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Comparison of motor skill performance on selected playing surfaces among field hockey players

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Abstract
The main purpose of the study was to compare the motor skill performance on selected playing surfaces among field hockey players. Twenty male students, studying in bachelors and masters of physical education at Lakshmibai National Institute of Physical Education were selected as subjects for this study. The age groups of the subjects were ranged from 18 to 25 years. Harban's Singh Dribbling and Hitting & D.K Dureha Dribbling and Goal Shooting Hockey Skill Tests were chosen to measure the hockey skill performance. In the present study the above mentioned tests were adopted as criterion measures of hockey skill performance i.e. Dribbling and Hitting & Dibbling and Goal Shooting. The data was collected by administering the Harban's Singh and D.K Dureha Hockey Skill Tests. Paired t-test was employed to analyze the effect of different playing surfaces on hockey skill ability of hockey players. By using paired t-test it was found that there was no significant difference within the skill ability of hockey players in terms of dribbling and hitting & dribbling and goal shooting when tested on natural grass surface, and artificial turf surfaces.

Keywords: Hockey skill test, male hockey players, natural grass surface and artificial turf surface

Introduction

Different sports are played on different surface and even the same sports can be played on different surface like hockey is played on grass, turf & clay surface, basketball is played on wooden surface and concrete, tennis on grass clay and hard court; volleyball on clay and wooden. This selection of surface can be by rule or law of game or sometime by the feasibility of organizer.

There are different kinds of surfaces on which the subjects play sports, e.g. natural grass, turf, asphalt and wooden. Besides, synthetic surfaces for sports and recreational usage have been manufactured. One of the important aspects in construction of sports surfaces is to improve athletic performances. Changes and challenges are twin law of nature and they affect every aspect of life. Changes are taking place all round and because of these changes new challenges have excelled previous performance every time. sports has developed among sports scientists, team physicians, athletic trainers, coaches and athletics to investigate modern scientific techniques in term of selection of athletes best suited to the activity and to device new tactics and training methods.

The game of hockey nowadays is being played in many types of surfaces namely grass, gravel and artificial surface. After the introduction of the artificial surface, the player, coaches and the conditioning experts now understand that the physical variables are playing vital role to reach high level performance in the artificial surface. All the major tournaments like Olympics, World Cups, Asian Games, Champion's Trophy, and commonwealth games are being played only in the artificial surface. Playing in the artificial surface requires high level of physical efficiency, especially in speed, agility, power and endurance. The role of physical fitness is phenomenal in modern hockey with the introduction of synthetic playing surface in hockey, the less conditioned players often experience difficulties in displaying techniques and tactics of the game owing to quick setting fatigue and exhaustion.

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Method & Procedure
In this chapter the researcher described the plan and procedure of the present study i.e selection of subjects, selection of variables, criterion measure, collection of data, administration of test and statistical techniques employed.

Selection of Subjects
Twenty male students, studying in B.P.Ed and M.P.E.d courses of Lakshmibai National Institute of Physical Education, Gwalior, Madhya Pradesh were selected as subjects of this study. The age of the subjects ranged from 18 to 25 years. All the subjects were the residents of the Institute and they had similar routine of work, diet, rest etc. Besides this all the subjects enjoyed good health as per the records Institute's Health Center and all of them attended regular activities in accordance with requirement of Institute curriculum.

Selection of Variables
The variables selected for the study were as follows:
- Natural grass surface
- Artificial turf surface

Selection of Tests
Harban's Singh Hockey Dribble and Hitting Test & D.K. Dureha dribbling and goal shooting test were chosen to measure the hockey skill performance. These mentioned tests were chosen by keeping the simplicity and administrative feasibility in mind.

Administration of the Tests
The skill test program was administered to the subjects at Astro Turf Hockey field, Lakshmibai National Institute of Physical Education, Gwalior, Madhya Pradesh. The subjects were properly instructed regarding the procedure of the test i.e. Harban's Singh & D.K Dureha hockey Skill test.

Harban's Singh Dribble and Hitting Test
Purpose: To determine dribbling and hitting ability.

Equipments: Hockey sticks, stop watch, balls, eight Indian clubs, and score sheets.

Field Markings
- A line 10 feet long to be used for starting line.
- A line perpendicular to the midpoint of the starting line and extending 72 feet from it.
- Eight Indian clubs shall be placed at a distance of eight feet from each other, starting from the starting line of the test.
- Another 10 foot line opposite to the starting line and parallel to it shall be drawn as an end line.

Procedure
The player being tested shall stand; behind the starting line with hockey ball placed on the starting line at any point to the right. At the signal, "Ready", "Go", the player shall dribble the ball forward in between the Indian clubs placed on the line. On reaching the end line, he shall hit the ball back to the starting line.
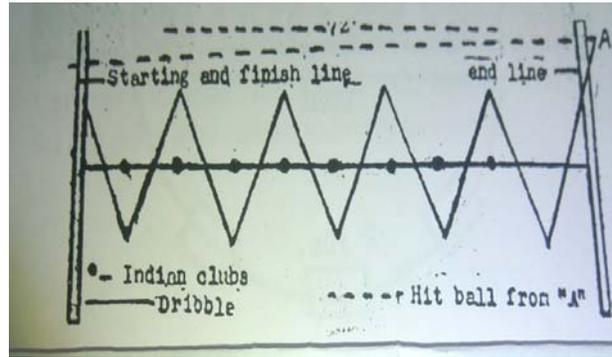

Fig 1: Dribbling and Hitting Test.

Scoring: The score shall be the time taken when signal "GO" is given from the starting line until the ball crosses the starting line after being hit by the subject from end line.

D.K Dureha's Dribbling and Goal Shooting Test
Purpose: To measure the dribbling ability of subjects in terms of time taken by them and to measure goal shooting ability of the subjects in terms of total points taken by them from the target board.

Equipments: Hockey stick, Hockey balls, cones and numbering plate.

Marking: On the shooting circle two shooting angles were marked at 60 degree angles on both right and left sides. Two meter inside the shooting circle another circle parallel to the shooting circle was drawn as a restricted area for taking the shot in to the goal post. Five cones were kept on both the side in zigzag formation 5 meter from each other. The distance from the angle flag to the 1st flag was 20 meter,5 hockey balls were kept at the top of shooting circle and one ball was kept at the starting point which was 18 meters away from the top of the shooting circle. A target board was kept at the goal mouth which was divided into 12 segments. Each segment was numbered serially from the center to the ends on both sides from one to six. As shooting at the center of the goal area was comparatively easy, and subject was given less credit for shooting at the middle and highest credit was given for shooting at right and left extreme of goal mouth; one point was awarded for shooting at right and left extreme of the goal mouth; one point was awarded for shooting at the middle and six points were awarded for shooting at the extreme ends on either side.
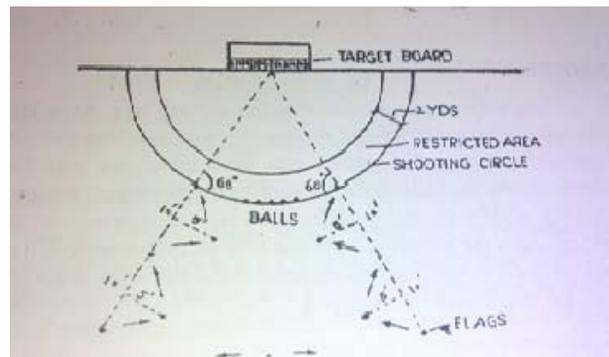
Fig 2: Dribbling and Goal shooting Test

Procedure: On the signal "Ready" the subject was asked to stand on the starting line on the signal "GO". He started dribbling from either left or right side in a zigzag way in between the cone when they reached the restricted area he took the shot at the goal with the intention of getting maximum credit of six after shooting he again run towards the remaining five balls which were kept at the top of the shooting circle and after collecting one, he started dribbling from other side and took the shot at the goal again from that angle. In this test he went thrice to each side with the ball and took the shot at the goal. After shooting last ball the stop watch was stopped and the counting of the points was completed.

Scoring: As the last ball was shot by the subject the total time taken to complete the full skill test was noted down. The time was measured nearest to1/10th of a second. The goal shooting ability of the subject was measured in terms of total points scored from the target board. The best performance of subjects trials was recorded as the score of the subjects.

Collection of Data
The data was collected by administrating Harban's Singh and Dr D.K Dhureha test on chosen subjects at Astro Turf Hockey field, L.N.I.P.E. Gwalior (M.P). To ensure that collected data was reliable, according to test norms, three numbers of trials were given to each subject

Statistical Techniques
To analyze the impact of different kinds of playing surfaces on the skill ability of hockey players, Paired t-test was applied as a statistical technique.

Analysis of Data and Results of the Study
The statistical analysis of data collected on 20 male hockey players to measure their playing ability by administering Harban's Singh & Dr D.K Dureha Hockey skill test have been presented in this chapter. The data presenting to Harban's Singh & D.K Dureha Hockey skill Test variable (Dribble and Hitting & Dribbling and Goal Shooting Test) performance on two playing surfaces was examined by using Paired t-test, to assess the significant differences within the group means. The Paired t-test values were tested for significance at 0.05 level.

Findings
The mean, standard deviation and Paired t-test values were computed to analyze the data statistically. The results have been presented in the following tables:-

Table 1: Descriptive Statistics of Skill Tests- Harban's Singh and D.K. Dureha Paired Samples Statistics

Pair 1	Mean	N	Std. Deviation
Skill 1 (Grass)	14.6420	20	1.76473
Skill 1 (Turf)	13.8625	20	1.63937

Table 1 indicates that the Mean and Standard Deviation of Skill 1(Grass) is 14.64$\pm$ 1.76 and Mean and Standard Deviation of Skill 1(Turf) is 13.86$\pm$1.63.
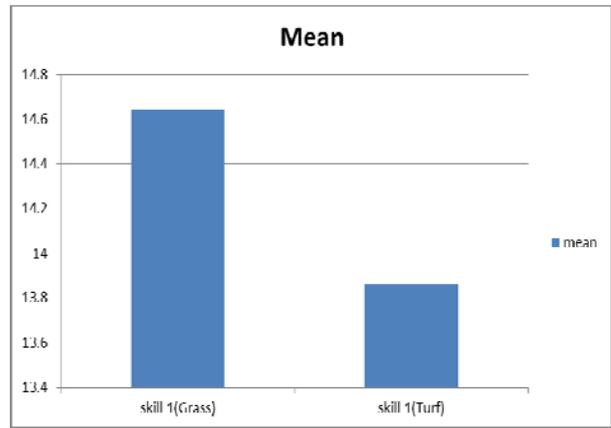

Fig 3: Graphical representation of mean of Harban's Singh Dribbling & Hitting Test between Grass and Turf Surface

Table 2

Pair 2	Mean	N	Std. Deviation
Skill 2 (Grass	14.4000	20	5.30541
Skill 2 (Turf)	16.0000	20	6.28281

Table 2 indicates that the Mean and Standard Deviation of Skill 2 (Grass) is 14.40$\pm$5.30 and Mean and Standard Devition of Skill 2 (Turf) is 16.00 $\pm$6.28.
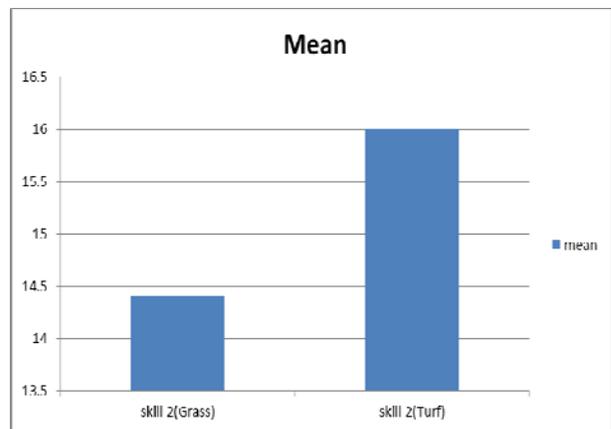

Fig 4: Graphical representation of mean of D.K Dureha's Dribbling & Goal Shooting Test between Grass and Turf Surface.

Paired Samples Test

Table 3: Comparison of Mean Scores of Harban's Singh Dribbling and Hitting Test between Grass and Turf Surface

Pair 1	T	df	Sig(2 tailed)
(Skill 1 Grass- Skill 1 Turf)	1.804	19	.087

Table 4: Comparison of Mean Scores of D.K Dureha's Dribbling and Goal Shooting Test between Grass and Turf Surface

Pair 2	t	df	Sig(2 tailed)
(Skill 2 Grass- Skill 2 Turf)	-.883	19	.388

From the Table 3 and Table 4 It was evident that Sig (2-tailed) values are higher than 0.05 therefore it is insignificant. Thus it may be concluded that the artificial turf surface & natural grass surface were equally good for hockey skill ability. Thus the hypothesis that there would be significant difference within the skill ability of hockey players in terms of dribbling-hitting & dribbling-goal shooting when tested on natural grass surface & artificial turf surface is not accepted. Thus, it concludes that skill ability of hockey players is perceived not significantly different on both the playing surfaces in terms of dribbling-hitting & dribbling-goal shooting.

Discussion of Findings
The major findings of the study are as follows:-
The difference within the skill ability of hockey players in terms of dribbling-Hitting & Dribbling-Goal shooting when tested on Natural Grass surface & Artificial Turf Surface was not found significant.
Findings of the study as the impact on skill ability of hockey players on artificial turf surface and natural grass surface have been discussed as follows:-
There was no significant difference found within the skill ability of hockey players in terms of dribbling-hitting & dribbling goal shooting, when tested on natural grass surface and artificial turf surface. It might be due to the individual ability of players, lack in adaptation of skill, small sample size & regular practice on different playing Surfaces. Hence insignificant differences was found on both the playing surfaces. This is supported by Jorge Diaz *et al.* (2015) [13] upon the comparison of tactical offensive variables in differences for the different surfaces. This is in conformity with the findings of Fernandez *et al.* (2010) [11] who examined how the training surface affects the characteristics of a tennis training session and did not find any significant influence of the court surface on any of the variables analyzed under the standardized exercise conditions of the study.
Kayla (2012) [3] conducted a study to determine individual's landing mechanics on wood basketball court surface as compared with a volleyball sport court surface which resulted in no significant differences between the scores on the wood basketball court and volleyball sport court surfaces within each participant and the findings of this study concluded that no differences in landing mechanics between a wood basketball court and volleyball sport court surface as assessed by scores. Binnie *et al.* (2013) [7] conducted study to see the effect of sand and grass training surfaces during sport-specific conditioning session in well-trained team sport athletes and found that there were no differences in 24 hours post exercise performance ($p>0.05$) and blood markers of muscle damage, inflammation and hemolysis were also similar between the surfaces ($p>0.05$). Similarly Hughes (2013) [17] investigated on participants performed football match simulation on high-quality artificial and natural surfaces in which the fatigue index of repeated sprints did not differ ($p>0.05$) between the artificial, and natural surface and results suggested that fatigue and physiological responses to football activity do not differ markedly between surface type using the high quality pitches. Anderson *et al.* (2008) [5] carried out a study to examine the movement patterns, ball skills and the impressions of Swedish elite football players during competitive games on artificial turf and natural grass. With no difference observed between artificial turf and natural grass in terms of total distance. In conclusion the running activities and technical standard were similar during games on artificial turf and natural grass. Martin *et al.* (2011) [15] compared tennis matches played on clay and resin courts in which running time values in speed tests were not significantly different between clay and resin. Gains *et al.* (2010) [12] conducted study to determine the difference in 40-yd dash and pro agility times performed on field turf and natural grass but there was no significant difference in 40-yd dash times between field turf and natural grass using an electronic timing system. Juan M (2009) [18] tested various metabolic and functional responses while playing tennis on clay and hard courts. The statistical analysis showed that resting time on clay courts and hard courts was not statistically different ($p>0.05$).

Discussion of Hypothesis
On the basis of research findings, text book depiction, scientific facts available & research scholar's own understanding the following discussion on hypothesis was made:-
For the purpose of the study it was hypothesized that there would be a significant difference of skill ability of hockey players on artificial turf surface and natural grass surface. But as the results were insignificant, the hypothesis stands rejected.

Conclusions
Based on the data collected and the research findings the following conclusions may be drawn:-
There was no significant difference within players skill ability on natural grass surface & artificial turf surface in terms of Dribbling and Hitting & Dribbling Goal shooting tests. It could be due to adaptation of hockey players on two different surfaces & they could have lack of interest, lack of coordination among the hockey players. One more reason for no significant difference could be that sample hockey players play in same environmental conditions regularly.

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