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## The Effect of clay and mat surface on coordinative and skill ability of the Kabaddi Players

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### Abstract

According to reports of Amateur Kabaddi Federation of India (AKFI) that there was every possibility of kabaddi being included in the 2020 Olympic Games as the norm of at least 50 countries playing the game would be achieved by that time. In this report it was mentioned that 32 countries are playing in a professional manner. The game has changed dramatically over the years and the surface has become soft mat instead of traditional clay which is still used in India. Players of national repute have voiced on this sensitive topic. They believe that hosting and organising an International tournament is good for popularising the sport but it is also mandatory to keep track on changing rules and environment. It is a well-known fact that European and American or for that instance South American population is more agile and physically stronger than us. This agility and physical supremacy is somewhat nullified when they used to play Kabaddi on clay. But with changing scenario, Kabaddi is being played on soft mat surface. Apart from this, the European countries can spend substantial amount on infrastructure development and coaching. So it will be only matter of time that these European countries will pick the skills of this game and India will lag behind in international kabaddi scene as happened in other sports in which changes in surface has affected performance of Indian sportspersons. In view of the above the research decided to assess the effect of clay and mat surface on coordinative and skill ability of the kabaddi players of India.

**Keywords:** Clay and mat surface, coordinative and skill ability, Kabaddi players etc

### Introduction

In a report of Amateur Kabaddi Federation of India (AKFI) there is a possibility that kabaddi will be a part of 2020 Olympic games because by that time norms of at least 50 countries participating in that particular game will be achieved.

The traditional game Kabaddi has seen dramatic change in recent years with soft mat is used as playing surface instead of clay surface that is still being used as playing surface in India. Many international and national kabaddi players have raised this issue. According to their view, popularizing and organizing International kabaddi event is a good thing but Indian kabaddi should also change themselves as per changing rules and environment of modern kabaddi.

It is proved scientifically that European, American and South Americans have superior motor skills as well as physical strength as compared to Indians. The agility and physical strength of Europeans and South American Kabaddi players are somewhat neutralized when playing surface is clay. But the scenario is different when the kabaddi playing surface is Eva soft mat.

Apart from this, European federations provide huge financial amount for infrastructure development as well as psychological and physiological aspects of the game. In this changing scenario, India will suffer in technical skills of kabaddi which is altogether different in mat surface as compared to clay surface. Hence, playing surface of kabaddi will similarly affect Indian kabaddi players as in hockey.

In view of the above the researcher decided to assess the effect of clay and mat surface on coordinative and skill ability of the kabaddi players of India.

It is believed that the origin of kabaddi dates back to pre-historic times. Kabaddi was played all over India with different forms. The game kabaddi was invented to thwart attacks of individuals. Kabaddi is very popular sport in southern Asia where it has been played under different names. A dramatized version of the great Indian epic, the "Mahabharata", has made an analogy of the game to a tight situation faced by Abhimaneu, the heir of ' the Pandava kings

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when he is surrounded on all sides by the enemy. Buddhist literature speaks of the Gautam Buddha playing Kabaddi for recreation. History also reveals that princes of Yore played Kabaddi to display their strength and win their brides. Kabaddi was known as HU-TU-TU in Western India, HA-DO-DO in Eastern India and Bangladesh, Chedugudu in Southern India, whereas in Northern India it was called Kaunbada. The name of the sport Kabaddi may have been derived from the term 'Kaunbada'. It means a challenge to the opponent.

### Playing surface and sports performance

The surfaces on which athletes run on can play a vital role in determining how well they perform. So one of the important aspects in construction of sports surfaces is to improve athletic performance (Baroud *et al.* 1999) [8, 9].

It has been documented that skill acquisition on different playing surface requires a lot of practice.

There are different kinds of surfaces on which the subjects play sports, e.g. natural grass, asphalt and wooden parquet. Besides, synthetic surfaces for sport and recreational usage have been manufactured. It has been suggested that the main feature of a sport surface that can affect the athletic performance is to store and return energy. Daren and Nigg, 2003 stated that if some of the energy that an athlete requires for each step, stride, jump, landing, etc. can be reused, through energy return from the surface, the athlete can perform the same movement more efficiently. In other words, one can achieve a given physical activity by using less energy and, therefore, he continues his activity during a longer period.

The expertise in performing various game specific motor or basic fundamental skills are dependent upon properties of playing surface. Different surface properties have different effects on the dynamics and mechanics of movement. The properties of these surfaces influence sports performance. The hard surface is better for achieving the best results, although they are toughest on the body and increase the risk of injury. It produces high ground reaction forces which transmit shock through the body as the foot strikes the ground. In hard surface, maximum force, peak & mean pressure were higher for the heel region and higher frictional coefficient that enhanced the speed but induce more frequent injuries.

Soft surfaces (PVC, soft clay & turf) are easy on impact and foot is able to roll more smoothly resulting in more balanced force and pressure values. Lower frictional coefficient leads to longer sliding movement or longer contact time on the soft surface.

### Objectives

1. To study the coordinative and skill ability on Clay surface of the kabaddi players.
2. To study the coordinative and skill ability on Mat surface of the kabaddi players.
3. To study the effect of coordinative and skill ability on Clay surface of the kabaddi players.
4. To study the effect of coordinative and skill ability on Mat surface of the kabaddi players.

### Methodology

To verify hypothesis, the next sequential step is methodology. To conduct the study, the systematic and scientific method is to be used to find out the results. To solve the problem, following steps have been taken to conduct the study.

### Sample

A random sample is one in which each element in the universe has an equal opportunity of being selected." Sampling is taking any portion of a population or universe as representative of that population or universe. It is rather taking a portion of population and considering it to be the representative.

Random sampling is the method of drawing a portion (sample) of a population or a universe so that all possible samples of fixed size "n" have the same probability of being selected.

Definitions indicate that a sample taken for the study may be selected from any place of the given area, therefore, for the above mentioned study, random sampling method has been selected.

For present study, 50 male kabaddi players (Ave. age 22.73 yrs.) and 50 female kabaddi players (Ave. age 23.92 yrs.) who took part in national level kabaddi tournaments were selected as sample. The selection of subjects was done from players of such teams who stood in top four places in national kabaddi tournament. The sample was collected through convenience sampling method.

### Nature of variables

#### (A) Motor Coordinative Ability

Coordination is the quality, which enables the person to integrate all the powers, and capacities he/she has into the effective doing of an act. It is the ability to move and organize oneself around his/her own physical body.

Seven coordinative abilities can be differentiated by their characteristics, and while all seven are fundamental as a whole they may appear in quite different values in each person. These abilities are: Comminatory ability, orientation, differential ability, agility, balance, reactive ability, adaptive ability, rhythmic sense and balance.

Out of these seven coordinative abilities agility has been chosen as motor coordinative ability in the present study and it acted as dependent variable in the present study.

#### (B) Skill ability

The classical definition of skill is "the learned ability to bring about pre-determined results with maximum certainty often with the minimum outlay of time or energy or both" (Knapp, 1977).

It has been widely recognized and accepted fact that fundamental element of all sport is skill. This is why sports performance is largely dependent upon the basic fundamental skill of that particular sport.

In kabaddi, both offensive and defensive skills are important for performance enhancement. In the present study, back kick, bonus point, ankle hold and toe touch skills are chosen as they are most basic skills in kabaddi. Skill ability in the present investigation acted as dependent variable.

#### (C) Playing surface

It has been documented in the research literature that different surfaces have variation in traction and friction which affect movement pattern. In India clay surface is used in kabaddi whereas mat surfaces are not in many numbers. In the present study clay and mat have been chosen as playing surface and acted as independent variables.

### Tools

To conduct the study following tools were used:-

**(A) Motor Coordinative Ability**

To assess agility of the selected kabaddi players, Cooper's JCR test (1963) was used. This is the modified, well-known JCR test. The agility of the selected subjects was assessed by shuttle run item of this test. This test is highly reliable and valid. The motor coordinative ability scores of subjects was ascertained by their shuttle run timings, hence lower the timing, higher the motor coordinative ability formula is used.

**(B) Skill Ability**

To assess skill ability of selected kabaddi players, four skills i.e. back kick, attempt to get bonus point, ankle hold and toe touch were selected after consultation from experts in the field of kabaddi and research guide.

The details of each skill are given below:

**Back kick:** Kicking the anti who comes behind the raider during the course of raid is known as back-kick. The different forms of back-kick are: (a) Running back-kick, (b) Standing back-kick, (c) Fake & kick and (d) Taking a turn and back-kick.

**Bonus Point:** The line parallel to Baulk line towards end line is known as Bonus line. One point shall be allowed to the raider when he crosses the bonus line. If the raider after crossing the bonus line is caught, the opponent team will also be awarded one point.

**Toe-Touch:** During the course of a raid, the raider moves in different angles, according to the positions and moves of the antes. At the same time, in order to apply this skill, the raider requires to extend his leg suddenly towards the anti. He extends all the joints (knee and ankle) in order to cover more distance and touch with the inner portion of the toe.

**Ankle Hold:** Ankle hold is an individual defensive skill in kabaddi. This is a counter skill used by defensive players against leg thrusts and foot touches by raiders during an attack or raid.

The proficiency of kabaddi players in these skills was evaluated by experts rating in a match like situation. In all two experts rated each skill i.e. back kick, attempt to get bonus point, ankle hold and toe touch on the basis of performance of a player on four point rating scale. Numerical weightage of 04 was given to excellent performance, 03 for good, 02 for average and 01 for poor performance. The average of rating given by two experts were termed as final rating. In this way higher the score, better the skill is the direction of scoring.

**Procedure**

- First of all, JCR test item shuttle run was performed by each selected subject on clay and mat surface under strict supervision of researcher.
- The timings on shuttle run test were recorded for each subject on clay and mat surface.
- Dummy match like situation was created and skill related components on clay surface were rated by the two experts.
- Similarly, in dummy match like situation, skill related components on mat surface were rated by the two experts.
- Rating of skill ability penned by two experts were averaged out.

**Results and discussion**

After data collection, the next legitimate step is to analyses the data statistically and interpret the findings at both statistical and theoretical levels. Collected data has been presented in a table form after calculating basic statistical factors like mean, median, mode, standard deviation, Skewness and kurtosis. The aim behind calculating the basic statistical factors is to see the normal distribution of the data. These results are shown in table 1, 2, 3 and 4 under the heading of statistical properties.

**Statistical properties of the variables**

After labelling all numerical data, scores regarding agility and kabaddi skill test, are presented in a table form with the help of mean, median, mode, S.D., Skewness and kurtosis.

The distribution of data in a symmetric manner and the normality of the curve or normal distribution of data have been observed through Skewness and kurtosis.

First of all it was decided to see the distribution of data in a group of male kabaddi players pertaining to performance on clay surface (Table 1).

The statistical properties of the dimensions of Kabaddi skills of male kabaddi players on clay surface depicted in table 1 reveals the following – Back Kick: Mean 2.84, Median 3.00, Mode 3.00, S.D. 0.76, Skewness 0.284 and Kurtosis-1.019; Bonus Point : Mean 2.72, Median 2.50, Mode 2.00, S.D. 0.80, Skewness 0.564 and Kurtosis-1.037; Ankle Hold: Mean 2.94, Median 3.00, Mode 3.00, S.D. 0.76, Skewness-0.032 and Kurtosis-1.014; Toe Touch: Mean 3.02, Median 3.00, Mode 3.00, S.D. 0.74, Skewness -0.032, Kurtosis-1.014 (Table 1).

**Table 1:** Statistical values of variables in a group of male kabaddi players on clay surface (N=50)

Variables	Mean	Median	Mode	S.D.	SK	Ku	P25	P75
<b>Kabaddi Skills</b>								
Back kick	2.85	3.00	3.00	0.77	0.285	-1.020	2.00	3.00
Bonus point	2.75	2.50	2.00	0.85	0.563	-1.040	2.00	3.00
Ankle Hold	2.95	3.00	3.00	0.77	0.106	-0.927	2.00	4.00
Toe touch	3.06	3.00	3.00	0.77	-0.036	-1.018	2.00	4.00
Motor Coordinative Ability (Shuttle Run)	15.36	15.23	16.07	1.58	0.177	0.006	14.37	16.10

A Closer look at the statistical properties of the variable shuttle run timings of male kabaddi players on clay surface which is depicted in table 1 reveals the following –Mean 15.34, Median 15.20, Mode 16.03, S.D. 1.52, Skewness 0.170 and Kurtosis 0.005. The distribution of data in a group of male kabaddi players pertaining to performance on mat surface is presented in table 2.

The statistical properties of the dimensions of Kabaddi skills

of male kabaddi players on mat surface depicted in table 2 reveals the following – Back Kick: Mean 2.54, Median 2.00, Mode 2.00, S.D. 0.73, Skewness 0.984 and Kurtosis-0.421; Bonus Point: Mean 2.64, Median 2.50, Mode 2.00, S.D. 0.72, Skewness 0.673 and Kurtosis-0.774; Ankle Hold: Mean 2.68, Median 3.00, Mode 2.00, S.D. 0.74, Skewness 0.599 and Kurtosis-0.923; Toe Touch: Mean 2.76, Median 3.00, Mode 3.00, S.D 0.68, Skewness 0.350 and Kurtosis-0.813 (Table 2).

**Table 2:** Statistical values of variables in a group of male kabaddi players on mat surface (N=50)

Variables	Mean	Median	Mode	S.D.	SK	Ku	P25	P75
<b>Kabaddi Skills</b>								
Back kick	2.56	2.00	2.00	0.77	0.989	-0.428	2.00	3.00
Bonus point	2.67	2.56	2.00	0.78	0.679	-0.779	2.00	3.00
Ankle Hold	2.70	3.00	2.00	0.78	0.600	-0.925	2.00	3.00
Toe touch	2.78	3.00	3.00	0.70	0.355	-0.816	2.00	3.00
Motor Coordinative Ability (Shuttle Run)	16.12	16.06	16.17	1.53	0.209	-0.127	15.08	17.09

A Closer look at the statistical properties of the variable shuttle run timings of male kabaddi players on mat surface which is depicted in table 1 reveals the following – Mean 16.09, Median 16.01, Mode 16.12, S.D. 1.49, Skewness 0.206 and Kurtosis-0.123.

The distribution of data in a group of female kabaddi players pertaining to performance on clay surface is presented in table 3.

The statistical properties of the dimensions of Kabaddi skills

of female kabaddi players on clay surface depicted in table 3 reveals the following – Back Kick: Mean 2.80, Median 3.00, Mode 2.00, S.D. 0.80, Skewness 0.387 and Kurtosis 0.662; Bonus Point: Mean 2.82, Median 2.00, Mode 2.00, S.D. 0.80, Skewness 0.342 and Kurtosis-0.826; Ankle Hold: Mean 2.94, Median 3.00, Mode 3.00, S.D. 0.76, Skewness 0.104 and Kurtosis 0.662; Toe Touch: Mean 3.04, Median 3.00, Mode 3.00, S.D. 0.78, Skewness-0.071 and Kurtosis-0.926 (Table 3)

**Table 3:** Statistical values of variables in a group of female kabaddi players on clay surface (N=50)

Variables	Mean	Median	Mode	S.D.	SK	Ku	P25	P75
<b>Kabaddi Skills</b>								
Back kick	2.85	3.00	2.00	0.84	0.390	0.666	2.00	3.28
Bonus point	2.88	2.00	2.00	0.86	0.347	-0.828	2.00	3.31
Ankle Hold	2.96	3.00	3.00	0.79	0.108	0.664	2.00	4.00
Toe touch	3.07	3.00	3.00	0.82	-0.074	-0.929	2.00	4.00
Motor Coordinative Ability (Shuttle Run)	17.88	17.90	16.44	1.19	0.163	-0.437	16.87	18.57

A Closer look at the statistical properties of the variable shuttle run timings of female kabaddi players on clay surface which is depicted in table 3 reveals the following –Mean 17.83, Median 17.87, Mode 16.40, S.D. 1.15, Skewness 0.159 and Kurtosis-0.432.

The distribution of data in a group of female kabaddi players pertaining to performance on mat surface is presented in table 4.

The statistical properties of the dimensions of Kabaddi skills

of female kabaddi players on mat surface depicted in table 4 reveals the following – Back Kick: Mean 2.56, Median 2.00, Mode 2.00, S.D. 0.67, Skewness 0.811 and Kurtosis-0.432; Bonus Point: Mean 2.56, Median 2.00, Mode 2.00, S.D. 0.70, Skewness 0.873 and Kurtosis-0.463; Ankle Hold: Mean 2.70, Median 3.00, Mode 2.00, S.D. 0.73, Skewness 0.545 and Kurtosis-0.943; Toe Touch: Mean 2.86, Median 3.00, Mode 2.00, S.D. 0.78, Skewness 0.255 and Kurtosis-0.875 (Table 4).

**Table 4:** Statistical values of variables in a group of female kabaddi players on mat surface (N=50)

Variables	Mean	Median	Mode	S.D.	SK	Ku	P25	P75
<b>Kabaddi Skills</b>								
Back kick	2.61	2.00	2.00	0.71	0.820	-0.441	2.00	3.00
Bonus point	2.58	2.00	2.00	0.75	0.877	-0.469	2.00	3.00
Ankle Hold	2.77	3.00	2.00	0.78	0.552	-0.945	2.00	3.00
Toe touch	2.90	3.00	2.00	0.82	0.258	-0.881	2.00	3.28
Motor Coordinative Ability (Shuttle Run)	18.28	18.39	16.43	1.37	-0.021	-1.026	17.32	19.38

A Closer look at the statistical properties of the variable shuttle run timings of female kabaddi players on mat surface which is depicted in table 4 reveals the following – Mean

18.25, Median 18.33, Mode 16.40, S.D. 1.31, Skewness-0.014, Kurtosis-1.020.

**Table 5:** Comparison of shuttle run timings of male kabaddi players on clay and mat surfaces (N=50)

Skill Variable	Performance of Male Kabaddi Players				Mean Diff.	't'
	Clay Surface		Mat Surface			
	M	S.D.	M	S.D.		
Back Kick	2.90	0.82	2.59	0.78	0.38	2.38*

\*Significant at .05 level

A perusal of statistical entries reported in table 6 shows that mean scores on back kick skill among male kabaddi players on clay surface was 2.84 while mean scores on back kick skill on mat surface was 2.54. The mean difference was calculated

to be 0.30 between back kick skill on clay and mat surface. The calculated  $t=2.33$  indicate that male kabaddi players were more adept in performing back kick skill on clay as compared to mat surface at .05 level of statistical significance.

**Table 6:** Comparison of Kabaddi Skill i.e. Bonus Point Attempt in a Group of Male Kabaddi Players on Clay and Mat Surfaces (N=50)

Skill Variable	Performance of Male Kabaddi Players				Mean Diff.	't'
	Clay Surface		Mat Surface			
	M	S.D.	M	S.D.		
Bonus Point Attempt	2.78	0.85	2.71	0.81	0.12	0.89(NS)

A perusal of statistical entries reported in table 7 shows that mean scores on attempt to get a bonus point among male kabaddi players on clay surface was 2.72 while mean scores on this skill on mat surface was 2.64. The mean difference was calculated to be 0.08 between attempt towards getting a

bonus point while playing on clay and mat surface. The calculated  $t=0.85$  which did not show any statistical significance, indicate that male kabaddi players attempts to get a bonus point irrespective of playing surface.

**Table 7:** Comparison of Kabaddi Skill i.e. Ankle Hold in a group of male kabaddi players on clay and mat surfaces (N=50)

Skill Variable	Performance of Male Kabaddi Players				Mean Diff.	't'
	Clay Surface		Mat Surface			
	M	S.D.	M	S.D.		
Ankle Hold	2.99	0.81	2.72	0.82	0.32	2.17*

A perusal of statistical entries reported in table 8 shows that mean scores on ankle hold skill among male kabaddi players on clay surface was 2.94 while mean scores on ankle hold skill on mat surface was 2.68. The mean difference was calculated to be 0.26 between ankle hold skill on clay and mat

surface. The calculated  $t=2.04$  indicate that male kabaddi players were more adept in performing ankle hold skill on clay as compared to mat surface at .05 level of statistical significance.

**Table 8:** Comparison of Kabaddi Skill i.e. Toe Touch in a group of male kabaddi players on clay and mat surfaces (N=50)

Skill Variable	Performance of Male Kabaddi Players				Mean Diff.	't'
	Clay Surface		Mat Surface			
	M	S.D.	M	S.D.		
Toe Touch	3.12	0.82	2.85	0.72	0.36	2.15*

A perusal of statistical entries reported in table 9 shows that mean scores on toe touch skill among male kabaddi players on clay surface was 3.02 while mean scores on toe touch skill on mat surface was 2.76. The mean difference was calculated to be 0.26 between toe touch skill on clay and mat surface. The calculated  $t=2.09$  indicate that male kabaddi players were more adept in performing toe touch skill on clay as compared to mat surface at .05 level of statistical significance.

### Discussion

The main objective of the present study is to analyses the impact of playing surface upon motor coordinative and skill ability of kabaddi players. After statistical analysis of data it was found that motor coordinative ability of kabaddi players as assessed by shuttle run was significantly different on clay and mat surface. The results indicate that kabaddi players are more agile on clay surface as compared to mat surface. The results regarding the effect of playing surface on skill ability of kabaddi players also indicate that proficiency in basic fundamental kabaddi skills are better on clay surface as

compared to mat. The results highlights the impact of playing surface upon motor coordinative and skill related ability of kabaddi players. It may be due to traction or grip or friction of foot/shoe with surface. When foot connects with playing surface, its traction or grip or friction with surface significantly influence performance because ability to remain upright and agility depends greatly upon this traction. The rotation part is a major aspect of traction. In most agility-oriented sports we pivot on the ground during cutting maneuvers it plays a major role. Studies conducted by also indicated significant variation in motor and technical skills on different playing surfaces. Hence when a kabaddi player made transition from clay to mat surface, the unadapt ability of friction/traction hinders performance. The coefficient of friction between foot and surface changes according to playing surface. In this perspective the results of the present study are not at all surprising.

### Conclusion

Agility of male and female kabaddi players is affected by

playing surface i.e. clay and mat. - Playing surface emerged as major factor which influence basic skills of male and female kabaddi players. Hence, it may be concluded that motor coordinative ability and to a great extent basic skills in kabaddi are affected by nature of playing surface. The results also feels that more and more synthetic mats are provided for upcoming young kabaddi player because without practicing on these synthetic mats young budding talent will lag behind in International kabaddi scenario in near future despite possessing better kabaddi skills and craft as compared to European players.

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