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Comparison of Anthropometric Characteristics among College Sprinters

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Abstract : *The purpose of the study was to find out the differences on the anthropometric characteristics among college sprinters. To achieve the purpose of this study, subjects were selected from the Mangalore University Inter University athletic championship held at Mahatma Gandhi District stadium, Ajjarkad from 19th to 20th December 2015. In this athletic championship 60 sprinter, in that 20 athletes represented 100 meters run, 20 athletes represented 200 meters run and 20 athletes represented 400 meters run were selected as subjects. The selected subjects were aged between 18 to 25 years. The subjects were tested on selected criterion variables such as standing height, sitting height, weight, chest breadth, hand breadth and foot breadth. The analysis of variance (ANOVA) was used followed by scheffe's post hoc test if necessary to find out the differences between the dependent variables among three groups of sprinters. The 0.05 level of confidence was fixed to test the significance, which was considered as an appropriate. The result of the present study has revealed that there was a significant difference among the three categories.*

Keywords: *anthropometric, athletes, sprinters, breadth.*

1. Introduction

Anthropometry refers to the measurement of the human individual. An early tool of physical anthropology, it has been used for identification, for the purposes of understanding human physical variation, in pale anthropology and in various attempts to correlate physical with racial and psychological traits. Anthropometry involves the systematic measurement of the physical properties of the human body, primarily dimensional descriptors of body size and shape. Today, anthropometry plays an important role in industrial design, clothing design, ergonomics and architecture where statistical data about the distribution of body dimensions in the population are used to optimize products. Changes in lifestyles, nutrition, and ethnic composition of populations lead to changes in the distribution of body dimensions and require regular updating of anthropometric data collections. One of the most important tasks for physical educationists is to measure different parts and components of human body. The scientific terminology given to the measurement of man is "Anthropometry" which is a word synthesized from two Greek word- 'Anthropos' means man and 'metreein' means to measure. Hence, anthropometry means the measurements of human body. A French mathematician, Barom Quetelet (Father of anthropometry) coined the term "Anthropometry" ('anthropo' means man and 'metry' means measurement). In ancient India and Egypt, the earliest anthropometric studies were undertaken to find one part of the body which would predict or become a common measurement of all other body parts. Thus, Anthropometry is the science of measuring the human body and its parts. It is used as an aid to the study of human evolution and variation. A review of literature reveals that anthropometry was the first technique of measurement used in physical education.

Anthropometry was first introduced in physical education by a physician Dr. Edward Hitchcock who occupied the first chair of physical education created in USA in 1861 at Amherst college, Ohio. Thus, the history of measurement in physical education is less than, 150 years old. Dr. Edward Hitchcock measured height, weight, girths, breadths, vital capacity and some strength variables of physical education students evaluate progress and gain in health. Anthropometry is a technique to measure physical characteristics (body size, shape of specific body parts and proportion) of living beings, including men.

Athropometry 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 athletic 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 support staff in the athletic 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 recognised 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. The relationship of body build or physique to physical performance and activity has been substantially investigated within given fields of interest. Over the years, the structure, size and function relationships have been well established and generally accepted by researches and practitioners in these fields. Research in this area of study has been centered on the development of morphological rating systems of assessment and classification and the application of these systems to physical performance. 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 athletic competition. All the races in which runner covers entire distance at full speed are termed as sprints. Sprinting as a race category includes all distances up to 400 Meters classified as a long sprint. 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 which type of muscle length athlete possess, i.e., short or long. Throwing events are the component of field event and comprises of the various individual events; namely, Discus throw, javelin throw, Hammer throw and Shot-put.

There are certain immutable truths concerning the performance of human body as it ages, particularly as the athlete reaches age 40. The physical peak for most humans, in most sports, is between 25 and 35 years of age; during this peak period, the well-conditioned athlete can create a confluence of muscular strength; peak cardiovascular and oxygen transport, speed and reaction time and mental capabilities (including the ability to deal with competitive pressures), all bound together by a desire to succeed. The heart, as with every human muscle, will gradually love efficiency and power over a time. The age of peak athletic performance depends upon the key functional element required of the successful competitor. In events were flexibility is paramount (for example, gymnastics and brief swimming events) the top competitors are commonly adolescents. In aerobic events, performance usually peaks in the mid-twenties, as gains from prolonged training, improved mechanical skills and competitive experience are negated by decreases in maximal oxygen intake and flexibility. Because of a longer plateauing muscle strength, performance in anaerobic events declines less steeply and in pursuits such as golf and equitation, where experience is paramount; the best competitors are aged 30-40 years. Caution is needed in drawing physiological inferences from athletic records, since the pool of potential competitor's decreases with age. Moreover, the motives of older participants often change from competitive success (winning at all costs) to social interaction and some participants in Masters events lack cumulated skills, since they did not begin competing until they reached their late thirties.

2. Methodology

The purpose of the study was to analyze anthropometric characteristics and performance of college athletes and further to determine the relationship between different anthropometric parameters and performance of college Athletes (sprinters). For the purpose of this study, subjects were taken from the Mangalore University Inter Collegiate Athletic Championship held at the Mahatma District Stadium in Ajjarkad, Udupi District, Andhra Pradesh from 19^{th} to 20^{th} December, 2015. In this athletic championship, the investigator had taken 60 male athletes {20 (100meters sprinters), 20 (200 meters sprinters and 400 meters sprinters)} from 43 colleges on the basis of their willingness. The subjects were participated in this study based on their voluntary interest. The subjects were tested on selected criterion variables such as standing height, sitting height, weight, chest breadth, hand breadth and foot breadth. The analysis of variance (ANOVA) was used followed by scheffe's post hoc test if necessary to find out the differences between the dependent variables among three groups of sprinters. The 0.05 level of confidence was fixed to test the significance, which was considered as an appropriate.

3. Results

The data collected on standing height, sitting height and weight for 100 meters, 200 meters and 400 meters sprinters of Mangalore University inter collegiate athletes were subjected to one way analysis of variance to determine any significant differences on the dependent variable among the three categories of sprinters. The results obtained are presented in Table I.

Table – I
One Way ANOVA for Standing Height, Sitting Height and Weight among 100 Meters, 200 Meters and 400 Meters Sprinters

Variables	Sprinters Group	Mean	S.D.	F ratio
Standing Height	100 meters	169.45	3.74	4.29*
	200 meters	170.84	4.65	
	400 meters	172.37	5.08	
Sitting Height	100 meters	122.74	3.48	2.52
	200 meters	123.68	3.72	
	400 meters	124.91	4.04	
Weight	100 meters	72.45	5.48	1.09
	200 meters	73.58	5.71	
	400 meters	75.14	6.01	

The table I show that the means of standing height of 100 meters, 200 meters and 400 meters sprinters as 169.45, 170.84 and 172.37 respectively. The obtained 'F' ratio of 4.29 was greater than the table value of 3.15 required for significance at .05 level of confidence for df 57 and 2. The results of the study indicate that there is a significant difference in standing height among the three categories of sprinters. The table I show that the means of sitting height of 100 meters, 200 meters and 400 meters sprinters as 122.74, 123.68 and 124.91 respectively. The obtained 'F' ratio of 2.52 was lesser than the table value of 3.15 required for significance at .05 level of confidence for df 57 and 2. The results of the study indicate that there is no significant difference in sitting height among the three categories of sprinters. The table I show that the means of weight of 100 meters, 200 meters and 400 meters sprinters 72.45, 73.58 and 75.14 respectively. The obtained 'F' ratio of 1.09 was lesser than the table value of 3.15 required for significance at .05 level of confidence for df 57 and 2. The results of the study indicate that there is no significant difference in weight among the 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 II.

Table – II
Scheffe's Post Hoc Test for Differences between the Paired Means on Standing Height among 100 Meters, 200 Meters and 400 Meters Sprinters

100 meters Sprinters	200 meters Sprinters	400 meters Sprinters	Mean Differences	Confidence Interval
169.45	171.84		2.39*	2.12
169.45		172.37	2.92*	2.35
	171.84	172.37	0.53	2.29

The mean difference on standing height between 100 meters and 200 meters sprinters was 2.39 and it was higher than the confidence interval of 2.12. The mean difference on standing height between 100 meters and 400 meters sprinters was 2.92 and it was higher than the confidence interval of 2.35. The mean difference on standing height between 200 meters and 400 meters sprinters was 0.53 and it was lesser than the confidence interval of 2.29. It is inferred that 200 meters and 400 meters sprinters were significantly taller than the 100 meters sprinters, but there was no significant differences in standing height between 200 meters and 400 meters sprinters.

The data collected on chest breadth, hand breadth and foot breadth for 100 meters, 200 meters and 400 meters sprinters of Mangalore University inter collegiate athletes were subjected to one way analysis of variance to determine any significant differences on the dependent variable among the three categories of sprinters. The results obtained are presented in Table III.

Table – III
One Way ANOVA for Chest Breadth, Hand Breadth and Foot Breadth among 100 Meters, 200 Meters and 400 Meters Sprinters

Variables	Sprinters Group	Mean	S.D.	F ratio
Chest Breadth	100 meters	33.45	2.84	0.94
	200 meters	31.57	3.42	
	400 meters	33.19	4.07	
Hand Breadth	100 meters	8.11	0.87	0.58
	200 meters	8.12	0.67	
	400 meters	8.02	0.74	
Foot Breadth	100 meters	8.23	0.58	3.54*
	200 meters	8.55	0.71	
	400 meters	8.19	0.68	

The table III show that the means of chest breadth of 100 meters, 200 meters and 400 meters sprinters as 33.45, 31.57 and 33.19 respectively. The obtained 'F' ratio of 0.94 was lesser than the table value of 3.15 required for significance at .05 level of confidence for df 57 and 2. The results of the study indicate that there is no significant difference in chest breadth among the three categories of sprinters. The table III show that the means of hand breadth of 100 meters, 200 meters and 400 meters sprinters as 8.11, 8.12 and 8.02 respectively. The obtained 'F' ratio of 0.58 was lower than the table value of 3.15 required for significance at .05 level of confidence for df 57 and 2. The results of the study indicate that there is no significant difference in hand breadth among the three categories of sprinters. The table III show that the means of foot breadth of 100 meters, 200 meters and 400 meters sprinters as 8.23, 8.55 and 8.19 respectively. The obtained 'F' ratio of 3.54 was higher than the table value of 3.15 required for significance at .05 level of confidence for df 57 and 2. The results of the study indicate that there is a significant difference in foot breadth among the three categories of sprinters.

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

Table – IV
Scheffe's Post Hoc Test for Differences between the Paired Means on Foot Breadth among 100 Meters, 200 Meters and 400 Meters Sprinters

100 meters Sprinters	200 meters Sprinters	400 meters Sprinters	Mean Differences	Confidence Interval
8.23	8.55		0.32*	0.28
8.23		8.19	0.04	0.26
	8.55	8.19	0.36*	0.25

The mean difference on foot breadth between 100 meters and 200 meters sprinters was 0.32 and it was higher than the confidence interval of 0.28. The mean difference on foot breadth between 100 meters and 400 meters sprinters was 0.04 and it was lower than the confidence interval of 0.26. The mean difference on foot breadth between 200 meters and 400 meters sprinters was 0.36 and it was higher than the confidence interval of 0.25. It is inferred that 200 meters sprinters had significantly wider than the 100 meters sprinters and 400 meters sprinters had significantly wider than the 200 meters sprinters, but there was no significant differences in foot breadth between 100 meters and 400 meters sprinters.

4. Discussion

The comparison of selected variables among 100 meters, 200 meters and 400 meters sprinters, 400 meters sprinters are better in standing height than the 100 meters and 200 meters sprinters. 200 meters sprinters are better in foot breadth than the 100 meters and 400 meters sprinters. The below mentioned studies are found to be related to the findings of the present study, Adhikari Anup and others, Rousanoglou, Noutsos and Bavios and Masaharu and Kagawa.

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