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Stride length for tribal and non-tribal adolescents at different phases of sprinting

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Abstract
The aim of the present study was to find out and compare stride length for tribal and non-tribal adolescents at different phases of 100 m sprinting. A total of 240 adolescent boys and girls within the age group of 10 to 15 yrs. were selected as subjects of this study. The subjects were divided into four equal sized group i.e., tribal boys, non-tribal boys, tribal girls and non-tribal girls. Each group was consisted of 60 subjects. The video graphic data was collected from 100 m performance of the subject. The average stride length for tribal boys was 219.94 (±16.84) cm in acceleration phase, where non-tribal boys was 222.20 (±15.91), the stride length in maximum speed phase for tribal boys was 313.59 (±32.06) cm, whereas non-tribal boys 320.78 (±28.50) cm and similarly the stride length in deceleration phase for tribal boys was 311.17 (±33.13) cm, whereas non-tribal boys was 316.14(±30.67) cm. In the same away the average stride length for tribal girls was 211.92 (±14.58) cm in acceleration phase, where non-tribal girls was 213.02 (±16.39), the stride length in maximum speed phase for tribal girls was 295.12 (±21.86) cm, whereas non-tribal girls 300.33 (±20.75) cm and similarly the stride length in deceleration phase for tribal girls was 286.55 (±25.39) cm, whereas non-tribal girls was 291.42 (±25.94) cm. In the both case of tribal and non-tribal adolescent boys' and girls' maximum stride length found at maximum speed phase of sprinting. The stride length in maximum speed phase increased from acceleration phase and it was further decreased in deceleration phase from maximum speed phase. The difference between tribal and non-tribal boys and girls at different phases of sprinting was not statistically significant at 0.05 levels.

Keywords: sprinting, stride length, adolescents, tribal, non-tribal, acceleration phase, maximum speed phase, deceleration phase

Introduction

Adolescence, transitional phase of growth and development between childhood and adulthood. The World Health Organization (WHO) defines an adolescent as any person between ages 10 and 19. This age range falls within WHO's definition of young people, which refers to individuals between ages 10 and 24 (Csikszentmihalyi, 2020) [7].

The concept of tribal is relating to a group or community belonging to ethnic groups of community or tribes. They have been classified as Scheduled Tribes under the Indian constitution. The meaning of non-tribal is relating to a community or group of people who are not belonging to tribal community. There are differences in living conditions and hereditary qualities between these two groups.

Sprinting is a form of running with maximum possible speed. For an individual it is believed to be genetic in nature. In Track & Field 100m, 200m, 400m run consider as sprint run. But in real sense sprinting is confined to 100m run. For this 100m sprinting is used in many situations as a test of ability of maximum speed of a person.

Running a relatively short distance with maximum possible speed is considered as sprinting (Bhowmick & Rumee, 2003) [5]. Speed is defined as "One's ability to perform successive movements of the same pattern at a fast rate"- (Barrow & Mc Gee, 1979) [3]. Speed may also be defined as "Rapidity with which a movement or successive movements of the same kind may be performed by an individual"- (Clarke & Clarke, 1986) [6].

The sprinting speed depends on some kinematic parameters such as stride length, stride frequency, body lean, front arm elbow angle, rear arm elbow angle, knee angle of front foot and angle of push etc. The only one kinematic parameter namely stride length considered for present study. The stride length is identified by the termination of contact of a foot with the ground through the next contact of this same foot. One stride consists of two steps (Adrian & Cooper, 1989) [2]. "Stride length is the distance covered between the spot where one foot hits the ground and the next time that same foot hits the ground again,"- (Mateo, 2020) [12]. The step length and stride length are two important measurement of gait analysis. Gait analysis is the study of how the person runs and walks. The doctors use visual observations and use different types of tools to measure stride length.

Speed is the function of stride length and frequency. Maximum speed depends on the ratio of these parameters. The increased of speed can be achieved by increasing stride length or stride frequency.

In sprinting maximum velocity is a key determinant of running time- (Mastsuo, 2008) [11]. The maximum running velocity determines by stride length and stride frequency. For increasing velocity to improve stride length and/or stride frequency – (Hunter, Marshall, & McNair, 2003) [9].

In the present study the distance of two steps considered as stride length. The video- graphic data was collected during 100 m sprinting. The stride length was calculated by motional analysis software Kinovea 0.8.15.

The research was to find out the stride length of tribal and non-tribal adolescents boys and girls at different phases of

100 m sprinting and to compare them.

Methodology

A total of 240 adolescent boys and girls within the age group of 10 to 15 yrs. ware selected as subjects of this study. The subject was divided into four equal sized groups: 60 tribal boys, 60 non-tribal boys, 60 tribal girls and 60 non-tribal girls.

The video graphic data was collected from 100 m sprinting of the subject. The video was recorded through 60 frames per second by Nikon D3300 camera. The camera was placed at the height of 1m from ground and it was placed 6.25m distance from the subject. The method shows in figure-1 and Photograph No.2. The stride length of subjects was computed by motional analysis software Kinovea 0.8.15 from video graphic data**.**

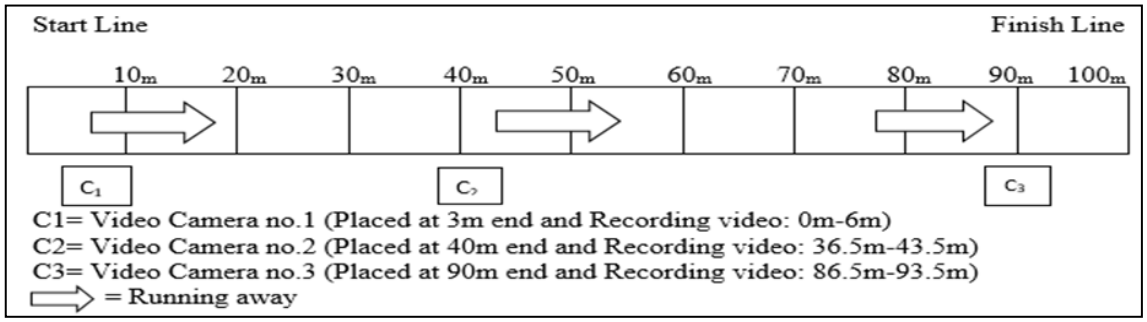

Fig 1: Method of data collection

Fig 2: Picture during data collection

Results

Keeping the focus of the study in mind, the stride length of tribal and non-tribal adolescents' boys and girls have been analyzed for better understanding. This was done separately.

Stride length for adolescent boys at different phases of sprinting

Stride length of tribal and non-tribal girls have been presented in table-1

Table 1: Mean values of stride length for tribal and non-tribal boys at three different phases of sprinting

Stride length at the phase of	Tribal Boys		Non-Tribal Boys	
	Mean (cm)	SD (cm)	Mean (cm)	SD (cm)
Acceleration	219.94	±16.84	222.20	±15.91
Maximum Speed	313.59	±32.06	320.78	±28.50
Deceleration	311.17	±33.13	316.14	±30.67

The average stride length for tribal boys was 219.94 (±16.84) cm in acceleration phase, where non-tribal boys was 222.20 (±15.91), the stride length in maximum speed phase for tribal boys was 313.59 (±32.06) cm, whereas non-tribal boys 320.78 (±28.50) cm and similarly the stride length in deceleration phase for tribal boys was 311.17 (±33.13) cm, whereas non-tribal boys was 316.14 (±30.67) cm. From the above information the stride length of tribal and non-tribal boys at different phases of sprinting drawn in Fig.3

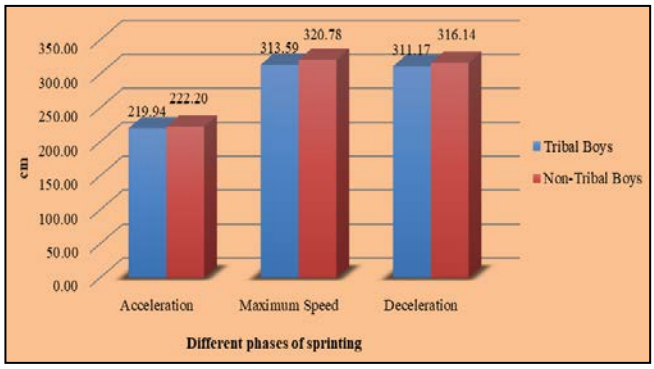

Fig 3: Stride length for tribal and non-tribal boys

From the Fig. 3, it was observed that the stride length of non-tribal boys higher than the tribal boys. In the both case of tribal and non-tribal boys' maximum stride length found in maximum speed phase. The stride length in maximum speed phase increased from the acceleration phase and it was further decreased in deceleration phase from maximum speed phase. From the figure it may be concluded that the stride length increased gradually from stationary position to maximum speed position and there after it was decreased.

Testing significant difference of stride length for tribal and non-tribal boys was done by t-test and the results have been shown in table-2

Table 2: Comparison of mean values of stride length at different phases of sprinting for tribal and non-tribal boys

Phase	Boys Group	Mean (cm)	SD (cm)	t-value	p-value	Remarks
Acceleration	Tribal	219.94	±16.84	0.755	0.45	Not-Sig.
	Non-Tribal	222.20	±15.91			
Maximum Speed	Tribal	313.59	±32.06	1.299	0.20	Not-sig.
	Non-Tribal	320.78	±28.50			
Deceleration	Tribal	311.17	±33.13	0.853	0.40	Not-sig.
	Non-Tribal	316.14	±30.67			

Required table value with df-118 at 0.05 level of significant = 1.980

Testing of significant difference between mean values of stride length for tribal and non-tribal boys in initial acceleration phase revealed a statistically not significant difference at 0.05 level of significant.
In maximum speed phase revealed a statistically not significant difference found at 0.05 level of significant.
In deceleration phase also revealed a statistically not significant difference found for tribal and non-tribal boys at 0.05 level of significance.

Stride length for adolescent girls at different phases of sprinting

The stride length defined as distance covered by two successive steps. Stride length of tribal and non-tribal girls have been presented in table-3

Table 3: Mean values of stride length for tribal and non-tribal girls at three different phases of sprinting

Stride Length at the phase of	Tribal Girls		Non-Tribal Girls	
	Mean (cm)	SD (cm)	Mean (cm)	SD (cm)
Acceleration	211.92	±14.58	213.02	±16.39
Maximum Speed	295.12	±21.86	300.33	±20.75
Deceleration	286.55	±25.39	291.42	±25.94

The average stride length for tribal girls was 211.92 (±14.58) cm in acceleration phase, where non-tribal girls was 213.02 (±16.39), the stride length in maximum speed phase for tribal girls was 295.12 (±21.86) cm, whereas non-tribal girls 300.33 (±20.75) cm and similarly the stride length in deceleration phase for tribal girls was 286.55 (±25.39) cm, whereas non-tribal girls was 291.42 (±25.94) cm.
From the above information the stride length of tribal and non-tribal girls at different phases of sprinting drawn in Fig.4

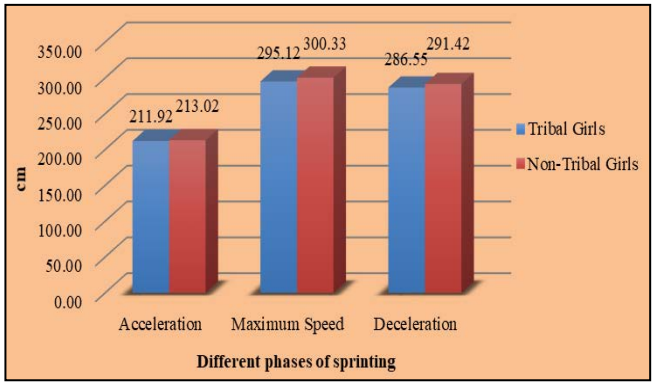

Fig 4: Stride length for tribal and non-tribal girls

From the Fig. 4, it was observed that the stride length of non-tribal girls slightly higher than the tribal girls. In the both case of tribal and non-tribal girls' maximum stride length found in mid phase of running i.e., maximum speed phase. The stride length in maximum speed phase increased from acceleration phase and it was further decreased in deceleration phase from maximum speed phase. From the figure it may be concluded that the stride length increased gradually from stationary position to maximum speed position and there after it was decreased towards end of sprinting.
Testing significant difference of stride length for tribal and non-tribal girls was done by t-test and the results have been shown in table-4

Table 4: Comparison of mean values of stride length in different phases of sprinting for tribal and non-tribal girls

Phase	Girls Group	Mean (cm)	SD (cm)	t-value	p-value	Remarks
Acceleration	Tribal	211.92	±14.58	0.391	0.70	Not-Sig.
	Non-Tribal	213.02	±16.39			
Maximum Speed	Tribal	295.12	±21.86	1.338	0.18	Not-Sig.
	Non-Tribal	300.33	±20.75			
Deceleration	Tribal	286.55	±25.39	1.038	0.30	Not-Sig.
	Non-Tribal	291.42	±25.94			

Required table value with df-118 at 0.05 level of significant = 1.980

Testing of significant difference between mean values of stride length for tribal and non-tribal girls in acceleration phase revealed a statistically not significant difference at 0.05 level of significant.
In maximum speed phase revealed a statistically not significant difference found at 0.05 level of significant.
In deceleration phase also revealed a statistically not significant difference found for tribal and non-tribal girls at 0.05 level of significance.

Discussions

Testing of significance of the difference between mean values of stride length in acceleration phase, maximum speed phase and retardation phase for tribal and non-tribal adolescent boys and girls revealed a statistically non-significant difference at 0.05 levels. Similar study conducted by (Mandal & Biswas, 2020) [10] on stride length at initial acceleration phase between tribal and non-tribal boys different age group, they found non-tribal group of boys

stride length higher than tribal group of boys in all age group. From the study we can say stride length in sprinting depended on leg length and training status of the subject. In the present study subject ware selected adolescent school boys and girls are not trained and their socio economic, cultural habits and active participation in daily life more or less similar. Per haves these reason differences of stride length between tribal and non-tribal boys was not found in statistically significant.

Conclusions

On the basis of results present study for tribal and non-tribal boys with existing limitations of the study following conclusions were drawn:

1. Stride length of both tribal and non-tribal adolescent boys and girls was increased in maximum speed phase of sprinting from acceleration phase of sprinting and it was further slightly decreased at deceleration phase of sprinting from maximum speed phase of sprinting.
2. The stride length of non-tribal boys was higher than their tribal boys' counterpart at different phases sprinting such as acceleration phases, maximum speed phases and deceleration phases of sprinting but non-statistically significant at 0.05 level of significance.
3. The stride length of non-tribal girls was higher than their tribal girls' counterpart at different phases sprinting such as acceleration phases, maximum speed phases and deceleration phases of sprinting but non-statistically significant at 0.05 level of significance.

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