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SELECTED MOTOR ABILITY COMPONENTS OF FIELD HOCKEY GOALKEEPERS AT DIFFERENT LEVELS OF PARTICIPATION

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ABSTRACT

The purpose of the study was to compare selected motor ability components of field hockey goalkeepers at different levels of participation. 45 male field hockey goalkeepers were selected for the purpose of the study. Out of 45 subjects, 15 subjects each were selected from inter-collegiate, inter-university and national level. The motor ability components selected in this were flexibility, orientation ability, balance ability and reaction ability. Before the collection of data the purpose and procedure of the tests items were explained to the subjects, and given sufficient time for warm-up before testing. Adequate demonstrations with regard selected test were also given. The necessary data was collected by administering various tests for the chosen variables. ANOVA (analysis of variance) technique was used to compare the means of different levels of participations followed by LSD (least significant difference) wherever applicable. The level of significant to determine the significant difference was set at 0.05 levels. The results of the study showed that significant difference existed in flexibility, orientation ability, balance ability and reaction time ability among senior national, inter-university and inter-collegiate level of field hockey goalkeepers.
Keywords: *Motor ability, field hockey, goalkeepers levels of participation.*

1. INTRODUCTION

Hockey is undoubtedly one of the most popular sports in the world. There are different levels of hockey tournaments in different countries. In India national level, state level, inter-university and district level hockey tournament are played. Research on performance of hockey usually focuses on players not on goalkeepers. Such studies attempt to understand those aspect related to the optimization of player's resources and to classify competition demands. Game

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situations allow coaches to identify some variables that can differentiate the best and worst teams and consequently lead to improve results. A game of field hockey is won by outscoring the opposition. The goalkeeper forms the last line of defense for a team and their task is to intercept shots that are made from within a 14.6 meters radius from the goal. According to Mohammad (2013) the ball travel about 110 to 120 km/h to the goalkeeper and goalkeeper have less than one second to react to a shot from the edge of area and move to stop it (Hussain, Mohammad, Khan, Bari, Ahmad, A., & Ahmad, 2011).

Mitchell and Tavener, (2005) as in most team's sports, each "line" or group of players-forwards, midfielders, defender's and goalkeepers- has slightly different fitness requirements, players in each position must train to perform the specific physical requirements to their position. The physical requirements of the goalkeepers are different to those of any of their team-mates, as so goalkeepers should train accordingly. Explosive speed and agility both laterally and vertically are characteristics necessary for goalkeepers to perform at the highest level. According to Coach's Goaltending Handbook, (2012) goalkeepers had several roles in their teams. Goalkeepers protect the goal and works as defensive coordinator. A goalkeeper needs to develop his physical and technical skills, focus and concentration, and their understanding of defensive tactics and strategy. Goalkeeper works on their physical and technical skills all the time. Good teams win games with only adequate goalkeeping but it is an area that does not receive as much attention as the other positions on the team. There is no scientific study to evaluate goalkeepers. A goalkeeper needs courage to face the shots, stay to the goal, and not turn away. They need flexibility and agility to make awkward movements and they need above-average reflex and hand-eye coordination. Goalkeepers usually have great playmaking ability near the net. The goalkeeper is arguably the most important position on the hockey field. A good goalkeeper can win games. Therefore it is paramount that goalkeepers get the attention and time they deserve at training sessions. The goalkeeper is responsible for the defensive circle and a strong goalkeeper will often take a leadership role on defense. According the Nelson and Johnson, (1970) the game demanded high level of motor ability. It includes several components such as speed, reaction time, endurance, flexibility, and the important of all the coordinative ability. If a player has a large amount of general athletic ability possesses the basic physical components necessary to achieve excellence number of activities, one will still be unable to perform well in a particular sport until he develops the skill specific to that sport. Coordinative abilities are qualities of an organism to coordinate, separate, elements of action in our system to decide a concrete action task. Coordinative abilities help in learning faster and also to achieve the high level of performance (Sadri, 1993).

The goalkeeping in the game of hockey demands agility, muscular coordination, breath holding capacity, quick responses and a great deal of presence of mind. The goalkeeping demands high level of motor fitness and a great deal of presence of mind. General motor ability includes several items such as strength, power, agility, speed, reaction time and flexibility. An abundance of these traits enables a person to perform well in such basic activities as running, jumping and throwing. If a performer has a large amount of general athletic ability, he is said to be a natural athlete. Harold and Rosemary, (1979) motor fitness variables have been considered the important prerequisite for sportsman to secure the top level performance in games. There is general agreement among authorities that general and specific motor fitness play a decisive role in one's level of performance in wide range of motor activities. Motor fitness is used to obtain achievement in motor skills. It denotes immediate state of individual performance in wide range of motor skills. Motor fitness is regarded as the preparation of performance with special regard to big muscles activity. As a more general phase of physical fitness, motor fitness is judged by the performance and common factors are strength, endurance, power, agility, balance, flexibility and speed.

Wakharkar, (2005) neuro-muscular co-ordination covers motor ability and motor fitness. Motor ability is one's proficiency in different sports and also termed as athletic ability. Motor fitness help to increase one's ability to perform work details or to perfect skills. All basic movement of the body such as running, jumping, pushing, pulling, throwing, etc. are factors to decide motor fitness ability. Speed, agility and accuracy are also necessary in deciding motor fitness ability. Speed is the ability of an individual to make successive movement of the body in shortest possible time. Sprint running is a good example of speed. Ability of an individual to change position in speed is called agility. In various games such as hockey and football agility is an essential component of motor fitness. Balance is ability of an individual to control one's body with confidence and grace. Gymnastics, hockey, skating etc. are examples where equilibrium of a body is needed. Accuracy is the ability of an individual to control voluntary movements towards a particular object. Goalkeeping, goal-kick and shooting are examples where accuracy is to be developed.

It is a fact that in India there is still limited information of elite players regarding motor fitness. Very fewer studies have been conducted regarding the performance of Goalkeeper. Above literature shows a relationship between sports performance and motor fitness components of Goalkeepers, off-course it is new area of exploration, which will provide scientific knowledge to the students/ players/beginners who want to make their carrier in hockey, especially in goalkeeping. Hence an attempt has been made to study the motor abilities of goalkeepers.

2. METHODS AND MATERIALS

2.1 Subjects

Forty five male hockey goalkeepers aged between 18-24 years were selected for the purpose of the study. Out of 45 subjects, 15 subjects each were selected from inter-collegiate level; inter-university level and national level competition. All the selected subjects belong to U.P. a state of India only.

2.2 Selection of Variables

The motor ability components selected in this were flexibility, orientation ability, balance ability and reaction ability.

2.3 Selection of Tests

As per available literature, the following standardized test items were used to collect data on the selected motor fitness variables are presented below-

2.3.1 Motor Ability Components

Variables	*Tests and Tools*
1. Flexibility	Sit and reach test
2. Coordinative ability	
a. Orientation ability	Numbered medicine ball run test
b. Balance ability	Long nose test
c. Reaction ability	Ball reaction exercise test

2.4 Collection of Data

Before the collection of data the purpose and procedure of the tests items were explained to the subjects, and given sufficient time for warm-up before testing. Adequate demonstrations with regard sit and reach test, numbered medicine ball run test, long nose test and ball reaction exercise test were also given. The necessary data was collected by administering various tests for the chosen variables. For administering the tests sit and reach test, numbered medicine ball run test, long nose test and ball reaction exercise test stations were set up in the field.

2.5 Statistical Procedure

To compare the selected motor ability components of hockey goalkeepers one way ANOVA (analysis of variance) technique was used to compare the means of different levels of participations followed by LSD (least significant difference) wherever applicable. All statistical function SPSS v.16 software was used. The level of significant to determine the significant difference was set at 0.05 levels.

3. RESULTS

Table 1: Analysis of variance (ANOVA) of the variable "flexibility" among different levels of competition

	Sum of Squares	*df*	Mean Square	*F*
Between Groups	8.10	2	4.05	
Within Groups	47.70	42	1.14	3.57*
Total	55.80	44		

*Significant at 0.05 level of significance Tabulated *F*= 3.20

An examination of above cited Table 1 evidenced that calculated *F* value (3.57) was found more than tabulated *F* value (3.20) at 0.05 level of significance with 42 degree of freedom, hence there is significant difference existed among senior national, inter-university and inter-collegiate levels of field hockey goalkeepers in the variable of flexibility. To know the exact position of goalkeeper's flexibility, representing different levels of competition, least significant difference (L.S.D.) a post-hoc test was applied and its result is presented in the following Table 2.

Table 2: Least significant difference (L.S.D.) of the variable "flexibility" among different levels of competition

Senior National	Inter-university	Inter-collegiate	Mean Difference	Critical Difference
4.73	4.73		0.00	
4.73		3.83	0.90*	0.79
	4.73	3.83	0.90*	

*Significant at 0.05 level

L.S.D. comparison of all three levels of competition cited in Table 2 showed that significant differences were found between senior national and inter-collegiate; inter-university and inter-collegiate level field hockey goalkeepers, whereas no

significant difference was documented between senior national and inter-university level field hockey goalkeepers in the variable of flexibility.

Table 3: Analysis of variance (ANOVA) of the variable "orientation ability" among different levels of competition

	Sum of Squares	*df*	Mean Square	*F*
Between Groups	33.37	2	16.69	29.88*
Within Groups	23.45	42	0.56	
Total	56.83	44		

*Significant at 0.05 level of significance Tabulated *F*= 3.20

Table 3's reading showed that calculated *F* value (29.88) was found more than tabulated *F* value (3.20) at 0.05 level of significance with 42 degree of freedom, there is significant difference existed among senior national, inter-university and inter-collegiate levels of field hockey goalkeepers in the variable of orientation ability. To know the exact position of goalkeeper's orientation ability, representing different levels of competition, least significant difference (L.S.D.) a post hoc test was applied and its result is presented in the following Table 4.

Table 4: Least significant difference (L.S.D.) of the variable "orientation" among different levels of competition

Senior National	Inter-university	Inter-collegiate	Mean Difference	Critical Difference
9.22	9.68		0.46	
9.22		11.23	2.01*	0.55
	9.68	11.23	1.55*	

*Significant at 0.05 level

The comparison of all three levels of competition cited in Table 4 showed that significant differences were found between senior national and inter-collegiate; inter-university and inter-collegiate level field hockey goalkeepers, whereas no significant difference was documented between senior national and inter-university level field hockey goalkeepers in the variable of orientation ability.

Table 5: Analysis of variance (ANOVA) of the variable "balance ability" among different levels of competition

	Sum of Squares	*df*	Mean Square	*F*
Between Groups	58.39	2	29.20	23.08*

Within Groups	53.13	42	1.27
Total	111.53	44	

*Significant at 0.05 level of significance Tabulated *F*= 3.20

From the above cited Table 5 it is evidenced that calculated *F* value (23.08) was found more than tabulated *F* value (3.20) at 0.05 level of significance with 42 degree of freedom, hence there is significant difference existed among senior national, inter-university and inter-collegiate levels of field hockey goalkeepers in the variable of balance ability. To know the exact position of goalkeeper's balance ability representing different levels of competition, least significant difference (L.S.D.) a post hoc test was applied and its result is presented in the following Table 6.

Table 6: Least significant difference (L.S.D.) of the variable "balance ability" among different levels of competition

Senior National	Inter-university	Inter-collegiate	Mean Difference	Critical Difference
8.74	10.47		1.73*	
8.74		11.51	2.77*	0.83
	10.47	11.51	1.04*	

*Significant at 0.05 level

The comparison of all three levels presented in the above cited Table 6 showed that significant differences were found between senior national and inter-university; senior national and inter-collegiate; inter-university and inter-collegiate level field hockey goalkeepers on the variable of balance ability.

Table 7: Analysis of variance (ANOVA) of the variable "reaction time ability" among different levels of competition

	Sum of Squares	*df*	Mean Square	*F*
Between Groups	4796.98	2	2398.49	11.19*
Within Groups	9036.00	42	215.14	
Total	13832.98	44		

*Significant at 0.05 level of significance Tabulated *F*= 3.20

An examination of above cited Table 7, revealed that calculated *F* value (11.19) was found more than tabulated *F* value (3.20) at 0.05 level of significance with 42 degree of freedom, there is significant difference existed among senior national, inter-university and inter-collegiate level of field hockey goalkeepers in the

variable of reaction time ability. To know the exact position of goalkeeper's ability representing different levels of competition, least significant difference (L.S.D.) a post hoc test was applied and its result is presented in the following table 8.

Table 8: Least significant difference (L.S.D.) of the variable "reaction time ability" among different levels of competition

Senior National	Inter-university	Inter-collegiate	Mean Difference	Critical Difference
147.33	163.47		16.14*	
147.33		172.27	24.94*	10.81
	163.47	172.27	8.8	

*Significant at 0.05 level

The comparison of all three levels of competition presented in the above cited Table 8, it showed that significant differences were found between senior national and inter-university; senior national and inter-collegiate level field hockey goalkeepers, whereas no significant difference was documented between inter-university and inter-collegiate level field hockey goalkeepers in the variable of reaction time ability.

4. DISCUSSION

The purpose of the study was to compare selected motor ability of field hockey goalkeepers at different levels of competitions. As the results of the study related to variables of motor ability components showed that significant differences existed among senior national, inter-university and inter-collegiate level of field hockey goalkeepers in the variables of flexibility, orientation ability, balance ability and reaction time ability. Uppal and Dutta (1980) also reported same type of results in their study; they worked on motor fitness and found significant difference among the subjects. They said that motor variables like flexibility having a higher degree of associations with the level of performance, and this is also revealed by the findings of our study that higher-level field hockey goalkeepers possesses higher degree of flexibility when they were compared with their lower levels of counterparts. This is also supported by Khetmalis, (2012).

The comparison through L.S.D. among all three levels of competition showed that differences were found between senior national and inter-collegiate; inter-university and inter-collegiate level field hockey goalkeepers in their flexibility, where as no significant difference was documented between senior national and inter-university level field hockey goalkeepers in the variable of

flexibility, this finding have been supported by Khetmalis, (2012). It indicates that both senior national and inter-university level field hockey goalkeepers have the similarities in the variable of flexibility; it may be because in the both levels almost similar type of training is given to the goalkeepers, Vyas, (1997) and Uppal & Dutta (1980) also found the same result.

The comparison using L.S.D. for the variable of orientation ability showed that differences were found between senior national and inter-collegiate; inter-university and inter-collegiate level field hockey goalkeepers, whereas no significant difference was documented between senior national and inter-university level field hockey goalkeepers in the variable of orientation ability, this finding have been supported by Khetmalis, (2012). As we stated earlier both senior national and inter-university level field hockey goalkeepers were given same type of training in the coaching centres may be one of the reason for results. Vyas, (1997) also found same result.

For the variable of balance ability it was found from the L.S.D. comparisons that significant differences were existed among all groups under investigation, which showed that all three level of field hockey goalkeepers differ among each other in their balance ability, this finding have been also supported by Erkut, Sirmen, Uzun, Ramazanoglu, Akan, and Atil, (2009) and Espenschde & Dable, (1953).

As far as the results of the L.S.D. comparison among all three levels for the variable of reaction ability showed that differences were found between senior national and inter-university; senior national and inter-collegiate level field hockey goalkeepers, whereas no significant difference was documented between inter-university and inter-collegiate level field hockey goalkeepers, this finding have also been supported by Erkut, *et al.*, (2009) and Keogh and Dalton (2003) also reported that significant difference was documented with the varying standards of competitions.

5. CONCLUSIONS

On the basis of obtained results of following conclusions may be drawn-

- Significant difference existed in flexibility, orientation ability, balance ability and reaction time ability among senior national, inter-university and inter-collegiate level of field hockey goalkeepers.
- Further it was found that significant differences were found for the variable of flexibility between senior national and inter-collegiate; inter-university and inter-collegiate level field hockey goalkeepers, where as no significant difference was documented between senior national and inter-university level field hockey goalkeepers.

- It was also found that significant differences were documented for the variable of orientation ability between senior national and inter-collegiate; inter-university and inter-collegiate level field hockey goalkeepers, whereas no significant difference was documented between senior national and inter-university level field hockey goalkeepers.
- The comparison L.S.D. showed that significant differences were found in balance ability between senior national and inter-university; senior national and inter-collegiate; inter-university and inter-collegiate level field hockey goalkeepers.
- The L.S.D. result showed that significant differences were found in reaction time ability between senior national and inter-university; senior national and inter-collegiate level field hockey goalkeepers, but no significant difference was documented between inter-university and inter-collegiate level field hockey goalkeepers.

On the whole, it was attributed from the results of the study, that the field hockey goalkeepers Uttar Pradesh state either; they were national or inter-university field hockey goalkeepers having almost similar type of motor fitness components.

6. REFERENCES

Durdin, R. & O'Haire, J., (2000). *Goalkeeping in field hockey training, techniques, coaching and materials.* New Zealand, O.B.O. Hockey.

Erkut, A. O., Sirmen, B., Uzun, S., Ramazanoglu, N., Akan, D. & Atil, Z. (2009). Espenschde, A. & Dable, R. R. (1953). Dynamic balance in adolescent boys. *Research Quarterly, 24*, 270.

Gursoy, R., Aggon, E., Stephens, R., & Ziyagil, M.A. (2012). Comparison of the Physical and Biomotor Characteristics, and Reaction Time between Turkish Male and Female Ice Hockey Players. *Advances in Physical Education, 2*(4), 169-171.

Harold, M. B. & Rosemary, M. (1979). *A practical approach to movements in physical education.* Philadelphia: Lea and Febiger.

Hirtz. P., (1985). *Co-ordinative fachigbeiten in school sports*. Berlin. Volb & Wissen, Volloci, Verlong.

Hussain, I., Mohammad, A., Khan, A., Bari, M.A., Ahmad, A., & Ahmad, S. (2011). Penalty stroke in field hockey: A biomechanical study. *International Journal of Sports Science and Engineering, 5*(1), 053-057.

Keogh, J.W.L., Weber, C.L. & Dalton, C.T. (2003). Evaluation of anthropometric, physiological, and skill-related tests for talent identification in female field hockey. *Canadian Journal of Applied*

Physiology, 28(3), 397-409.

Khetmalis, M.S. (2012). Comparison between selected coordinative abilities and motor abilities of female athletes of selected international Schools in Pune. *International Journal of Research Pedagogy and Technology in Education and Movement Sciences, 1*(2), 01-13.

Levine, G.D. & Carter. (1974). *Genetic and anthropological studies of Olympic athletes*. New York, Academic Press.

Luce, W.M. (1976). A comparison of selected and anthropometrical measurements and physical performance between Mexican-American and Anglo-American adolescents. *Dissertation Abstracts International, 37*, 2721.

Mitchell, C., & Tavener (2005). *Field hockey: Techniques and tactics.* U.S., Human Kinetics.

Mohammad, A. (2013). Analysis of penalty corner of Indian team as compared to foreign counterparts in the field hockey: A biomechanical study. (Unpublished doctoral dissertation, Aligarh Muslim University) Ph.D. Thesis, Department of Physical Health and Sports Education, Aligarh Muslim University, Aligarh, India.

Nelson, N.P., & Johnson, C.R. (1970). *Measurement and statistics in physical education*. Belmont, California, Wordswoth Publishing Company.

Sadri, R.N. (1993). *Promotion of sports: A necessity*. New Delhi, Competition Success Reviews Pvt. Ltd.

Uppal, A.K. & Datta, A.K. (1988). Motor fitness components predictors of hockey performance. New Horizons of Human Movement, Seoul Olympic Scientific Congress, p. 58.

Vyas, R. (1997). Comparison of coordinative abilities of batsman and bowler in cricket. (Unpublished doctoral dissertation, LNUPE) Ph.D. Thesis, LNUPE, Gwalior, India.

Wakharkar, D.G. (2005). *Hand book of physical education*. New Delhi: India, Friends Publication.