



Kinematic Comparison of Medium and Bullet Start In University Level Athlete

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Date of Submission: 25-12-2023

Date of Acceptance: 05-01-2024

ABSTRACT-

Introduction -Starting blocks assist in overall acceleration during the sprint start, as the feet can exert large backwards forces and create a stretch of the calf muscles that consequentially load the muscles. Sprinting is the fullest form of running performed over short distance in which maximum or near maximum effort can be sustained. The Study was conducted on sprinters of LNIPE, Gwalior where six (6) female subjects were taken with purposive sampling and Linear and Angular kinematic variables were selected for the Comparison of this study. Linear Variables were Displacement of first step from set position. Centre of gravity at the moment of set position, and angular kinematic variables were angle of right ankle joint, angle of right knee joint. Angle of right hip joint. Method- Data was collected with the help of CANON EOS 80. At the moment of bullet and medium start by following the standard protocol. Analysis -To measure Kinovea version 0.95 was used. Descriptive statistics and t- ratio was used for the comparative analysis of the data at 0.05 level of significance. Result -The results showed that the results of the study indicate that there was no significant difference in the selected linear and kinematic variables i.e., Length of First step, Center of Gravity, the Knee angle, Hip angle, Ankle angle, between medium and bullet start of Female sprinters.

Index Terms- Bullet start, Biomechanics, Medium start , Kinovea

I. INTRODUCTION

A well-executed sprint start, where the sprinter must rapidly accelerate from a stationary set position, is one of the determining factors of high performance in sprinting (Atwater, 1982; Bowman, 1975; Mackala et al., 2010) According to the literature, an effective sprint start predominantly depends on start block positioning and the body centre of gravity (BCG) in the set position (Coppenolle et al., 1990; Korchemny,

1992; Schot and Knutzen, 1992), There are basically 3 types of crouch start used by sprinters all around the world.

1. Bullet start - The toes of the rear foot are approximately level with the heel of the front foot and both feet are placed well back from the starting line.
2. Medium start-the knee of the rear leg is placed opposite a point in the front half of the front foot.
3. Elongated start - the knee of the rear leg is level with or slightly behind the heel of the front foot.

Previously studies have been conducted on the "Comparison of medium and bullet starts on speed in young sprinters" but little has been reported on the biomechanical comparison between medium and bullet start. Therefore the purpose of this study was to determine the differences in the kinematic comparison of medium and bullet start in university level athletes.

MATERIALS AND METHODS

Selection of subject

In this study 6 female sprinters were selected. Their age ranged between 18 to 25 years. All the selected female athletes were free from injury and the consent was taken from them to act as participant. The subjects have been selected from L.N.I.P.E. Gwalior only.

Procedure

On the basis of the video recording and with the help Kinovea analysis. One video camera CANON EOS 80 in a field setting was employed in study. The distance of camera from the subjects was 7.82 m on the lateral side of each start. For this purpose, each subject was given 2 different trials of medium and bullet start and was asked to move first 5 initial steps during start.



Statistical procedure

To find difference among the sprinter of university level athletes' descriptive statistics for each variable

was used. Mean and standard deviation were used as descriptive statistics.

II. Results:-

S.No	Group	N	Knee angle (in degrees)	Standard Deviation
1.	Medium start	6	101.33	9.136
2.	Bullet start	6	95.86	13.76

Table- 1

Descriptive Statistics of Knee angle between bullet start and medium start.

Group	N	Ankle angle (in degrees)	Standard Deviation
Medium start	6	88.71	9.93
Bullet start	6	78.56	16.23

TABLE 2

Descriptive Statistics of Ankle angle between bullet start and medium start.

Group	N	Hip angle (in degrees)	Standard Deviation
Medium start	6	60.11	5.14
Bullet start	6	57.23	13.06

TABLE 3

Descriptive Statistics of Hip Angle between bullet start and medium start

Group	N	Displacement (cm)	Standard Deviation
Medium start	6	100.74	10.91
Bullet start	6	111.80	9.39

TABLE 4

Descriptive Statistics of displacement of first step between bullet starts and medium start.

Group	N	Center of gravity	Standard deviation
Medium start	6	64.42	6.018
Bullet start	6	65.28	2.170

TABLE 5

Descriptive Statistics of center of gravity between bullet starts and medium start.

S no		mean	variance	df	t-stat	t-critical
1	bullet	95.86	189.59	10	0.810	2.2281
2	medium	101.33	83.4			

TABLE 6

Comparison by t-test of Bullet start and medium start of knee angle.



s. no		Mean	Variance	df	t-stat	t-critical
1	bullet	57.23	170.78	10	0.50	2.22
2	medium	60.11	26.43			

Table-7

Comparison by t-test of Bullet start and medium start of Hip angle

s.no.		Mean	Variance	df	t-stat	t-critical
1	bullet	78.56	264.24	10	1.305069	2.2281
2	medium	88.71	98.67			

TABLE 8

Comparison by t-test of Bullet start and medium start of ankle angle.

s.no.		Mean	Variance	df	t-stat	t-critical
1	bullet	111.80	88.23	10	1.88219	2.2281
2	medium	100.74	119.064			

TABLE 9

Comparison by t-test of Bullet start and medium start of displacement of first step length.

s.no.		Mean	Variance	df	t-stat	t-critical
1	bullet	65.285	64.42	10	0.3116157	2.2281
2	Medium	64.42	36.22			

TABLE 10

Comparison by t-test of Bullet start and medium start of center of gravity.

Picture representation of subject

Knee Angle of Bullet Start at moment set position



III. Discussion

The mean of Ankle angle in Bullet start of girls has been found (78.566) and medium start of girls have been found to be (88.716), the standard deviation of the Bullet start of girls is (16.256) and medium start of girls is (9.93).

The mean of hip angle in Bullet start of girls has been found (57.233) and medium start of girls have been found to be (60.116), the standard deviation of the Bullet start of girls is (13.068), and medium start of girls is (5.14)

The mean of knee angle in Bullet start of girls has been found (95.86) and medium start of girls have been found to be (101.33), the standard

deviation of the Bullet start of girls is (13.76) and medium start of girls is (9.136).

The mean of centre of gravity in Bullet start of girls has been found (65.28) and medium start of girls have been found to be (64.42), the standard deviation of the Bullet start of girls is (2.170) and medium start of girls is (6.018).

The mean of displacement of first step length in Bullet start of girls has been found (111.80) and medium start of girls have been found to be (100.74), the standard deviation of the Bullet start of girls is (9.39) and medium start of girls is (10.91).

The result of study revealed that there is



no significance difference between Linear and angular kinematics of Bullet and medium start , the possible reason that there no much differences lies between that paddle of both type starts so that there is no significant difference have been seen in the kinematics while performing bullet and medium start. As the subject size was quit small so that statistically the difference between kinematics not being seen while performing bullet and medium start. The first step distance and the knee, hip and ankle angle can affect by the anthropometry of the person, which may not be able to vary significantly with change different kind of start technique.

IV. CONCLUSION

Study was conducted on sprinters of LNIPE College in Gwalior city where 6 female subjects were taken and (Linear and Angular) variables were selected. Displacement of first step from set position Centre of gravity at the moment of set position, angle of right ankle joint, angle of right knee joint, and angle of right hip joint. Cinematography method was used for the purpose of data collection. After analysis of the subject and their angles it was found that there was no significant difference in the displacement of first step, knee angle, hip angle, ankle angle in athletes for bullet and medium start. The null hypothesis in this case came out to be failed to reject. This implies that for the athletes both start makes no difference in the starting technique, in case which ever method suits the athlete is fine.

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