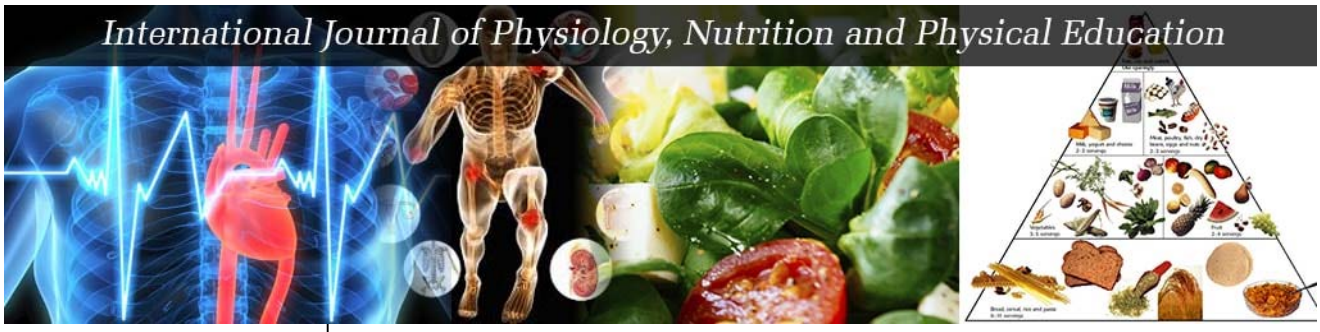

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Relationship among explosive leg strength, leg length and speed of inter college level sprinters

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Abstract
The purpose of the present study was to determine the relationship among Leg Strength, Leg Length and Speed of Inter College Level Sprinters. For the purpose 20 male Inter College level Sprinters age ranged from 17-25 years of various participating colleges in the Dibrugarh University Inter College Athletic Meet 2014-15 were selected as the subjects. The required data were collected on the explosive strength, leg length and speed respectively by using Standing Broad Jump, measuring tap and 30 Yard Dash and score were recorded in centimeter and second respectively. For the statistical analysis the Pearsons' Product Moment Co-relation statistical technique was employed. To find out the relationship among the selected three variables Partial and Multiple correlations technique was also employed. To test the significance in correlation between the variables the t test was used and the level of significance was observed at 0.05 level of confidence. On the basis of findings it was found that there was no significant but slight positive correlation between leg length and Explosive leg strength (r_{12} = 0.072 < tabulated r value 0.433) and slight negative correlation between explosive leg strength and speed and leg length and speed (r_{32} = -0.31 & r_{13} = -0.0063 < tabulated r value 0.433). When significance was tested, no significant relationship between Leg length and Explosive leg strength, explosive leg Strength and Speed, Leg Length and Speed (r_{12} = 0.30, r_{13} = -0.026 and r_{23} = - 1.46 < tabulated value 2.101). The positive partial co-relationship among the variables; in case of $r_{12.3}$ = 0.071 and negative in partial co relationship $r_{13.2}$ = - 0.029 and $r_{23.1}$ = - 0.32 was observed. It was also further conclude that there are slight positive correlation among explosive leg strength, leg length and speed was observed ($R_{1.23}$ = 0.070, $R_{2.13}$ = 0.32, $R_{3.12}$ = 0.002).

Keywords: Sprinter, explosive leg strength, leg length, speed

Introduction
Since ancient times, sports activities in the shape of running, jumping and throwing have been a natural part of man's existence whether it was hunting animals for food or escaping from the wild and dangerous species. However, latterly these activities became pleasurable and competitive, leading to desire for improving his own speed of movement or ability to complete in these competitions. The development in the present country in all walk of human life has surprised the progress of thousands of years and sports also a part of life. It has become a very important and integral part of the total educational process. Through the well directed programme, children develop skills for the worth use of leisure time, engage in activities that are conductive to healthy living and all the endeavours load to their physical, social, mental and emotional health. Now it has became a necessity to identify and select a future elite athlete in right in childhood or adolescent it takes many years of intensive regular training till an international sports performance level is achieved [Tanwar, B (2013)] [1].

Human variation is a biological fact. This is a strikingly apparent in every sports and games where events selectively reflect concomitant genetic and environmental influence on physique. Anthropometry is the interface between anatomy and movement. It is the application of a series of measurements made on the body and from these we can use the data that we gather directly or perform calculations using the data to produce various indices and body composition predictions and to measure and describe physique [Balwinder & Singh, I.] [2].

Races over short distances, or sprints, are among the oldest running competitions. Sprinting events are focused around athletes reaching and sustaining their quickest possible running speed.

Sprinting involves a quick acceleration phase followed by a velocity maintenance phase. During the initial stage of sprinting, the runners have their upper body tilted forward in order to direct ground reaction forces more horizontally. As they reach their maximum velocity, the torso straightens out into an upright position [Wikipedia] [3].

Sprinting performances rely strongly on a fast acceleration at the start of a sprint and on the capacity to maintain a high velocity in the phase following the start. Simulations based on a model developed in which the generation of metabolic power is related to the mechanical destinations of power showed that for short-lasting sprinting events, the best pacing strategy is an all out effort, even if this strategy causes a strong reduction of the velocity at the end of the race. Even pacing strategies should only be used in exercises lasting longer than 80 to 100 seconds [Gerrit Jan Ingen van Schenau, Jos J. de Koning, Gert de Groot (1994)] [4].

Successful sprint running performance requires good starting ability, highest maximum running velocity, and endurance of that velocity capacity. Maximum running velocity in elite sprinters is achieved by optimal stride length (SL) and stride frequency (SF) in the distance between 30 m and 60 m [Gambetta, V. (1991)] [5].

Anthropometry and fitness plays an important role in sports performance. The sprinting performance of an athlete is depends upon various factors such as anthropometrics measurements, physical factor, psychological factors, physiological factor and their relationship.

Methodology

For the purpose 20 male Inter College level Sprinters age ranged from 17-25 years of various participating colleges in the Dibrugarh University Inter College Athletic Meet 2014-15 were selected as the subjects. For the present study single group design was employed. The required data were collected on the explosive strength, leg length and speed by using Standing Broad Jump, measuring tap and 30 Yard Dash [Kansal D.K. (2008)] [6] and score were recorded in centimeter and second respectively. For the statistical analysis the Pearsons' Product Moment Co-relation statistical technique was employed. To find out the relationship among the selected three variables Partial and Multiple correlations technique was also employed. To test the significance in correlation between the variables the t test was used and the level of significance was observed at 0.05 level of confidence.

Results

Table 1: Summary of correlations co-efficient between the explosive leg strength, leg length and speed

		1	2	3	
		Leg length	Explosive Leg Strength	Speed	t- ratio
1	Leg Length		r = 0.072	r= -0.31	r_{12} = 0.30
2	Explosive leg strength			r = -0.0063	r_{13} = -0.026
3	Speed				r_{23} = - 1.46

No significant at 0.05 level of confidence r0.05 (18) = .444 & t0.05 (18) = 2.101

From the table no- 1 learned that there is minimum correlation co-efficient between Leg Length and Explosive Leg Strength (r_{12} = 0.072) and minimum negative co-relation between Leg Length and Speed & Explosive Leg Strength and Speed (r_{13} = -0.31 and r_{23} = -0.0063) but not significant at 0.05 level of confidence ($r_{0.05\ (18)\ =\ .444}$). When testing of significance was done by employing t-test, no significant relationship was observed (r_{12} = 0.30, r_{13} = -0.026 and r_{23} = - 1.46 < tabulated value 2.101)

Table 2: Summary of Partial Correlations among the explosive leg strength, leg length and speed

		1	2	3
		Leg length	Explosive Leg Strength	Speed
1	Leg Length		$r_{12.3}$ = 0.071	$r_{13.2}$ = - 0.029
2	Explosive Leg Strength			$r_{23.1}$ = - 0.32
3	Speed			

From the table no- 2 the positive partial co-relationship among the variables in case of $r_{12.3}$ = 0.071 and negative in partial co relationship $r_{13.2}$ = - 0.029 and $r_{23.1}$ = - 0.32 was observed.

Table 3: Summary of Multiple Correlations among the explosive leg strength, leg length and speed

		1	2	3	Multiple correlation
		Leg length	**Explosive Leg Strength**	**Speed**	
1	Leg Length				$R_{1.23}$ = 0.070
2	Explosive leg strength				$R_{2.13}$ = 0.32
3	Speed				$R_{3.12}$ = 0.002

From the table no- 3 it was observed that there was positive correlation among explosive leg strength, leg length and speed as the $R_{1.23}$ = 0.070, $R_{2.13}$ = 0.32, $R_{3.12}$ = 0.002.

Discussion of findings

From the tables -1 it was found that there were positive correlation of coefficient between leg length and explosive leg strength (r = 0.072) and slight negative correlation of coefficient between Explosive leg strength and speed (r = -0.0063) and leg length and speed (r -0.31) but not significant at 0.05 level of confidence ($r_{0.05\ (18)\ =\ .444}$). When testing of significance was done by employing t-test, no significant relationship was found (r_{12} = 0.30, r_{13} = -0.026 and r_{23} = - 1.46 < tabulated value 2.101).

Table 2 shows the positive partial co-relationship among the variables in case of $r_{12.3}$ = 0.071 and negative in partial co relationship in case of $r_{13.2}$ = - 0.029 and $r_{23.1}$ = - 0.32 was observed.

Whereas when the multiple correlation is being calculated positive correlation among explosive leg strength, leg length and speed was observed ($R_{1.23}$ = 0.070, $R_{2.13}$ = 0.32, $R_{3.12}$ = 0.002).

The result of study might be attributed to the proper improvement of the variable. For better performance all the effecting factors are interrelated. Here the Leg length is the independent variables and the Explosive leg strength and speed is dependent variable. Explosive leg strength is affected by leg length some cases and speed is dependent on the leg length as well as explosive strength. Moreover leg length is not trainable i.e. cannot be improved. On the other hand other two variables can be improved by proper training.

Hence for better speed ability one must have good leg length and explosiveness on it. For example we can consider that that all the world class sprinters have comparatively more leg length.

Conclusions

On the basis of findings it was found that there was no significant but slight positive correlation between leg length and Explosive leg strength (r_{12} = 0.072 < tabulated r value 0.433) and slight negative correlation between explosive leg strength and speed and leg length and speed (r_{32} = -0.31 & r_{13} = -0.0063 < tabulated r value 0.433). When significance was tested, no significant relationship between Leg length and Explosive leg strength, explosive leg Strength and Speed, Leg Length and Speed (r_{12} = 0.30, r_{13} = -0.026 and r_{23} = - 1.46 < tabulated value 2.101). The positive partial co-relationship among the variables; in case of $r_{12.3}$ = 0.071 and negative in partial co relationship $r_{13.2}$ = - 0.029 and $r_{23.1}$ = - 0.32 was observed. It was also further conclude that there are slight positive correlation among explosive leg strength, leg length and speed was observed ($R_{1.23}$ = 0.070, $R_{2.13}$ = 0.32, $R_{3.12}$ = 0.002).

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