Chapter V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The purpose of the study was to investigate the relationship of physical, physiological and psychological variables to performance in hockey and to find out the combined contribution of physical/physiological variables to hockey playing ability besides developing a multiple regression equation for the prediction of hockey performance. The subordinate purpose was to assess the relationship of each of the physical/physiological variable to hockey playing ability when the effect of one or both of the remaining physical/physiological variables was eliminated.

The subjects were seventy four male hockey players, studying in different Indian Universities, who had reported at Lakhsmibai National College of Physical Education, Gwalior, for participation in the selection trials for the Combined Universities Hockey Team (Men Senior) in November, 1983. The dependent variable was hockey playing ability and independent variables were physical, physiological and psychological variables.
Hockey playing ability was determined by taking the average of subjective grading by three experts who based their judgement on the Strait Field Hockey Rating Scale. Physical variables included speed, grip strength, power, agility, dynamic balance, flexibility and kinesthetic perception which were measured by test items i.e. 50 yard run, dynamometer, standing broad jump, dodging run, Johnson Modification of Bass Test, forward bend of trunk, upward backward movement of arms and a test of horizontal distance respectively. Physiological variables included cardio-respiratory endurance, resting pulse rate, reaction time, movement time, response time, and body composition which were measured by Cooper's 12 Minute Run/Walk Test, heart beats per minute, Nelson's Hand and Arm Reaction Test, Nelson's Speed of Movement Test, Four Way Alternate Response Test and Skinfold calipers, respectively. Psychological variables included anxiety and intelligence which were measured by the IPAT Anxiety Scale and Culture Fair Test respectively. The tests were administered in the Research Laboratory, Track and Hockey Field of Lakshmibai National College of Physical Education, Gwalior, for collection of data, Tester competency, subject reliability and reliability of
tests were established by test re-test method and the reliability co-efficients were found to be satisfactorily high.

The data were analyzed using the Pearson Product Moment (r) for assessing the relationships of the hockey playing ability to each of the physical, physiological and psychological variables; Multiple Correlation for assessing the combined contribution of physical/physiological variables to playing ability; Regression equation for predicting the hockey playing ability from physical and physiological variables, and partial correlation for eliminating the effect of one or the others of the physical/physiological variables. Level of significance for testing the null hypothesis was set at .05.

Analysis of data revealed significant relationship of hockey playing ability to each of the following physical, physiological and psychological variables: speed (r = -0.29), right grip strength (r = 0.29), left grip strength (r = 0.47), agility (r = -0.30), balance (r = 0.27), and kinesthetic perception (r = -0.29). Cardio-respiratory endurance (r = 0.30), resting pulse rate (r = -0.48), hand reaction time (r = -0.49),
speed of movement \((r = -0.58)\), response time \((r = -0.38)\), and body composition \((r = -0.23)\); and anxiety \((r = -0.46)\). The relationships between standing broad jump, trunk flexibility, shoulder flexibility and intelligence to hockey playing ability were not found to be statistically significant at .05 level of confidence.

Multiple correlation was computed to determine those physical/physiological variables which contributed most to the hockey playing ability. The results of the study indicated the following findings: left grip strength (3), balance (5) and speed (1) contribute most to hockey playing ability \((C) = R_{C.351} = .5631\) among physical variables; speed of movement (s), hand reaction time (R) and response time (T) contribute most to hockey playing ability \((C) = R_{C.SRT} = .728\) among physiological variables.

Multiple regression analysis resulted in the following equations for physical (A) and physiological (B) variables:

\[ A = X_c = 0.552 X_3 - 0.2345 X_5 - 0.3983 X_1 - 63.18; \]
\[ B = X_c = -0.1184 X_8 - 13.13 X_R - 0.0921 X_T - 41.44. \]
Partial correlation (first and second order) revealed a significant relationship at .05 level between left grip strength and hockey playing ability, agility and hockey playing ability and speed and hockey playing ability when the effect of either or both was partialled out among physical variables. Physiological variables also revealed a significant relationship at .05 level between speed of movement and hockey playing ability, hand reaction time and hockey playing ability and response time and hockey playing ability when the effect of either or both was partialled out.

Conclusions

Within the limitations of this study the following conclusions appeared justified as per the results obtained:

1. The physical variables namely, speed, grip strength, agility, balance and kinesthetic perception are significantly related to hockey playing ability.

2. Amongst physiological variables cardiorespiratory endurance, resting pulse rate, hand reaction time, speed of movement, response time and body composition are significantly related to hockey playing
ability.

3. Among the psychological variables, anxiety is significantly related to hockey playing ability.

4. Standing broad jump, flexibility (trunk and shoulder) and intelligence are not found to be significantly related to hockey playing ability.

5. Left grip strength, balance and speed contribute the most to hockey playing ability amongst physical variables.

6. Among physiological variables, speed of movement, hand reaction time and response time contribute most towards hockey playing ability.

7. It is possible to predict hockey playing ability on the basis of physical/physiological variables.

8. The relationship of left grip strength to hockey playing ability, balance to hockey playing ability and speed to hockey playing ability remain unchanged when balance and/speed; left grip strength and/speed; and left grip strength and/balance respectively are partialled out.
9. The relationship of speed of movement to hockey playing ability, hand reaction time to hockey playing ability and response time to hockey playing ability remain unchanged when hand reaction time and/ response time; speed of movement and/response time; and speed of movement and/hand reaction time respectively are partialled out.

Recommendations

In the light of the results of this study, it is recommended that:

1. The results of this study can be used by the physical education teachers and coaches as an aid in screening and selecting hockey players.

2. In the training programmes for hockey players emphasis must be laid on improvement of grip strength, balance, speed, speed of movement, hand reaction time and response time besides anxiety.

3. It is recommended that the same study may be repeated by selecting subjects belonging to different age groups and levels of achievement other than those employed in the present study.
4. It is recommended that a similar study may be conducted with women hockey players as subjects.

5. It is recommended that more intensive research work may be undertaken in other sports where the criterion used for measuring success is the game performance.

6. It is recommended that a longitudinal study may be conducted to see if high scores on physical, physiological and psychological variables by a player will predict his hockey playing ability as a national player.

7. A similar study should be conducted utilizing the functional variables in addition to the variables chosen in this study.

8. A similar study may be carried out on hockey players playing at different positions.