A COMPARATIVE STUDY OF MORPHOLOGICAL AND MOTOR ABILITIES OF INDIAN ELITE MALE HOCKEY PLAYERS AT DIFFERENT POSITIONS AND LEVELS

FINAL SYNOPSIS

Submitted to the University of Mysore through the Department of Studies in Physical Education and Sports Sciences

By

MAHESH DATT RANGA

Guide

PROF. M. CHANDRA KUMAR  Ph.D.

Department of Studies in Physical Education and Sports Sciences
Sports Pavilion, University of Mysore
MYSORE

November 2005
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Field hockey is a sport with a long history that has undergone quite rapid and radical changes within the past two decades. Today hokey is essentially a team game and has developed into a fast and highly skillful one. The game includes short bursts of speed with rest pauses or slow movements in between for a period of 70 minutes with a rest of 10 minutes in between two halves of 35 minutes duration. The players have to be very alert and active during the play. It is not only the speed of movement, but also the tactics of movement that counts. The player has to perform number of zigzag movements and straight runs with high speed, in accordance with the requirements of the game. The speed of the ball requires the players to be alert, quick, agile and having well developed coordination, neuromuscular control and postural reflexes. The synthetic surface in hockey calls for speed, stamina and strength. A very high level of physical fitness is demanded of a player to exploit his individual skills to the full. The characteristics of modern hockey have been described as short duration attacks with fast crossing in the middle field, continuous free running of those players who are not in possession of the ball; constant changing of positions during attacks and very good physical fitness in speed, endurance, stamina and agility – the basis of modern hockey. Hockey is a team sport where size, shape, body composition and fitness, all play an important part in providing distinct advantage for specific playing positions particularly at the
highest levels of performance where there is a high degree of player specialization.

While hitting a ball with hockey stick or pushing forcefully, the body segments apply near-maximum force, and the amount of force that can be applied has strong influence on success. Strength contributes to agility, which is defined as the ability to change direction of the body and its parts rapidly. Agility is demonstrated in such activities as the dodging, shuttle run, zigzag run, and squat thrust. Agility is essential to good performance in field games (such as football, soccer, and hockey) and court games (such as basketball, tennis, volleyball and badminton). Field hockey requires some degree of hand strength. Weak grip may lead to failure in executing skills.

Body composition is important for optimal physical performance. Generally, a relatively low body fat is desirable to optimize physical performance in sports requiring jumping and running. A large muscle mass enhances performance in strength and power activities. Physique and muscular function in hockey differ between playing positions. Somatotype is important in differentiating between players in various positional roles.

In the field invasive games such as hockey, the skill requirements and postural stress are superimposed on the work-rate demanded by the game and its pattern of play. This is accentuated in players as they dribble the ball or move in a semi crouched posture. This position of the spinal flexion has been described as an ergonomically unsound position for fast locomotion. It may be implicated in risk of back injury.

The task of the players at all positions viz, goalkeepers, fullbacks, halfbacks and forwards is well defined and they have to display proficiency of fundamental skills and physical fitness.
Hockey is our national game. In the past India has ruled the world of hockey till 1964 Tokyo Olympic Games where India defeated Pakistan by 1-0 to clinch a first place. However, with the advent of synthetic surface and change of rules we have unfortunately not tasted a major victory in recent major international competitions barring 1980 Moscow Olympics (marred by widespread boycotting of the games) and 1998 Bangkok Asian Games. The Indian Hockey Federation (IHF) has now started taking active interest towards building of good teams at junior and senior levels. Over the years, different researchers in India and abroad have contributed in their own way. However, much more needs to be done at junior level along with their senior counterparts. Junior Indian players have been consistently doing well internationally. We have to find out why the same juniors are not able to display equally convincing hockey at senior level when they reach that stage. Technically speaking, at that time, the promoted juniors are supposed to possess better qualities than the junior players because they have spent more number of years in training and their training age is more.

Taking into consideration all the above points, the research scholar has taken the comparative study on morphological characteristics and motor abilities of Indian elite male hockey players at different positions and levels.
SUMMARY

The purpose of the present study was to compare the morphological and motor abilities of Indian elite male hockey players at different positions and levels. A total of 222 male national level hockey players were selected as subjects. Out of 222 players, 106 were seniors and 116 were junior players. Senior players comprised of 21 goalkeepers, 23 fullbacks, 31 halfbacks and 31 forwards. The junior players comprised of 23 goalkeepers, 21 fullbacks, 36 halfbacks and 36 forwards. The subjects were selected from the national level coaching camps conducted at different centres of Sports Authority of India viz., Bangalore, Patiala and Hyderabad for international competitions. The variables selected for comparing the morphological and motor abilities of senior and junior hockey players were height, weight, percent body fat, lean body mass, somatotype, back strength, grip strength (right), grip strength (left), explosive strength, agility and speed. The morphological characteristics were assessed by height, weight, percent body fat as described by Siri and Durnin and Rehaman, lean body mass as described by Fairbanks and somatotype ratings as described by Heath and Carter. The motor abilities were assessed by back strength dynamometer as described by Bosco and Gustafson, grip strength dynamometer as described by Waldo, Mathiowetz et. al. and Bosco and Gustafson, explosive strength assessed by vertical jump as described by Mathews, agility assessed by 6 x 10 meter shuttle run as described by Eckert and speed measured by 30 meter run (standing start) as described by Mallett.
STATISTICAL ANALYSIS

1. One Way Analysis of Variance (ANOVA) had been used to test the significant differences between averages of different positions (goal keepers, full backs, half backs and forwards) and levels of players. When the differences were found to be significant, Scheffe’s Post Hoc test was applied to find out the significant differences between the group means.

2. Student’s t – test has been applied to test the hypothesis concerning the difference between two means for different levels of players (seniors and juniors). The F-ratios and t-values obtained were tested for significance at 0.05 level.

   All the statistical procedures were performed by applying the standard formulae on the computer software SPSS (version 10.01) which is Microsoft compatible.

   The findings of the study revealed significant differences in the morphological and motor abilities of the players of different positions belonging to senior and junior category.

   The morphological assessment of the players revealed that in all the players positions in senior category, all the players were found equal in height whereas in junior category, fullbacks were found taller and forwards were found shortest. In senior and junior category, goalkeepers, fullbacks and halfbacks were found equal in
height and the senior forwards were found taller than the junior forwards. Senior goalkeepers were found heaviest and halfbacks were found lightest. Where as the juniors in all the positions were found equal in weight. Senior goalkeepers were found to have highest percentage of body fat followed by senior halfbacks. Similarly, junior goalkeepers had higher percentage of body fat than the junior halfbacks. No difference in percentage of body fat was found between the senior and junior players of different positions. In the case of lean body mass, both seniors and juniors irrespective of their positions were found equal. However, the forwards of senior and junior levels were found significantly different in lean body mass where the seniors were found better in lean body mass. The goalkeepers, fullbacks, halfbacks and forwards of senior category were found to have the somatotype ratings of endomorph mesomorph, balanced somatotype, balanced ectomorph and mesomorph ectomorph respectively. The goalkeepers, fullbacks, halfbacks and forwards of junior category were found to have the somatotype ratings of balanced somatotype, balanced ectomorph, balanced ectomorph and balanced ectomorph respectively. Endomorphic and ectomorphic components of senior and junior players in all the positions were equal where as in mesomorphic component in all the positions, seniors were found superior.

The results pertaining to the motor abilities showed that in back strength, both senior and junior players in all the positions were found equal and between seniors and juniors, the seniors possessed higher back strength than the juniors in all the positions. In grip strength of right and left hands, senior players in all the positions were found equal where as in junior section, goalkeepers had the highest
grip strength. Between seniors and juniors, seniors were found superior in grip strength in different positions. In agility, forwards were found superior both in senior and junior categories. Where as between seniors and juniors, all the players were found equal in all the positions. The explosive strength of senior and junior players of different categories didn’t exhibit any significant difference and the same trend was observed between seniors and juniors in different positions. As far as the senior players’ speed was concerned, the forwards superseded the other positional players. Where as in juniors, all the players irrespective of their position were found equal. The speed abilities between seniors and juniors have shown that the seniors were superior in speed compared to juniors of different positions.

CONCLUSIONS

Within the limitations of the present study, and on the basis of the findings, the following conclusions may be drawn:

1. All the senior players irrespective of their playing positions were equal in height. The fullbacks of junior hockey level were found taller than the players of other playing position of the junior category. However, senior forwards were found taller than junior forwards. At other playing positions, all the senior and junior players were found equal in height.

2. Senior goalkeepers were heavier than players of other playing positions of the senior category. Where as all the junior players irrespective of their position
were found equal in weight. Between senior and junior category, the halfbacks and forwards of the senior level were found to be significantly heavier than the halfbacks and forwards of the junior level.

3. The percentage of body fat of senior and junior level goalkeepers was more than the players of other positions in both the categories. However, the percentage body fat between seniors and juniors irrespective of their playing position was found equal.

4. The lean body mass of senior and junior players irrespective of their positions and between the senior and junior players was found equal but in case of forwards, senior players had better lean body mass.

5. The senior goalkeepers were found to be more endomorphic than halfbacks and forwards of the senior category. Similarly, the endomorphic rating of the junior goalkeepers was significantly higher than the junior halfbacks. Between the senior and junior players in all the positions, the endomorphic component was found equal.

6. Among the senior players, goalkeepers had the highest mesomorphic component and halfbacks had the lowest. Among the junior players, irrespective of positions, all of them had equal mesomorphic component. Between the senior and junior players in all the positions, seniors had better mesomorphic component compared to juniors.
7. Among the senior players, halfbacks were found more ectomorphic compared to other positions. Among the juniors, all the players in ectomorphic component of somatotyping were found equal. Between senior and junior players in all the positions, there was no significant difference in ectomorphic component of somatotype.

8. Among the senior and junior categories, all the players irrespective of their positions were found to be equal in back strength. The fullbacks, halfbacks and forwards of the senior category players were found to have more back strength than their junior counterparts.

9. In all the players’ position in senior category, all the players were found equal in right grip strength. Where as in junior category, goalkeepers had the highest right grip strength and the forwards had the least right grip strength. Between senior and junior players, the senior halfbacks and forwards were found to possess more right grip strength than their junior counterparts.

10. In all the players’ position in senior category, all the players were found equal in left grip strength. Where as in junior category, goalkeepers had the highest left grip strength and the halfbacks had the least left grip strength. Between senior and junior players, the senior fullbacks, halfbacks and forwards were found to possess more left grip strength than their junior counter parts. The left grip strength of both the categories of goalkeepers was found equal.
11. The agility of senior and junior forwards was more than other players in both the categories irrespective of their positions. However, the agility between seniors and juniors irrespective of their playing position was found equal.

12. Among the senior and junior categories, all the players irrespective of their positions were found to be equal in explosive strength. Between senior and junior players also, irrespective of their playing position, the explosive strength was found equal.

13. Among the senior and junior level players, all the junior players irrespective of their position were found equal in speed. However, senior forwards had highest speed and the least speed was exhibited by senior goalkeepers. Between senior and junior categories, the goal keepers of both the levels were found equal in speed. However, the fullbacks, halfbacks and forwards of senior hockey level were significantly higher in speed than their junior counterparts.

**RECOMMENDATIONS**

In the light of the findings and the conclusions drawn, the following recommendations are made:

1. Tall players for the fullback position may prove to be better for the team as they have a mechanical advantage of controlling, clearing, hitting or scooping the
ball, all of which require more reach and amplitude. Therefore, tall players for the fullback position may be selected.

2. The players selected for halfback position may be lighter than any other positional player because at times they have got to do almost 75 yards of running in attack as well as in defense.

3. The mesomorphic component of all the senior as well as junior players irrespective of their playing position needs to be improved as their foreign counterparts have a very high rating of mesomorphic component.

4. The percentage body fat of all the senior as well as junior players irrespective of their playing position needs to be decreased.

5. The forwards and halfbacks of both levels of players need to have more back strength as these are the positions where the players need to cover large distances very fast. Dribbling while running requires the players to flex their trunks and therefore the back has to be strong. When the players qualify from junior to senior category, they need to improve their back strength and this aspect may be given due consideration and training programmes also may be chalked out accordingly.

6. The coaches and trainers may give more emphasis upon improving the grip strength of goalkeepers during their preparation.

7. The coaches and trainers may give more emphasis upon improving the agility of forwards and goalkeepers during their preparation.
8. Explosive strength of all the players need to be developed as the present day hockey game is faster an explosive in nature.

9. Because speed at the elite hockey level has its due importance, therefore, with the transformation of junior players irrespective of their playing position to the senior category, speed may be developed to a considerable extent as per the demand of the game. The goalkeepers of senior level hockey players also need to improve their speed.

10. A similar study may be conducted, employing female subjects.

11. A similar study may be performed by employing more motor ability variables which are not examined in this study.

12. A similar study may be conducted by including sub – junior hockey players.

13. During the preparation of hockey team, more emphasis may be given for the fitness development and the fitness components such as speed, explosive strength and agility should be developed optimally to cater to the demand of modern hockey.

(Prof. M. Chandra Kumar)  
(Guide)