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A comparative study of acceleration measures of Kabaddi players on clay and synthetic surface: With reference to Raiders

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Abstract

The aim of the present study was to assess acceleration measures of raiders on two different playing surfaces. To conduct the study, 100 national/interuniversity Kabaddi players (Average age 25.23 years) were selected. Following the inclusion criteria only raiders from teams were selected purposively as sample. Tracker video motion analysis software was used in the present study to assess acceleration measures of Raiders. A movement puzzle, designed in consultation with Kabaddi experts was used to study directional movement of selected raiders with the help of video motion analysis. It was found that the raiders accelerate faster on synthetic surface (Mean=36.53 m/s²) as compared to clay surface (Mean = 31.53 m/s²). The calculated $t=4.68$ also supports this findings at .01 level of statistical significance because it is greater than the table value of 2.63 for $df=99$. It was concluded that the synthetic surface is more helpful in rate of change of velocity of raiders in relation to time as compared to clay surface.

Keywords: Acceleration, raider, synthetic and clay surface

Introduction

Traditionally Kabaddi is played on natural clay surface while recognized national and international tournaments are played on synthetic surface. Scientifically there is a major difference in mechanical properties of clay and synthetic surface. On synthetic surface a player needs to pick his feet up in contrast to clay where a player can slide his feet which is not possible in synthetic surface. Studies have also shown that faster speed and acceleration can be attained on synthetic surface as compared to clay surface. Since majority of European and Asian countries have better infrastructure facilities than India hence it is important to know the impact of playing surface on performance of Indian kabaddi players because India does not have sufficient number of synthetic surfaces to practice and is available only in handful of places. The tournaments organised at local and district levels are still played on clay surface. Thus, it is mandatory to have scientific data on mechanical advantage to kabaddi players on synthetic surface and to what magnitude? A thorough glance at previous studies specify that Krahenbuhla (1974) ^[3], McMahon and Greene (1979) ^[5] assessed speed of movement on synthetic and natural grass surface. The impact of The impact of friction on turning movements over different sports surfaces was assessed in a study by Dura and Lozano (1999). Villwock *et al.* (2009) ^[6] studied the shoe grip on different soccer playing surfaces. Kuganesan (2015) ^[4], Choi *et al.* (2015) ^[7] in their studies assessed the impact of different court surfaces on speed and agility of tennis players. Gale-Ansodi *et al.* (2016) ^[2] comparatively evaluated the acceleration and speed of tennis players on different playing surfaces while Abdul Yamin *et al.* (2017) ^[1] assessed the ground reaction force while running on different sports surfaces. Research literature in the area of sports surface and its effect on performance related factors and especially on injury pattern is very vast but so far mechanical advantage in terms of acceleration measures to kabaddi players on synthetic surface with special reference to raiders has not been assessed comparatively in the light of clay surface. Thus, this study was conducted.

Objective of the Study

The main objective of the present study is to compare the acceleration of raiders on clay and synthetic surface.

Hypothesis

Significant difference will be observed in acceleration of raiders on clay and synthetic playing surface.

Methodology

Sample

To conduct the study, 100 national/ interuniversity kabaddi players (Average age 25.23 years) were selected. Following the inclusion criteria only raiders from teams were selected purposively as sample.

Tools

(i) Tracker Video Motion Analysis Software

Tracker video motion analysis software was used in the present study to assess speed, acceleration, velocity and their associated measures of raiders. Tracker is a video player used in sports analysis. It contains tools to capture and measure kinematic variables. This software uses information from high definition cameras to analyse directional movement and also

provide speed, acceleration and velocity of object while performing certain movements. This is free and open source software. The relative reliability with Intraclass Correlation Coefficient and the Coefficient of Variance (CV) (95% confidence interval) as evaluated by Puig *et al.* (2019) was found to be satisfactory.

(ii) Movement Puzzle

A movement puzzle, designed in consultation with kabaddi experts was used to study directional movement of selected raiders with the help of video motion analysis. The movement puzzle was used to assess specific kinematic abilities of raider. The degree of difficulty was also kept in mind considered while developing movement puzzle. The nature of this movement puzzle consists of simple as well as complex movement tasks. The test-retest reliability of this puzzle was found to be 0.82. The validity of this puzzle on the basis 10 judges rating was found to be high 0.92 and quite satisfactory as determined by Lawshe method.

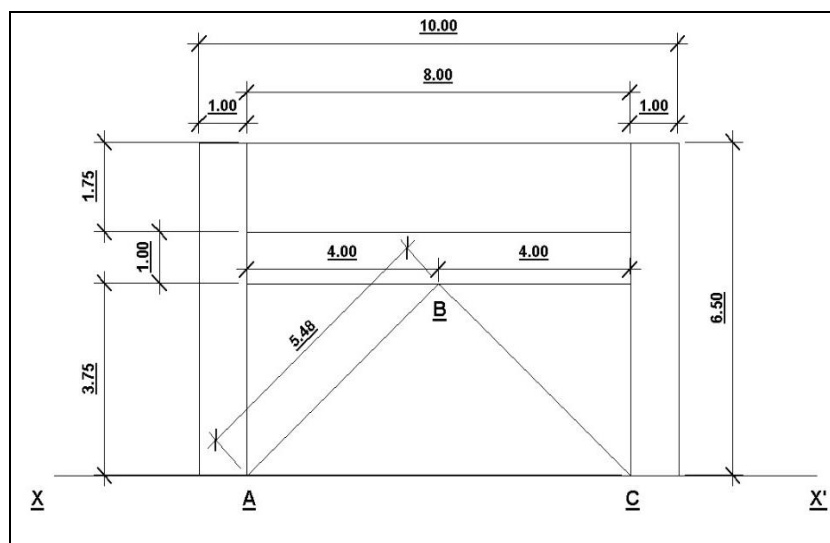


Fig 1: Movement Puzzle

- The starting point of this movement puzzle is point A.
- Subject starts running till point B and then change direction to move towards point C.
- The distance between point A and B is 5.48 meters while the distance between point B and C is also 5.48 meters
- From point C subject again change direction and move towards point A.
- The distance between point A and C is 8 meters.
- Three HD cameras are placed record movement along segment AB, BC and CA respectively.

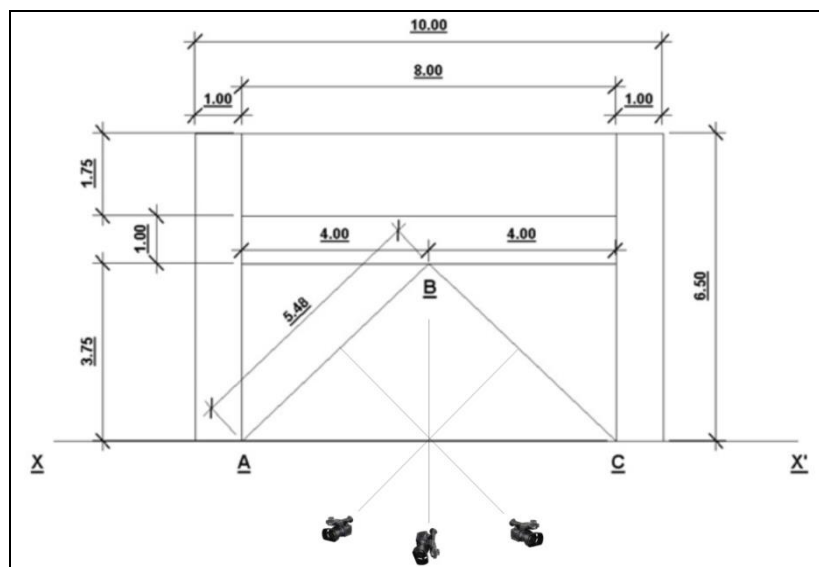


Fig 2: Placement of HD Cameras in Movement Puzzle

Procedure

Each raider was asked to complete the movement puzzle on clay surface. Subject was asked to run and accelerate as quickly as possible and then deaccelerate to change direction. The whole movement activity was captured by three HD cameras placed strategically. The video motion so captured in HD cameras was then transferred to Tracker video motion analysis software for further analysis. The reading on

acceleration measure was recorded from Tracker video motion analysis software for each raider. The same procedure is followed in synthetic surface. The tabulated data for clay and synthetic surface was analysed with the help of parametric statistical tools. The results are presented in table 1.

Result and Discussion

Table 1: Comparison of Acceleration Measures of Raiders on Clay and Synthetic Surface

Variable	N	Type of Playing Surface				Mean Difference	't'
		Clay		Synthetic			
		Mean	S.D.	Mean	S.D.		
Acceleration (m/s ²)	100	31.53	9.23	36.53	9.01	5.00	4.68, $p < .01$

t(df=99) at .05 = 1.98, t(df=99) at .01 = 2.63

Acceleration measures of raiders on different playing surface as depicted in table 4 reveals that raiders accelerate faster on synthetic surface (Mean=36.53 m/s²) as compared to clay surface (Mean = 31.53 m/s²). The calculated $t=4.68$ also supports this findings at .01 level of statistical significance because it is greater than the table value of 2.63 for df=99. Results show that synthetic surface is more helpful in rate of change of velocity of raiders in relation to time as compared to clay surface. It indicates that raide acceleration dependent on how quickly a raider turns.

Verstegen and Marcello, 2002 and Ferrauti *et al.*, 2003 also reported that clay courts are more slippery and loose as compared to acrylic courts. Also acrylic court provides more grip. That is why players opined that less grip in clay court allows for more sliding but on the other hand more grip in acrylic surface allows players to quickly change direction.

Conclusion

On the basis of results and associated discussion it can be concluded that mechanical properties of synthetic surface is more suitable for raiders to achieve greater acceleration as compared to clay surface hence gives them mechanical advantage on synthetic surface.

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