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Research Article

Comparison of anthropometric characteristics among All India Inter University sprinters

■ R. PRABU AND K. SEKARBABU

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See end of the article for authors' affiliations

Correspondence to :

R. PRABU
Research Scholar, Department of Physical Education and Sports Sciences, Annamalai University, Annamalai nagar, CHIDAMBARAM (T.N.) INDIA

■ **ABSTRACT**

The purpose of the study was to determine the differences on the dependent variables such as standing height, sitting height, upper leg length, lower leg length among the categorical variables of 100m, 200m and 400m sprinters. For the purpose of this study, subjects were selected from the 72th All India Inter-University Athletic Championship held at the Rajiv Gandhi University of Health Sciences in Mangalore from 17th to 21st December, 2011. In this atheletic championship, 1257 male athletes of 151 universities participated. Out of these athletes, all 47 male sprinters who have qualified for the semi-finals and finals of 100m, 200 m and 400 m were selected as subjects. Thus, the present study comprised of 16 sprinters from 100m, 13 sprinters from 200 m and 18 sprinters from 400 m. The sprinters who have participated more than one sprinting events were not included in this study. Further, one way ANOVA was applied followed by scheffe S' Post Hoc Test if necessary, to find out the differences between the dependent variables among the three groups of sprinters (independent variables). The results of the study revealed that 400 m sprinters were significantly taller than 100 m sprinters and ankle girth was significantly more for 200 m sprinters than 100 m sprinters. Besides, other dependent variables have taken for this study did not differ significantly among the three categories of sprinters.

■ ***Key Words*** **:** Anthropometric characteristics, Inter-university, Sprinters

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Anthropometry is a technique to measure physical characteristics (body size, shape of specific body parts and proportion) of living beings, including men. Anthropometry has been widely applied in a broad range of disciplines, such as ergonomics and health sciences. Because of its convenience, anthropometry has also been applied to understand physical characteristics of athletes in the field of sports science which targets improvement of atheletic performance. Since correct application of anthropometric techniques and interpretation of the information assist management of health status in athletes and also improves their performance, it is important that supporting staff in the atheletic fields, including sports dieticians, share the knowledge associated with anthropometry. To date, the measurement protocol proposed by the International Society for the Advancement of Kinanthropometry (ISAK) has been recognized as an international standard for anthropometric measurements in health and sports science and has been applied across many countries. It is hoped that the international measurement protocol such as that by ISAK to be recognized widely in the sports sciences also and will lead to development of human resources skilled in anthropometry (Masaharu and Kagawa, 2008).

Sprinting is the short distance race which remained important part of competitive play of world's important civilizations. Sprinting is considered to be the oldest form of atheletic competition. In specific terms, it is not easy or even possible to give a list of qualities necessary for an athlete to

become a successful sprinter. However, on the basis of top class sprinters, some of these qualities can be mentioned. Generally an athlete of long height can become an outstanding sprinter easily. His weight should not be more than 170 pounds. For fast sprinting, drive power is very important irrespective of the fact that whether the type of muscle length athletes possess, *i.e.*, short or long (Sharma, 2005).

■ METHODOLOGY

The purpose of the study was to determine the differences on the dependent variables such as standing height, sitting height, upper leg length, lower leg length, among the three categorical independent variables of 100 m, 200 m and 400 m sprinters.

For the purpose of this study, subjects were selected from the 72th All India Inter-University Athletic Championship held at the Rajiv Gandhi University of Health Sciences in Mangalore from 17th to 21st December, 2011. In this atheletic championship, 1257 male athletes from 151 universities participated. Out of these athletes, all 47 male sprinters who have qualified for the semi-finals and finals of 100 m, 200 m and 400 m were selected as subjects. Thus, the present study comprised of 16 sprinters from 100 m, 13 sprinters from 200 m and 18 sprinters from 400 m. The sprinters who have participated more than one sprinting events were not included in this study.

■ OBSERVATIONS AND DISCUSSION

The data collected on standing height, sitting height, upper leg length, lower leg length for 100 m, 200 m and 400 m Inter-university sprinters were subjected to one way analysis of variance to determine any significant difference on dependent variable among the three categories of sprinters. Whenever the F ratio was found to be significant, Scheffe S' post hoc test was applied to find out the significant difference among the paired mean. The results obtained are presented in Table 1.

Table 1 shows that the means and standard deviations on standing height among 100 m, 200 m and 400 m Inter-university sprinters were 170.03 ± 5.13, 172.23 ± 5.76 and 176.42 ± 5.89, respectively. The obtained F ratio 5.70 was greater than the table value of 3.21 required for significance at .05 level of confidence for df 44 and 2. It is inferred from the results of the study that there was a significant difference in standing height among three categories of sprinters.

To find out which of the paired mean differences were significant, Scheffe s' post hoc test was applied and the results are presented in Table 2.

The mean difference on standing height between 100 m and 200 m sprinters was 2.20 and it was less than the confidence interval of 5.31 required for significance at .05 level of confidence. The mean difference on standing height between 100 m and 400 m sprinters was 6.39 and it was higher than the confidence interval required for significance at .05

Table 1 : One way ANOVA for standing height, sitting height, upper leg length and lower leg length among 100m, 200m and 400m inter-university sprinters

Variables	Sprinters – groups	Mean	S. D.	N	SS	df	MS	'F' Ratio
Standing	100 m	170.0313	5.13312	16	358.493	2	179.246	
height	200 m	172.2308	5.76128	13	1382.667	44	31.424	5.704*
	400 m	176.4167	5.88680	18				
Sitting height	100 m	123.8437	3.89752	16	69.079	2	34.539	
	200 m	125.1923	3.93456	13	631.198	44	14.345	2.408
	400 m	126.6944	3.57746	18				
Upper leg	100 m	45.9063	8.78677	16	167.450	2	83.725	
length	200 m	49.7692	5.37205	13	3501.987	44	79.591	1.052
	400 m	45.3056	10.83993	18				
Lower leg	100 m	42.0937	4.83811	16	59.131	2	29.566	
length	200 m	43.2308	4.30898	13	867.528	44	19.717	1.500
	400 m	44.7222	4.15587	18				

Table 2 : Scheffes' post hoc test for differences between paired means on standing height among 100m, 200m and 400m inter-university sprinters

100 m sprinters	200 m sprinters	400 m sprinters	Mean differences	Confidence interval
170.03	172.23	_	2.20	5.31
170.03		176.42	6.39*	4.91
	172.23	176.42	4.19	5.11

level of confidence. The mean difference between 200 m and 400 m sprinters on standing height was 4.19 and it was less than the confidence interval required for significant at .05 level of confidence. It is inferred that 400 m sprinters were significantly taller than 100 m sprinters but there were no significant differences in standing height between 100 m and 200 m sprinters and 200 m and 400 m sprinters.

Table 1 also indicates that the means and standard deviations on sitting height among 100 m, 200 m and 400 m Inter-university sprinters were 123.84 ± 3.90, 125.19 ± 3.93 and 126.69 ± 3.58, respectively. The obtained F ratio 2.41 was less than the table value of 4.91 required for significance at .05 level of confidence for df 44 and 2. It is inferred from the results of the study that there was no significant difference in sitting height among three categories of sprinters.

Table 1 also indicates that the means and standard deviations on upper arm length among 100 m, 200 m and 400 m Inter university sprinters were 30.50 ± 1.18, 32.35 ± 6.06 and 31.42 ± 1.96, respectively. The obtained F ratio1.03 was less than the table value of 5.11 required for significance at .05 level of confidence for df 44 and 2. It is inferred from the results of the study that there was no significant difference in upper arm length among three categories of sprinters.

Table I further indicates that the means and standard deviations on lower arm length among 100 m, 200 m and 400 m Inter university sprinters were 27.50 ± 2.58, 29.77 ± 6.74 and 28.42 ± 3.28 respectively. The obtained F ratio 0.98 was less than the table value of 3.21 required for significance at .05 level of confidence for df 44 and 2. It is inferred from the results of the study that there was no significant difference in lower arm length among three categories of sprinters.

There are many factors that determine athletes success in sprint events and the most important are the anatomical, morphological and physiological parameters Baechle 1994; Crowder *et al.,* 1992; Dintiman *et al.,* 1997; Javer, 1995; Telez, 1994). Further Hay (1993) has stated that the skill of sprinting is actually depending upon athletes' ability to combine the action of the legs, trunk, and arms so on into a smoothly coordinated whole action. Hence, the upper leg length, lower leg length, sitting height and standing height as dependent variables and in addition three categories of sprinters namely 100 m, 200 m and 400 m sprinters as independent variables or categoriacal variable. It is also stated that greater relative muscle mass in the thighs with strong quadriceps muscles will result in strong driving force for sprinter. Hence, in addition to the standing height, sitting height, upper leg length and lower leg length, an addition of three more variables. were also selected as dependent variables. The result of the study indicated that the 400 m sprinters had significantly taller than 100 m sprinters. The speed depends upon two factors *i.e.* stride length and stride frequency. In short sprints like 100 m and 200 m sprints, the frequency of the stride is more important than the stride length whereas as the distance of the run increases the length of the stride plays relatively more role even at the cost of reduced stride frequency. In this study, though there was no significant difference in upper leg length, lower leg length and sitting height, the standing height was significantly higher for 400 m sprinters than 100 m sprinters. It is also interesting to note that the trend of the score also showed that the upper leg length, lower leg length and sitting height increased as the distance of sprint increased. To understand a clear picture either application of MANOVA or computation of ratio of leg length relative to standing height and also ratio of upper leg length and lower leg length relative to the total height would give a clear picture about influence of lower and upper leg length to sprint performance.

Conclusion :

The following conclusions were drawn within the limitation of the present study :

- 400 m sprinters were significantly taller than 100 m sprinters.
- There was no significant difference in standing height between 100 m and 200 m sprinters and also between 200 m and 400 m sprinters.
- There was no significant difference in sitting height, upper arm length and lower arm length among three categories of sprinters.

Authors' affiliations:
K. SEKARBABU, Department of Physical Education and Sports Sciences, Annamalai University, Annamalai Nagar, CHIDAMBARAM (T.N.) INDIA

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