Chapter-5
Summary, Conclusion and
Recommendations

The previous chapter described in detail the findings of this study after an analysis of the data gathered. This chapter presents the summary of the findings of this research, the conclusions derived from these findings and the researchers’ recommendations for future researches of similar concern.

The chapter is organized in sections covering:

i. Summary

ii. Conclusions of the study

iii. Recommendations of the study
SUMMARY

Performance factors are numerous, such as physiological, physical, psychological, sociological and so on. However, the physical factors are considered to be dominant of all. Physical factors include motor fitness as well as body characteristics including body proportions. Matching of individuals to the sports and sports to the individuals is most important to achieve excellence in any of athletic activities. Physical and physiological requirements of athletes are different from sport to sport. For example longer height is the requirement in volleyball, basketball and handball whereas short height is most suited for gymnastics. Similarly strength is the requirement of wrestles and footballers both, but predominantly in the arms of wrestler and legs of footballers. The cardiovascular endurance is the requirement of long distance runner as well as swimmer, but the heat dissipation of the swimmer on the water. In certain sport, explosive strength is required whereas in other like weight, gross strength is needed. Keeping in view the different physical requirements of sports the present research scholar has attempted to identify the physical fitness and skill requirements, in term of anthropometric motor fitness and motor skill variables to determine the performance of handball players. To achieve the objectives of the study the following procedures were adopted:

Sample

For the purpose of the present study, One Hundred Two (N=102), Female University Level Handball Players between the age group of 18-25 years (Mean ± SD: age 23.15±1.98 years, height 176.35±5.17cm, body mass 67.87±7.15kg) were selected. A purposive sampling technique was used to select the subject for the study. The players in the teams who participated in the Inter-University handball women championship of Punjab University Chandigarh, Punjabi university Patiala, Guru Nanak Dev University Amritsar, Kurkshetra University Kurkshetra, M.D University Rohtak, Delhi University Delhi, Himachal Pardesh University Shimla and P.A.U University Ludhiana were considered. These universities had participated in the Inter-University tournament from 18-09-2010 to 22-09-2010 held at Noida College of Physical Education Dhoon Manikpur Dadri Ghaziabad Chadhury Charan Singh Meerut. There were one hundred twenty eight players in eight teams. In additions to these players’ other players from other teams selected for Indian University coaching camp at G.N.D. University, Amritsar camps were also
considered as subjects. Because of injuries to certain players during Inter-College competitions as well as medical problems and other players who could not appear in the test for data collection purpose were dropped. Under the circumstances total 102 players were considered fit to act as subjects for collection of data. The subjects were purposively assigned into following groups:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Subjects</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Punjabi University, Patiala</td>
<td>14</td>
</tr>
<tr>
<td>2.</td>
<td>Panjab University, Chandigarh</td>
<td>14</td>
</tr>
<tr>
<td>3.</td>
<td>Guru Nanak Dev University, Amritsar</td>
<td>16</td>
</tr>
<tr>
<td>4.</td>
<td>Kurkshetra University, Kurkshetra</td>
<td>14</td>
</tr>
<tr>
<td>5.</td>
<td>M.D University, Rohtak</td>
<td>12</td>
</tr>
<tr>
<td>6.</td>
<td>Delhi University, Delhi</td>
<td>12</td>
</tr>
<tr>
<td>7.</td>
<td>Himachal Pardesh University, Shimla</td>
<td>10</td>
</tr>
<tr>
<td>8.</td>
<td>P.A.U University, Ludhiana</td>
<td>10</td>
</tr>
</tbody>
</table>

**SELECTION OF VARIABLES**

A feasibility analysis as to which of the variables/skills could be taken up for the investigation, keeping in view the availability of tools, adequacy to the subjects and the legitimate time that could be devoted for tests and to keep the entire study unitary and integrated was made in consultation with experts. With the above criteria’s in mind, the following Anthropometric Variables, Physical Fitness Variables and Skill Variables were selected for the present study:

- **ANTHROPOMETRIC VARIABLES**
  - i. Age
  - ii. Height
  - iii. Weight
  - iv. Shoulder width
  - v. Biacromion width
  - vi. Arm length
  - vii. Upper arm length
  - viii. Fore-arm length
  - ix. Leg length
x. Calf circumference
xi. Sitting height
xii. Supra-iliac skin fold
xiii. Thigh skin fold
xiv. Sub scapular skin fold
xv. Calf skin fold
xvi. Bicep skin fold
xvii. Tricep skin fold

• PHYSICAL FITNESS VARIABLES
  i. Speed
  ii. Agility
  iii. Power of arms
  iv. Power of legs
  v. Cardio vascular endurance
  vi. Grip strength

• SKILL VARIABLES
  i. Dribbling
  ii. Passing
  iii. Handball throw for distance
  iv. Throwing ability:
      a. Dominant hand
      b. Non-dominant hand
  v. Throwing accuracy
  vi. Defensive movements

• DEPENDENT VARIABLES
  Overall playing ability performance was worked out by applying three judges rating scale.

SELECTION OF MOTOR SKILL VARIABLES
  Out of six motor skill variables the expert considered only three handball motor skill tests on handball players. These tests are:
  1. Handball throw for distance: Handball throw
  2. Throwing accuracy: Service placement test
  3. Throwing ability: Wall-volley test
  The remaining three tests listed below were picked up from the game of basketball to measure the motor skills of handball players.
  1. Dribbling: - AAHPERD control dribble test item.
2. Passing: - AAHPERD passing test item.

Since the movements of handball and basketball players are identical in these motor skills, therefore the standardized tests to measure these motor skills in basketball game could be easily adopted to measure the motor skill of handball players. The recommended procedure adopted to measure the motor skills of dribbling, passing and defense of handball players which is used for basketball players.

These tests were applied on 12 basketball and 12 handball players. The relationship between two sets of scores was obtained.

The collected data was subjected to the application of stepwise regression in order to identity meaningful anthropometric variables, motor fitness variables and motor skill variables affecting playing ability of handball players.

**CONCLUSIONS OF THE STUDY**

On the basis of results of stepwise regression analysis, the following conclusions were drawn:

**Results related to anthropometric variables:**

The anthropometric variables namely age, height biacromion width arm length, upper arm length, leg length, calf circumference, sitting height, supra-iliac skin fold were found to be positively significant in relation to the performance of handball players. However following anthropometric variables considered meaningful to draw-out final equation:

1. Height (2)
2. Calf circumference (10)
3. Supra-iliac skin fold (12)
4. Thigh skin fold (13)
5. Bicep skin fold (16)
6. Tricep skin fold (17)

The final equation came to be as under:

\[ Y = -4.24 + 0.038x_2 + 100x_{10} + 0.048x_{12} - 0.96x_{13} - 0.313x_{16} - 0.220x_{17} \]

**Result related to motor fitness variables**

The motor fitness variables namely speed, agility, power of arm, power of legs, endurance and left handgrip strength were found to be significantly related to the performance of handball players. However following motor fitness variables were considered meaningful to draw-out final equation.
Summary, Conclusions and Recommendations

1. 50 meter sprint (18)
2. Shuttle run (20)
3. Sargent jump (25)
4. 12 minute run/walk (26)
5. Handball throw (31)

The final equation came to be as under:
\[ Y = 1.79 - 0.119x_{18} - 0.333x_{20} + 0.053x_{25} + 0.033x_{26} + 0.001x_{31} \]

**Result related to motor skill variables**

Dribbling, passing handball throw, dominant hand throwing ability, non-dominant hand throwing ability, throwing accuracy and defensive movement motor skill variables were found to be significantly related to the performance of handball players. However following motor skill variables were considered meaningful to draw out final equation:

1. Passing (30)
2. Handball throw (31)
3. Dominant hand throwing ability (32)
4. Throwing accuracy (34)
5. Defensive movements (35)

The final equation came to be as under:
\[ Y = -0.310 + 0.042x_{30} + 0.50x_{31} + 0.054x_{32} + 0.016x_{34} - 0.169x_{35} \]

**Results related to combined anthropometric, motor fitness and motor skill variables:**

The following anthropometric motor fitness and motor skill variables were considered meaningful to draw out final equation:

1. 30 meter sprint (19)
2. Shuttle run (20)
3. Sargent jump (25)
4. 12 minute run/walk (26)
5. Handball throw (22)
6. Defensive movements (35)

The final equation came to be as under:
\[ Y = 2.59 - 1.24x_{19} - 0.387x_{20} + 0.051x_{25} + 0.001x_{26} + 0.040x_{22} - 0.85x_{35} \]
RECOMMENDATIONS OF THE STUDY

1. Coaches and trainers and advised to use the anthropometric, motor fitness and motor skill equation mentioned in the results to select the players for Interuniversity teams.

2. On the basis of results, coaches and trainers may develop their program laying more emphasis on the related motor fitness and motor skill variables proved to be important for the performance.

3. The similar studies may also be conducted on male handball players.

4. Similar studies may also be conducted for other sports.