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Page: 01-11

RELATIONSHIP OF SELECTED MOTOR FITNESS COMPONENTS WITH PLAYING ABILITY AMONG MALE KHO-KHO PLAYERS

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ABSTRACT

Kho-Kho is a traditional Indian team game, which involves movement, acceleration, deceleration, frequent changes of speed, direction and intensity of movement along with performance of sport specific skills. The present study focused on the correlation between the selected components of motor fitness and the playing ability in male college players of Kho-Kho game. The participants for the study for the academic year 2024–2025 and 2025–2026 involved 50 male Kho-Kho players aged 18-23 years from Guru Kashi University Talwandi Sabo Punjab. A battery of physical fitness tests was used to assess the selected motor fitness components, such as the 50-m sprint for speed, shuttle run for agility, standing broad jump for explosive leg power, push ups for muscular endurance and 12-minute run/walk test for cardiovascular endurance. Game play was evaluated using an observation and rating system that observed and rated both defending and chasing skills. Descriptive statistics and Pearson's product moment correlation coefficient were used to assess the association between the motor fitness components and playing ability. The motor fitness components that were evaluated were significantly related to playing ability for all of the six components. The 50-m sprint's time was strongly correlated with playing ability ($r = -0.68$, $p < .001$), and the shuttle run's time was also strongly correlated with playing ability ($r = -0.72$, $p < .001$). The standing broad jump and the push-up performance correlated well with each other ($r = 0.78$ and 0.73 , respectively, $p < 0.001$ for both). There was also a strong positive correlation between the

cardiovascular endurance and playing ability ($r = 0.61$, $p < 0.001$). The negative correlations with the sprint and shuttle run times suggest that a decrease in run times correlated with higher playing ability scores. The combined results suggest that certain motor fitness attributes were significantly correlated to playing ability in the male college level Kho-Kho players. The study however, was a correlational study and the results were used to establish causality.

KEYWORDS: *Kho-Kho, Motor fitness, speed, agility, explosive leg power, muscular endurance, cardiovascular endurance and Playing ability.*

INTRODUCTION

Kho-Kho is the one of traditional game of team sport in India that include high speed of changing, increase or decrease speed, changes of direction, evasion, chasing and tactical thinking. In this sport players should be repeatedly engaged in short duration, high intensity movements, with awareness of technical efficiency and tactical awareness. It is therefore, essential that the motor fitness level is adequate to perform the appropriate Kho-Kho skills.

Motor fitness is a set of several physical characteristics which make someone successful in sporting activity. Agility is the skill to accelerate, decelerate and change direction rapidly with efficiency and ability according to the demands of the movement whilst speed is the ability to undertake a given distance in a swift manner. Explosive leg power is an important factor in fast movement like acceleration, jumping and diving. Muscular endurance allows players to repeatedly perform muscular actions to a degree that will not result in excessive fatigue. Cardiovascular endurance helps to maintain activity and recover between efforts; flexibility aids in good range of motion in the required actions of the sport. Agility and speed are important aspects in the movement required in Kho-Kho. Players may find that during chasing situations they need to change their direction quickly, accelerate quickly, navigate the pole and react to another's movement. Defensive players also need to be able to attack, dodge and control the body. These actions involve more than one fitness component and depend on the interactions of several. In the field of sports science, previous studies have shown that relationships exist between speed, agility, strength and power and athletic performance. In the case of acceleration, maximum speed and agility they have been shown as related but not equal abilities (Little & Williams, 2005). Sheppard and Young (2006) also highlighted the multi-dimensionality of agility which contains perceptual, decision making and change of direction aspects. Power of the whole lower body as well as acceleration capacity have been

shown by studies in plyometric and strength related training to be key attributes in athletic performance (Cronin & Hansen 2005, Miller et al. 2006). There have also been some specific studies on Kho-Kho related to physical fitness characteristics and performance. Most of the existing literature however, has concentrated on looking at differences between groups, profiles of physiological fitness or individual fitness parameters when it comes to investigations of the simultaneous correlation between multiple standardized motor fitness indicators and an independently determined general athletic performance rating.

Skill in Kho-Kho is a multi-faceted attribute related to successful execution of technical aspects, efficient movement, tactical adaption and play under real game conditions. Hence, fitness assessment focusing on individual body fitness tests can be misleading about a player's playing competency. An integrated approach on standardized fitness assessment accompanied by structured game performance evaluation is more meaningful when exploring the relationship between physical attributes and level of playing ability. This study hence concentrated on the relationship between the selected components of motor fitness and play ability of college level male Kho-Kho players. Particular focus was given to the relationship between speed, agility, explosive leg power, muscular endurance and cardiovascular endurance with respect to a structured playing ability score for this study.

Review of Literature: Little and Williams (2005) looked at the acceleration, max speed, and agility in professional soccer players and found they are correlated but different performance factors. They conclude that there is a need to examine the physical characteristics of the individuals rather than measuring all types of movement abilities as one.

Sheppard and Young (2006) reviewed the literature on agility and defined it as a multi-component attribute that requires the athlete to change velocity and/or direction in response to a relevant stimulus and involves the incorporation of speed components over the whole body. This career application is especially relevant to Kho-Kho where players should be able to adapt to their counterparts and to the circumstances at hand, while being able to change direction fast.

Cronin and Hansen (2005) investigated the association between strength and power characteristics and sprint performance. They found that strength and power in the lower body is a significant factor in sprint ability. In Kho-Kho, these traits can be correlated with explosive movements like accelerations, pole movements, diving etc.

The main aim of Kumar and Singh (2018) was to observe the role of agility and speed of the college-level Kabaddi and Kho-Kho players. They found agility specifically ability to run

shuttle runs to be the most closely correlated skill with efficiency in the specific game skills (chasing and evasions). There was a significant positive correlation between the measure of sprint speed (measured from short sprints) and performance, meaning that if a player can run fast and continue to run fast, they have a higher chance of tagging an opponent or avoiding being tagged. The authors also found that agility and speed play an important role in the success of tag with emphasis on including agility and speed exercises in order to build up these parameters as part of the routine training.

In the study, Sharma et al. (2020) studied the role played by endurance and strength in the assessment of performance in traditional games of India including Kho-Kho. Players with good endurance levels (based on the 12-minute run/walk score) could continue at a high intensity level without developing significant fatigue during the game. Areas of strength (push-up test and standing broad jump test) were linked with effective tackling, lunging and explosive movement which was essential in the game. They discovered that agility and speed are important for short periods of activity and endurance and strength are important for prolonged periods of activity throughout the game. These findings are in line with the principles of modern sports science that concept that the combination of anaerobic and aerobic conditioning is important in intermittent high intensity sports.

The effect of Flexibility and Coordination on sports performance were discussed by Gupta and Reddy (2017). While flexibility did not necessarily relate to game specific performance, it was seen to minimise risk of injury and improve efficiency of movement. Coordination was important, though, for performing more complicated movements including tagging or dodging quickly. Co-ordination is important in Kho-Kho where swift movements and timely action are essential for winning the game because the moves made must be swift and synchronize with the opponent's actions as well as maintain balance and control.

A few studies are also foreshadowing the necessity of a comprehensive fitness evaluation. Singh and Kaur (2019) highlighted issues that analyzing multiple components of motor fitness gives more in-depth knowledge about the player's abilities. In the study of inter-college Kho-Kho players, they found that there was significant proportion of variance in playing ability that could be explained by agility, speed, endurance and strength. The study recommended for the trainings should not centre on one fitness component but also combine trainings which will provide multi-component improvement in order to achieve a well-rounded athlete.

METHODOLOGY

The research design that is used in the present study is a correlational research design. The design was chosen because randomizing and assigning the participants to different conditions were not the goal of studying the statistical relationships between selected motor fitness characteristics and playing ability.

They provided an aim to explore the associations between the selected motor fitness components and playing ability of college male Kho-Kho players. Hypotheses were made that among the selected motor fitness components namely speed, agility, explosive leg power, muscular endurance and cardiovascular endurance there are statistically significant motor components which were directly related to playing ability of Kho-Kho players.

The number of players took part were 50 male college level Kho-Kho players aged between 18-23 belonging to Guru Kashi University Talwandi Sabo Punjab. The participants were of the 2024-2025 as well as 2025-2026 academic sessions. Any player that was injured or unable to do the testing procedures was not allowed to play and was conveniently omitted from the fray. Random sampling was followed in the selection of the participants that were eligible college-level Kho-Kho players.

Independent Variables: Speed, Agility, Explosive leg power, Muscular endurance and Cardiovascular endurance.

Dependent variable: Playing ability, measured via playing in competitive matches, using expert observation and standardized scores.

Table 1 Selected Motor Fitness Components and Tests.

Motor Fitness Component	Test	Unit	Direction of Better Performance
Speed	50-m Sprint	Seconds	Lower score
Agility	Shuttle Run	Seconds	Lower score
Explosive Leg Power	Standing Broad Jump	Cm	Higher score
Muscular Endurance	Push-ups	Repetitions	Higher score
Cardiovascular Endurance	12-Minute Run/Walk	Distance	Higher score

Data were analyzed using Pearson's correlation coefficient to determine the relationships between motor fitness components and playing ability. Descriptive statistics, including mean, standard deviation, minimum and maximum values, were calculated for all variables. The significance level was set at $p < 0.05$.

Playing Ability Assessment: Playing ability was assessed through a structured observation procedure involving two broad categories of Kho-Kho skills.

1. Defensive skills
2. Chasing skills

The original skill rating structure provided a maximum of 100 raw points, consisting of 50 points for defensive skills and 50 points for chasing skills.

Table 2: Structured Playing Ability Assessment.

No.	Defensive Skill	Points	Chasing Skill	Points
1	Dodging	10	Sitting Procedure	8
2	Pole-to-Pole Run	6	Sudden Change of Direction	10
3	Chain Game	10	Grasping Direction	6
4	Pole Turn	6	Giving Kho	6
5	Pole Slide	10	Diving	10
6	Zig-Zag Movement	8	Tapping	10
Total		50		50

Total raw score = 100 points.

Statistical Analysis: The collected data were analyzed using descriptive statistics and Pearson's product moment correlation coefficient. Descriptive statistics included the mean, standard deviation, minimum and maximum values for all study variables. Pearson's correlation coefficient was used to determine the direction and magnitude of the relationships between each selected motor fitness component and playing ability. The level of statistical significance was set at $p < 0.05$.

RESULTS

Table 3: Descriptive Statistics of Selected Motor Fitness Components and Playing Ability.

Variable	M	SD	Minimum	Maximum
50-m Sprint (s)	7.20	0.50	6.50	8.10
Shuttle Run (s)	10.50	0.60	9.50	11.80
Standing Broad Jump (cm)	180.00	15.00	155.00	210.00
Push-ups (repetitions)	25.00	5.00	18.00	35.00
12-Minute Run/Walk	22.00	3.00	17.00	28.00
Playing Ability Score (0–100)	76.00	8.00	60.00	92.00

Interpretation: Table 3 shows that the participants recorded a mean playing ability score of 76.00 ± 8.00 . The mean 50-m sprint time was 7.20 ± 0.50 s, while the mean shuttle-run time was 10.50 ± 0.60 s. The mean standing broad jump performance was 180.00 ± 15.00 cm, and

the mean number of push-ups was 25.00 ± 5.00 repetitions. The mean distance covered in the 12-minute run/walk was 22.0 ± 3.0 m.

Table 4: Pearson Correlations between Selected Motor Fitness Components and Playing Ability. (N = 50)

Variable	r with Playing Ability	Interpretation
50-m Sprint (s)	-0.68	Strong negative
Shuttle Run (s)	-0.72	Strong negative
Standing Broad Jump (cm)	0.78	Strong Positive
Push-ups (repetitions)	0.73	Strong Positive
12-Minute Run/Walk	0.61	Strong positive

Table 4 indicates a strong negative correlation between 50-m sprint time and playing ability ($r = -0.68$, $p < 0.001$), indicating that participants with faster sprint times tended to demonstrate higher playing ability scores. Similarly, shuttle-run time was strongly and negatively correlated with playing ability ($r = -0.72$, $p < 0.001$), suggesting that better agility performance was associated with higher playing ability.

Standing broad jump performance demonstrated a very strong positive correlation with playing ability ($r = 0.78$, $p < 0.001$). Push-up performance also showed a strong positive correlation with playing ability ($r = 0.73$, $p < 0.001$). Cardiovascular endurance, assessed through the 12-minute run/walk, was positively and strongly related to playing ability ($r = 0.61$, $p < 0.001$). Overall, the findings suggest that speed, agility, explosive leg power, muscular endurance and cardiovascular endurance were significantly associated with playing ability among the participants.

Graphical Representation

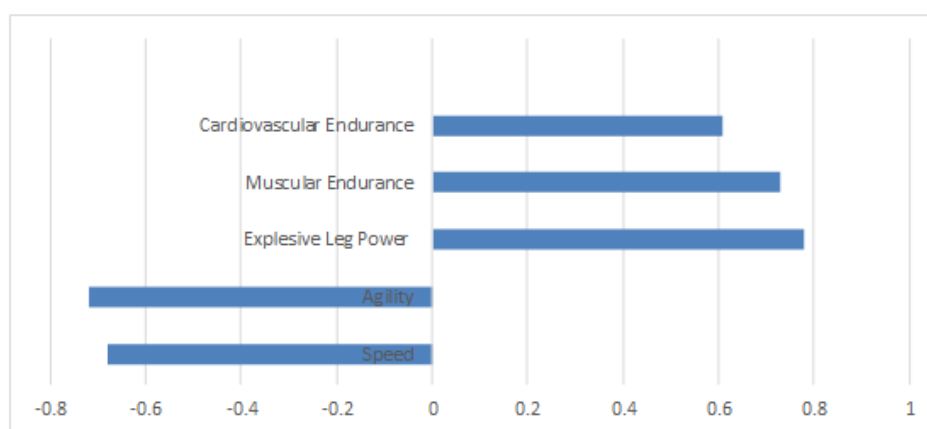


Figure 1: Bar chart showing correlation of motor fitness components with playing ability.

Discussion: In the present study the relationships between selected motor fitness components and playing ability were examined among the college level male Kho-Kho players. The results showed significant relationships between all the six selected components of motor fitness and skill at playing. These relationships were inconsistent based on the physical characteristic measured and the direction for the scoring the test measured.

A combination of both speed and playing ability: Playing ability ($r = -0.68$, $p < 0.001$) was correlated with the 50 m sprint time, which had a strong negative correlation. Lower times didn't signify that the athlete was faster, as sprint performance was measured in seconds. Hence, the negative correlation suggests that players who were able to complete the 50-m plain sprint at a shorter time tended to score higher in playing-ability.

Agility and Playing Ability: The playing ability was highly negatively correlated with shuttle run time, $r = -0.72$ ($p < 0.001$). Lower times for shuttle run were deemed as better performance, as a result the coefficient is negative, meaning that a better shuttle run time correlated with a higher playing ability score being attained by the player.

Explosive Leg Power & Playing Ability: There was a positive strong correlation between standing and broad jump ability ($r = 0.78$, $p < 0.001$) and playing ability. This meant that a higher score on broad jump was correlated with high score on playing-ability.

Playing ability and Muscular Endurance: Playing ability of push-ups displayed a high Level of significance and Positive correlation ($r = 0.73$, <0.001). Those who successfully made more push ups tended to score more playing ability. The push up test however, mainly is indicative of upper extremity muscular ability and cannot be considered as complete muscle demand of Kho-Kho. The finding only offers an association between the chosen measure of muscular endurance and playing ability and as such does not prove a causal contribution from muscular endurance to the overall performance.

Playing Ability and cardiovascular Endurance: There was good positive association between the 12-minute run/walk performance and playing ability ($r = 0.61$, $p < 0.001$). Players scoring higher in the endurance test tended to get higher scores for their playing-ability. Kho-Kho is an activity with intermittent high intensity bursts of activity followed by recovery intervals. Cardiovascular conditioning can thus be relevant to having adequate tolerance of repeated activity and the ability to recover between intense activity units. There

is some evidence (present result) suggesting a relationship between general cardiovascular endurance and playing ability. The 12-minute run/walk test however measures general endurance and is not a good direct measure of a Kho-Kho specific repeated sprint capacity.

CONCLUSION

In conclusion, in the present study relation between playing ability and selected motor fitness components among 50 college level male Kho-Kho players (18-23 years) has been investigated. The results showed statistically significant links between all 5 selected motor fitness components and playing ability.

Strong negative correlations were seen with playing ability for both sprint and shuttle run times (50m and shuttle run respectively), with faster times being correlated with higher playing ability scores. Roof measurements of standing broad-jump performance, push-up performance, and 12-minute run/walk performance all had strong positive relationships with playing ability with sat and reach performance showing a moderate positive relationship.

In general, the results suggest that playing ability of the fielders in the study group of Kho-Kho players in college level is associated with the attributes of speed, agility, explosive leg power, muscular endurance and cardiovascular endurance. The results, therefore, provided support for the evaluation of several motor fitness characteristics in the context of the physical profile of Kho-Kho players.

But it is not possible to draw causal inference from the design of the study as it is a correlational study. The results must therefore be interpreted as statistical associations, and not as causal connections between motor fitness and playing ability of any single component of motor fitness. Larger and more diverse samples along with longitudinal and experimental designs should be used in future research studies as these would be helpful in determining the extent to which specific motor fitness changes to any of the selected components of motor fitness led to significant changes in performance in Kho-Kho playing.

Taken together, the findings demonstrate that all six selected motor fitness components were significantly associated with playing ability. Among the reported coefficients, agility showed the largest absolute association ($r = -0.72$), followed by speed ($r = -0.68$), cardiovascular endurance ($r = 0.61$), muscular endurance ($r = 0.73$), and explosive leg power ($r = 0.78$).

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