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Difference between selected movement parameters in Straight and Curve path among national level players in Bangladesh

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Abstract
Sprint is a most popular event in track and field event in athletics. In straight and curve path sprinting speed are not similar but it is different in several zone in athletic track. From the research it would be possible to compare the different zones of 100m running in respect of straight and curve running. A total sixteen (16) male and eight (8) female athletes were selected to participate as a subject for the present study. At first the total length of 100m straight and 100m curve was divided into five parts and three zones. Five trained time keepers were posted with digital stop watch for recording time. The raw data were analyzed following standard statistical technique. The difference in movement parameters between straight and curve running are found not to be significant. The significant of present study is find differentiation not relation with straight and curved paths movement parameters.

Keywords: Sprint, Zone, Movement parameters, Time.

Introduction
Running is a fundamental activity for human beings and provides a group of competitive events for Track and Field Athletics. According to mechanics running can be rectangular and curvilinear. Sprinting is running for a short distance cover in a limited period of time. It is used in many sports that incorporate running, typically as a way of quickly reaching a target or goal. In sports field many sprinting events, such as 100-meter dash, 200-meter dash, 110-meter hurdles, and 100-meter hurdles, sprinters should run on both straight and curved paths at top or near top running speed. Sprinter or runner is not running in same sprit on both straight and curved paths. Hayato, Masanobu, Akihito and Yuichi, (2018) [1] to enhance sprint performance in most sprinting events, it is important to improve running speed on both straight and curved paths. Stoner and Ben-Sira (1979) [3] compared 20-m straight path and curved path running and indicated that on curved paths, the running speed was slower than the straight line. It is generally accepted that the running speed on curved paths tends to be slower than on straight paths.

However, it is generally accepted that the running speed on curved paths tends to be slower than on straight paths (Chang and Kram, 2007; Churchill *et al*., 2015a, 2015b; Greene, 1985; Stoner and Ben-Sira, 1979; Usherwood and Wilson, 2006) [4, 9, 5, 6, 3, 8].

Some previous studies aimed to clear concept about differences in sprint movement between straight and curved running. These previous studies also clarify the factors that affected the running speed on straight path and curved paths. Most of the studies consistently showed that the movement parameters on a curved path were slower than on a straight path. On the other hand, Alt *et al*. (2015) [2] indicated that there were no significant differences in running speed between straight and curved paths.

So, the extent of the decline in maximum running speed on a curved path in relation to a straight path differs. Running speed on a curved path is considered to be determined by maximum running speed or sprint ability on the straight path.

By comparing the differences between straight and curve running in selected movement parameters also dependent biomechanical factor. Running speed on a curved path is considered to be determined by maximum running speed or sprint ability on the straight path,

and the cornering technique to change direction of movement along the curve without decreasing running speed.

2. Materials and methods

2.1 Selection of subjects

A total number of sixteen (16) male and eight (8) female athletes were selected to participate as a subject for the present study. They were within the age group between 18-26 years old. All of them are sprinter and jumper in national level of Bangladesh.

2.2 Procedure for collecting data

At first the total length of 100m straight and 100m curve was divided into five parts 10m, 45m, 55m, 90m, 100m, thus there were three zone (0-10m), (45m-55m), and (90m-100m). First zone (0-10) m was the 'Acceleration zone', second zone (45-55) m was the 'Maximum speed zone' (90-100) m and the third was the 'Deceleration zone'.

Five trained time keepers were posted with digital stop watch for recording time. The starter signaled all the time keepers along with the athlete on start of the race. One by one subject started the race of 100m with the usual command of the starter. With starting whistle the subject started running and the time keepers started watches. When the subject touched or crossed the marked zone the time keeper stopped his respective stop watch. After finishing 100m sprint run the time of all the watches were recorded. At first 10m, then 45m, then 55m, then 90m, then 100m time were recorded.

2.3 Statistical Model

Zonal times for all the three zones of 100m sprint were calculated from the basic data. The collected data were analyzed using statistical procedure.

Mean was calculated as a measure of central tendency by using the formula:

$$\bar{X} = \frac{\sum X}{N}$$

Where, $\bar{X}$ donates the mean, $\sum$ X denote the sum total of scores and N denotes the number of scores.

The standard deviation (SD) was calculated as the measure of variability by using the formula:

$$SD\ (\sigma) = \sqrt{\frac{(X-\bar{X})^2}{N}}$$

Where, σ denotes the standard deviation, $\sum(X-\bar{X})^2$ denote the total of square of the deviation and N denote the number of scores.

The formula used for t-test

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

The raw data were analyzed following standard statistical technique.

2.4 Analysis of data

At first the difference between straight and curve running both male and female athlete acceleration zone (0-10) m were calculated. Table -1 shows the results.

Table 1: Showing difference between straight and curve running both male and female athlete in Acceleration zone (0-10) m.

Group	Mean Values of time (s)		t-value	Remark
	Straight running	Curve running		
Male	1.92 ± 0.66	1.97 ± 0.16	0.24	Not significant
Female	2.33 ± 0.16	2.40 ± 0.13	0.84	Not significant

In the table number one we are clearly understood that the acceleration zone (0-10) m straight running speed is better than curve path running speed both male and female athlete.

The second zone (45-55) m was the Maximum speed zone difference between straight and curve running both male and female athletes were calculated. Table -2 shows the results.

Table 2: Showing difference between straight and curve running both male and female athlete in Maximum speed zone (45-55) m.

Group	Mean Values of (45-55)m from start		Mean Difference	t-value	Remarks
	Straight running	Curve running			
Male	1.25 ± 0.29	1.32 ± 0.20	0.07	0.59	Not significant
Female	1.37 ± 0.14	1.43 ± 0.51	0.06	1.00	Not significant

In the table number two we are clearly understood that the (45-55) m was the Maximum speed zone straight running speed is better than curve path running speed both male and female athlete.

The third zone (90-100) m was the Deceleration zone difference between straight and curve running both male and female athlete was calculated. Table -3 shows the results.

Table 3: Showing difference between straight and curve running both male and female athlete in deceleration zone (90-100) m.

Group	Mean Values of (90-100)m from start		Mean Difference	t-value	Remarks
	Straight running	Curve running			
Male	1.35 ± 0.14	1.40 ± 0.23	0.05	0.53	Not significant
Female	1.46 ± 0.18	1.68 ± 0.29	0.22	1.46	Not significant

In the table number three we are clearly understood that the deceleration zone (90-100) m straight running speed is better than curve path running speed both male and female athlete.

3. Result and Discussion

The past studies have shown that running speed on a curved path is slower than on a straight path. It is clearly understood that both of male and female athletes the time for the curve running in the acceleration zone (0-10) m is greater than that of straight running. The top speed zone (45-55) m both of male and female athlete time for the curve running is greater than the straight running. For both the male and female athlete the time for the curve running in the deceleration zone (90-100) m was greater than that of the straight running. All of the result, the difference in movement parameters between straight and curve running are found not to be significant.

Previous studies (Chang and Kram, 2007; Churchill *et al*., 2015a, 2015b; Greene, 1985; Stoner and Ben-Sira, 1979; Usherwood and Wilson, 2006) [4, 9, 5, 6, 3, 8] have shown that running speed on a curved path is slower than on a straight path. Additionally, this tendency becomes stronger as the curvature decreases (Chang *et al*., 2007) [4, 9]. On the basis of analysis of data results were obtain and calculation where drawn that difference between straight and curve running are found not to be significant.

The number of participants in this study was limited. There has been no research on the relationship between running speed on the straight and curved paths. Future research with more sprinters included is required to quantify the percent difference in running speed on a curved path relative to a straight path.

4. Conclusion

In this research find that time for curve running is more than that of straight running for both male and female groups of subject for all the different zones of 100m running-acceleration zone, maximum speed zone and deceleration zone. The significant of present study is find differentiation not relation with straight and curved paths movement parameters.

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