined from 1500-3000 m runners (33.7mm) to 400m to 800m runners (33.5 mm) to 5000-10000m runners (28.7mm) and to marathoners (22.6mm). Muthiah and Venkateswarlu (1973) ^[6] investigated the Indian field athletes and reported that the throwers were heavier, taller and older than other athletes, whereas jumpers and hurdlers were taller and heavier than sprinters but were shorter and lighter than the throwers. Singh K. *et al.* (2010) ^[10] found that high performer pole vaulters were significantly greater in weight, total arm length, upper arm length and sitting height and were also significantly greater in all circumferences except upper arm circumference compared to low performer pole vaulters. The high performer pole vaulters were also significantly greater in shoulder, knee, and ankle diameters and lean body mass compared to low performer pole vaulters. In athletes, body composition measures are widely used to prescribe desirable body weights, to optimize competitive performance, and to assess the effects of training

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(Sinning, 1996) [11]. These researchers, also conducted similar study on different game players i.e. Sharma and Shukla (1988) [9], Battinelli (2000) [12], Chauhan, M.S. (2003) [4], Pritam, *et al.* (2009) [7] and Ragad, A.I. (2010) [8] etc. They have given the characteristics of various sports person for specific games and also shown similar results. From the literary review it is evident that there is a clear paucity of research in the area of athletic in Indian context this study helps the coaches to identify and selection of talented Sprinters and throwers. In the present study, an attempt has been made to determine the statically difference between the sprinters and throwers kinanthropometric parameters and body composition measurements.

Material and methods

Selection of Subjects: For the purpose of the present study, Sixty (N=60), Male North Indian National level and All-India Inter-University Level (Sprinters and Throwers) between the age group of 17-28 years were selected as subject in the present study. The subjects were purposively assigned

into two groups: Group-A: Sprinters (n=30) and Group-B: Throwers (n=30).

Selection of Variables

The kinanthropometric measurements of the subjects were collected by using the anthropometric rod; vernier calipers, steel tape and skin-fold calipers, according to the instructions given by Weiner and Lourie (1969) [14]. Body composition variables i.e., body density, fat percentage; fat weight and lean body mass were calculated by using Durnin and Rehaman's Equation (1967) and Siri's Equation (1961) respectively.

Statistical Technique Employed

The data were analyzed by applying 't' test to find out significant mean difference between sprinters and throwers with the help of SPSS (11.5) computer software.

Results & Discussion

Table 1: Comparative status of sprinter and Thrower Kinanthropometric profile.

Sr. No	Variables	Sprinters		Thrower		T Test Values for Equality of Means			
		Mean	S.D.	Mean	S.D.	't' Ratio	Df	Sig. Value	CI
1	Weight	67.533	5.420	85.367	16.936	5.4928**	58	0.0000	-11.3345
2	Height	176.133	4.115	179.630	5.229	2.8783**	58	0.0056	-1.0649
3	Sitting height	88.423	3.060	90.547	3.798	2.3843*	58	0.0204	-0.3407
4	Trunk Length	57.727	2.419	58.903	3.334	1.5647	58	0.1231	0.3287
5	Arm Length	78.533	2.542	80.853	2.509	3.5582**	58	0.0008	-1.0148
6	Hand Length	18.997	2.220	19.697	0.683	1.6509	58	0.1042	0.1488
7	Hand Breadth	8.313	0.632	8.907	0.398	4.3490**	58	0.0001	-0.3202
8	Leg Length	92.397	3.071	94.720	3.852	2.5834*	58	0.0123	-0.5231
9	Wrist Diameter	5.670	0.330	5.800	0.301	1.5945	58	0.1163	0.0332
10	Elbow Diameter	6.780	0.228	6.790	0.295	0.1468	58	0.8838	0.1263
11	Shoulder Diameter	43.137	2.347	45.423	3.395	3.0349**	58	0.0036	-0.7785
12	Hip Diameter	34.363	12.920	33.520	1.976	0.3534	58	0.7251	5.6199
13	Knee Diameter	8.953	0.443	9.627	0.476	5.6690**	58	0.0000	-0.4356
14	Ankle Diameter	6.873	0.310	7.120	0.448	2.4829*	58	0.0159	-0.0478
15	Shoulder Girth	112.433	5.580	120.200	9.312	3.9186**	58	0.0002	-3.7992
16	Upper Arm Girth	28.893	4.099	29.800	3.595	0.9109	58	0.3661	1.0858
17	Chest Girth	86.833	4.691	98.187	8.743	6.2676**	58	0.0000	-7.7274
18	Abdomen Girth	76.100	5.269	84.493	10.743	3.8419**	58	0.0003	-4.0202
19	Hip Girth	90.700	4.580	98.567	5.507	6.0159**	58	0.0000	-5.2491
20	Thigh Girth	52.407	4.240	56.900	6.635	3.1255**	58	0.0028	-1.6156
21	Calf Girth	34.970	2.928	37.207	4.988	2.1180*	58	0.0385	-0.1228

**Significant at 0.01 level & * Significant at 0.05 level N = 60 d.f. = 58

Required value for being significant at .01 Level of significance= 2.66 and significant at .05 Level of significance= 2.00 ; CI= Confidence Interval

Table-1 summarizes that the Mean, S.D. and 't' ratio of sprinters and throwers. Results shows that the 't' ratio of weight, height, arm length, hand breadth, shoulder and knee diameters, chest, hip and thigh girth are significant at 0.01 level of significance, whereas 't' ratio of sitting height, leg length and calf girth are significant at 0.05 level of significance. It clears that these variables varies between the sprinters and throwers. Further the mean values of weight and body linear measurements of throwers are higher than that of sprinters.

Hence it implies that, throwers are bulky and have more body weight and linear measurements as compare to sprinters which helps him in throwing events because more body weight helps throwers to maintain body balance and strength whereas, more height provides high point of release which helps throwers to cover more distance. Broader shoulder and knee diameters provide the throwers more range of movements for executing throw effectively. More girth measurements of throwers means more development of muscles on that particular region it provides more strength to execution of throw, whereas heavy upper body weight hinders the performance of sprinters.

Table 2: Comparative status of sprinter and thrower skin folds and body composition variables.

Sr. No	Variables	Sprinters		Throwers		T Test Values for Equality of Means			
		Mean	S.D.	Mean	S.D.	't' Ratio	Df	Sig. Value	CI
22	Biceps Skin Fold	2.847	0.598	3.107	1.150	1.0983	58	0.2766	0.2139
23	Triceps Skin Fold	4.907	1.424	7.060	2.576	4.0067**	58	0.0002	-1.0775
24	Sub Scapular Skin Fold	7.693	1.198	12.577	4.893	5.3092**	58	0.0000	-3.0422
25	Suprailliac Skin Fold	5.330	2.387	12.140	21.324	1.7383	58	0.0875	1.0318
26	Thigh Skin Fold	14.353	13.087	12.543	10.783	0.5846	58	0.5611	8.0072
27	Calf Skin Fold	6.500	2.421	7.890	3.696	1.7232	58	0.0902	0.2247
28	Body Density	1.067	0.008	1.060	0.010	2.8452**	58	0.0061	0.0117
29	Percentage Fat	13.849	3.926	17.085	4.488	2.9729**	58	0.0043	-1.0572
30	Fat Weight	9.331	2.476	14.951	5.994	4.7457**	58	0.0000	-3.2491
31	Lean Body Mass	58.617	5.743	70.813	12.267	4.9315**	58	0.0000	-7.2454

**Significant at 0.01 level & * Significant at 0.05 level N = 60 d.f. = 58

From table-2, clearly indicated that the 't' ratio of skin folds and body composition variables i.e., triceps, subscapular skin folds, body density, percent fat, fat weight and lean body mass are significant at 0.01 level of significance. It clears that these variables varies between the sprinters and throwers and the mean values of skin folds measurements and body composition variables of throwers are higher than that of sprinters.

It is, therefore, suggested that the more accumulate of adipose tissue in body reduce speed of sprinters, whereas it helps the throwers to apply more force for more duration effectively.

Conclusion

1. A perusal of summary of results in table-1 shows that throwers have more body weight, height, sitting height, arm length, leg length, hand breadth, shoulder diameters, knee diameters, chest girth, hip girth and thigh girth as compare to sprinters and there exists highly significant mean difference between them. Similar result reported by Battinelli (2000) ^[2], Chauhan, M.S. (2003) ^[4] and Pritam, *et al.* (2009) ^[7].
2. While observing results presented in table-2, it can be summarized that throwers body accumulate more fat at triceps, subscapular sites and they also have more percent fat, fat weight and lean body mass than that of sprinters and their mean difference significantly exist at 0.01 level of confidence. Similar finding reported by Bloomfield, J. *et al.* (1995) ^[3], Sodhi (1991) ^[13] and Chauhan, M.S. (2003) ^[4].

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