

ORIGINAL ARTICLE



OPEN ACCESS

Received: 12-04-2020

Accepted: 05-05-2020

Published: 07-06-2020

Editor: Dr. Natarajan Gajendran

Citation: Din BM, Din RM, Shafqat M, Tabassum Y, Ali S (2020) A performance analysis about running sequence on male and female 60m hurdles. Indian Journal of Science and Technology 13(15): 1607-1611. <https://doi.org/10.17485/IJST/v13i15.244>

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Funding: None

Competing Interests: None

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A performance analysis about running sequence on male and female 60m hurdles

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Abstract

Objective: The purpose of this study is to examine the running sequence of men and women, 60m (H) athletes World indoor athletics championship, Portland 2016. **Methods:** Sample of study was selected including eight finalist men (n=8) hurdlers and eight finalist women (n=8) hurdlers of this championship (M. age =26.0 years, SD = 2.45years), M. height = 185cm, SD=4.75cm), M. weight = 80.5kg, SD = 5.29kg) & women (M. age =27.7years, SD = 4.13 years), M. height = 168cm, SD = 3.97cm), M. Weight = 60.1kg, SD = 3.48kg). The researcher did performance analysis through video races of 60m (H), analyzing five variables; approach run phase & Intermediate timing, the hurdle unit phase, run in timing and hurdle clearance timing. **Findings:** The results of independent t.test revealed that men (n=8) hurdler had significant difference (p-value < 0.01) on Approach Run Phase than women and men had significant difference (p-value < 0.01) of hurdle unit phase HUP1, HUP2, HUP3 than women. The results also indicated that men had significant difference (p-value < 0.01) less time in Run-in than women. Hurdler clearance results revealed that women had significant difference (p-value < 0.01) cross hurdle in less time than men.

Keywords: Hurdler; Clearance; Running sequence; Athletes

1 Introduction

Hurdle races are considered as a track event, which is divided into two types of hurdle, one is high (110m-100m) hurdles and the second is intermediate hurdles (400m- male & female). The male hurdle race was introduced in the second half of the 19th century and the history of female hurdle race starts in the 1920s⁽¹⁾.

In 1987, it was made decision to include 60m hurdles for men and women in world indoor championship. This decision was taken by (The International Association of Athletics Federation). It occurred in Indianapolis, USA. Similarly, rule of height and

position of the hurdles in the 60m event remains same for men for 110m and women for 100m hurdles. But in 60m hurdles events number of hurdles is reduced from 10 to 5 and this has made 60m unique to 110-100m events⁽²⁾.

It was considered that in hurdler race motor skill and technique were used together. Numerous studies related to theory and practice of hurdling did not consider this factor that played an imperative role in the accomplishment of success. Most of the studies indicate that it is an essential factor which is being associated to the development of motor skill (speed, endurance, and strength). The significant methods and techniques which are connected to the clearance of ten hurdles also indicated in most of the studies⁽³⁻⁷⁾. Various jumping and running kinematics are complex form of hurdle technique⁽⁸⁾. In athletics three hurdler race events (110m-100m-400m) are most popular at international events⁽⁹⁾. Kinematic analyses are used for improvement of the technique of hurdle by the athletes, trainers, and researchers which are supportive for better performance in hurdle race⁽⁸⁻¹²⁾. There is a lot of Bio-mechanical literature associated to kinematic analysis of hurdles that help to understand the different techniques which are related to clearance of hurdles at different steps for the improvement of performance of male and female hurdlers. The review of literature showed that most of the studies considered that techniques of hurdler's sprint were executed in training session or in controlled environment, not in the actual situation or competition⁽¹²⁾.

Therefore, it is complicated to change actual races competition situation into preset condition due to some variables, e.g. may be the athlete does not perform better in training session, but he/she pays full attention to the competition. Most of the athletes focus on their competition races and perform better than training session races⁽⁹⁾. The hurdle competition delineate the World class hurdlers between 3rd and 6th hurdle attain their maximum race velocity⁽¹¹⁻¹³⁾.

In the research of⁽¹⁴⁾ the analysis was done on hurdle split times regarding hurdle races in 110m and 100m (H). In 2011⁽¹⁵⁾ also done analysis of the hurdle races of 110m and 100m, and they also split times in which from touchdown to touchdown behind hurdle using video records of panned cameras^(16,17). (In this research also examination hurdle split times in 60m hurdle races with the aid of video recordings.) For the analysis of race performance it was taken predictors reaction time and approach run time. Hence, the researcher was not finding out a significant relationship among race performance and reaction time. This study also find out the correlation among intermediate times and final performance⁽¹⁶⁾.

The major objective of the present study was to examine the running sequence of male and female of 60m hurdle at World Indoor Athletics Championships, Portland 2016. The basic reason to did research in that field; the researcher has personally keen interest in hurdle race because he was participating 110m hurdle race in National Junior Athletics Championship Islamabad Pakistan in 2013 and got Gold Medal in this competition⁽¹⁸⁾. The researcher also represented Pakistan in South Asian Junior Athletics Championship Ranchi India in 2013 and got Bronze Medal⁽¹⁹⁾. The researcher was finding out split time of the approach run phase & Intermediate timing, the hurdle unit phase, run in timing and hurdle clearance timing. A study of this kind is conducted for the first time in Pakistan. It would be helpful to improve performance of hurdlers (men & women) and will also provide literature related to performance analysis of hurdlers.

2 Methods

The Researcher used purposive sampling technique in this study. The total population of study was all athletes (Men & Women Hurdlers) of World Indoor Athletics Championships, Portland 2016. The sample of study were eight finalist men (n=8) hurdler and eight finalist women (n=8) hurdler of 60m (H) selected from World Indoor Athletics Championship, Portland 2016. The video of races was taken from www.youtube.com with the special permission of (International Association of Athletics Federations-IAAF) committee. The researcher analyzed five variables of split time of the approach run phase (starting fire to the contact on the track after the 1st hurdle), the hurdle unit phase (Hurdle clearance time and the three intermediate running steps), run in (final time minus 5th intermediate hurdle) timing and hurdle clearance timing (take-off the hurdle to touchdown). Quintic v29 Bio-mechanic software⁽²⁰⁾ was used for analysis of 60m hurdle race times. SEIKO (official timing) was considered for final timing of men and women of 60m (H). Statistical Package for Social Sciences (SPSS) was used for the data check, the mean, standard deviation and independent t.test was analysed.

3 Results

Table 1. Age, height and weight of men and women

Variable	Group	n	Minimum	Maximum	Mean/Std. Deviation
Age	Men Women	8 8	22year 23year	29year 36year	26.0±2.45 27.7±4.13
Height	Men Women	8 8	180cm 163cm	192cm 175cm	185±4.75 168±3.97
Weight	Men Women	8 8	73kg 54kg	85kg 64kg	80.5±5.29 60.1±3.48

In this Table 1 the age, height, and weight of groups, men and women were not same on average. Men (n=8) was minimum age (22) twenty-two years old, maximum age (29) twenty-nine years old and M/SD=26.0±2.45 and Women (n=8) of was minimum age twenty-three years old (23), maximum age (36) thirty-six years old and M/SD=27.7±4.13. Minimum height of men was 180cm, maximum height 192cm and M/SD=185±4.75 and Minimum height of women was 163cm, maximum height 175cm and M/SD=168±3.97. Minimum weight of men was 73kg, maximum weight of 85kg and M/SD=80.5±5.29 and Minimum weight of women was 54kg, maximum weight of 64kg and M/SD=60.12±3.48.

Table 2. Results of independent t-test all variables regarding men and women

Variables	n	Men	Women
		Mean± SD	Mean± SD
Approach Run Phase	8	2.27±0.10*	2.37±0.09
Hurdle Unit Phase1 (HUP1)	8	0.67±0.04*	0.77±0.06
Hurdle Unit Phase2 (HUP2)	8	0.71±0.05*	0.78±0.12
Hurdle Unit Phase3 (HUP3)	8	0.65±0.03*	0.74±0.14
Hurdle Unit Phase4 (HUP4)	8	0.69±0.07	0.67±0.07
Run-in	8	1.15±0.01*	1.58±0.07
Clearance Time	8	0.35±0.03	0.28±0.02

In this Table 2 were shown Mean, standard deviation and result of independent t.test. The results revealed that men (n=8) hurdler had significant difference (p-value < 0.01) on approach run phase than women. Accordingly, to independent t-test results also indicated that men had significant difference (p-value < 0.01) of HUP1, HUP2, HUP3 than women. On the HUP4 there is no significant difference between men and women but accordingly to mean difference women had better hurdle unit phase (HUP) then men. The results also revealed that men had the fastest hurdle unit phase (Mean/SD=0.65±0.03) at HUP3 and women (n=8) hurdler achieved the fastest hurdle unit phase (Mean/SD=0.67±0.07) at HUP4. The results indicated that men had significant difference (p-value < 0.01) less time in Run-in than women. Hurdler clearance results revealed that women had Mean/SD (0.28±0.02) significant difference (p-value < 0.01) cross hurdle in less time than men (M/SD=0.35±0.03).

Table 3. Coefficients of correlation of variables (men & women)

Variables (men & women)	Approach Run Phase	Hurdle Unit Phase	Run In Timing	Hurdle Clearance Timing
Approach Run Phase	1	.565**	.564**	.444**
Hurdle Unit Phase		1	.654**	.267**
Run In Timing			1	.440**
Hurdle Clearance Timing				1

**Significant at the 0.01 level (2-tailed)

Correlation coefficients of men & women (all variables) Approach Run Phase, Hurdle Unit Phase, Run in Timing, Hurdle Clearance Timing were shown in Table 3. The correlations between all variables were positive significant (p<0.01) difference each other.

4 Discussion

This study examined the running sequence of eight finalist men hurdlers and eight finalist women hurdlers of 60m (H) from World Indoor Athletics Championship Portland 2016. The results revealed that men (n=8) hurdler had significant difference (p-value < 0.01) on approach run phase than women. Accordingly, to independent t.test results also indicated that men had significant difference (p-value < 0.01) of HUP1, HUP2, HUP3 than women. On the HUP4 there is no significant difference between men and women but accordingly to mean difference women had better hurdle unit phase (HUP) then men. The results also revealed that men had the fastest hurdle unit phase (Mean/SD=0.65±0.03) at HUP3 and women (n=8) hurdler achieved the fastest hurdle unit phase (Mean/SD=0.67±0.07) at HUP4. The results of both variables of the current research were highly supported the previous study^(14,15) because all previous studies sample size was same with current study (only eight finalist hurdlers of championship) were included. Additionally, above both variables the results of present study was lesser than previous study⁽²⁾. One of main reason was that previous study sample size much greater than present study. Maybe, different atmosphere of training state of affairs ought to explain a part of these variations. The results indicated that men had significant difference (p-value < 0.01) less time in Run-in than women. The results of current studies highly supported with previous

studies⁽²⁻¹⁷⁾. Hurdler clearance results revealed that women had Mean/SD (0.28 ± 0.02) significant difference (p -value < 0.01) cross hurdle in less time than men ($M/SD = 0.35 \pm 0.03$). Additionally, Hurdle clearance plays an imperative role for good performance⁽²⁾. The correlations between all variables were positive significant ($p < 0.01$) difference each other. Compared to the previous study⁽²⁻¹⁶⁾, correlations of the approach run phase, hurdle unit phase, run-in phase were greater in the present study.

5 Conclusion

Sample of study included eight finalist men hurdler and eight finalist women hurdlers of 60m (H) from World Indoor Athletics Championship, Portland 2016. The results revealed that men ($n=8$) hurdler had significant difference (p -value < 0.01) on approach run phase than women. Accordingly, to independent t.test results also indicated that men had significant difference (p -value < 0.01) of HUP1, HUP2, HUP3 than women. On the HUP4 there is no significant difference between men and women but accordingly to mean difference women had better hurdle unit phase than men. The results also revealed that men had the fastest hurdle unit phase (Mean/SD= 0.65 ± 0.03) at HUP3 and women ($n=8$) hurdler achieved the fastest hurdle unit phase (Mean/SD= 0.67 ± 0.07) at HUP4. The results indicated that men had significant difference (p -value < 0.01) less time in Run-in than women. Hurdler clearance results revealed that women had significant difference (p -value < 0.01) cross hurdle in less time than men.

Recommendation

The present research will be beneficial for athletes all over the world and also given successful path way for all athletics federation of the world. This type of research is conducted for the first time in Pakistan. The researcher has secured distinguished titles in national and international events. The research outcomes will be useful for betterment of athletes and coaches during training. In the future, it might be possible to use more advanced variables for this type of analyses. Similar studies shall be conducted in Pakistan and the rest of the world during national and international events by the future researchers. Major factors were described in current research which were beneficial for world-class outdoor and indoor hurdlers and coaches for betterment for hurdle performances the sprint factor was very important factor for winning the hurdle event. The variables. Like approach run phase & Intermediate timing, the hurdle unit phase, run in timing and hurdle clearance timing, is recommended during the training of the athletes for improving speed work to increase approach run phase, hurdle unit phase and Run-in timing.

Acknowledgments

The authors are thankful to the International Association of Athletics Federations (IAAF) for given us permission for this analysis. We are also thankful to Pakistan Olympic Association, Pakistan Athletics Federation and Pakistan Kabaddi Federation for their support. I am (Corresponding Author) grateful to my beloved parents, who have always given me their unreserved support, "Thank you for your unceasing prayers for me" Last, but not least, my sincere thankfulness goes to all my friends & Supporters.

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