Chapter III

METHODOLOGY

The present study aims to investigate the relationship of socio-economic status with physical fitness, health status, sports performance, and proneness to disorders among the sportsperson of University of Mysore. In this chapter the methods adopted to estimate the socio-economic status, health status, sports performance and proneness to disorders, besides the procedure followed to find the status of physical fitness of the subjects are explained. The subjects were selected as explained here under.

Subjects

The Men Sports persons who had participated in selection trials held to choose the candidates to represent University of Mysore in the Inter-University competitions in various sports and games during the year 2003-04 were chosen as the subjects of the present study. University of Mysore has a unique practice of administering physical fitness test to the university sportspersons who were desirous of representing the university in the inter-university competitions in men section each year. There will be 5 tests for each of the candidate, where maximum of 5 points will be awarded for each test, totaling a maximum of 25 points. A student has to participate in all the 5 tests, and secure a minimum of one point per test and students who secures a minimum of 15 points cumulated by all the tests will be selected for the next round. These sports persons were allowed to take part in the final game selection trials. The items of the test were different for different games. The fitness test preceded the game trials. The researcher selected all the men student sports persons who were scored 15 and above points, who were eligible for the final selection of the sample.
Table 1
The following table shows the break-up of student sportspersons who were included as subjects in the present research

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Game</th>
<th>No. of Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>Athletics</td>
<td>15</td>
</tr>
<tr>
<td>02</td>
<td>Kho-Kho</td>
<td>29</td>
</tr>
<tr>
<td>03</td>
<td>Hand ball</td>
<td>27</td>
</tr>
<tr>
<td>04</td>
<td>Football</td>
<td>30</td>
</tr>
<tr>
<td>05</td>
<td>Ball Badminton</td>
<td>31</td>
</tr>
<tr>
<td>06</td>
<td>Cricket</td>
<td>24</td>
</tr>
<tr>
<td>07</td>
<td>Shuttle Badminton</td>
<td>20</td>
</tr>
<tr>
<td>08</td>
<td>Table Tennis</td>
<td>21</td>
</tr>
<tr>
<td>09</td>
<td>Volleyball</td>
<td>25</td>
</tr>
<tr>
<td>10</td>
<td>Tennis</td>
<td>08</td>
</tr>
<tr>
<td>11</td>
<td>Hockey</td>
<td>23</td>
</tr>
<tr>
<td>12</td>
<td>Basket ball</td>
<td>28</td>
</tr>
<tr>
<td>13</td>
<td>Kabaddi</td>
<td>30</td>
</tr>
</tbody>
</table>

A total of three hundred and eleven subjects were included in the research and tests were administered to all the subjects.

Classification of sports

The sample selected had a wide representation from various sports and games, there was a necessity to classify these sports/events to lesser number of categories to arrive at meaningful conclusions. This process was done on the basis of similarities in the movements, nature of equipment used, and major body organ involved. To do this, appropriate books were referred, several times web contents were browsed, discussions held with referees, coaches and teachers involved in those particular games. Finally with consensus of majority and for convenience, following major classification was evolved. The classification is as follows.
Classification of individual events/games into categories

<table>
<thead>
<tr>
<th>Groups</th>
<th>Individual events/games involved</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ball games</td>
<td>Handball, Football, Volleyball, &amp; Basket ball</td>
<td>110</td>
</tr>
<tr>
<td>Racket games</td>
<td>Ball badminton, Shuttle Badminton, Lawn tennis &amp; Table tennis</td>
<td>80</td>
</tr>
<tr>
<td>Human powered games/Events</td>
<td>Athletics, Kho-Kho, &amp; Kabaddi</td>
<td>74</td>
</tr>
<tr>
<td>Bat &amp; Ball/ Stick &amp; Ball</td>
<td>Cricket &amp; Hockey</td>
<td>47</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>311</td>
</tr>
</tbody>
</table>

Estimation of Socio-Economic Status

Socio economic status of the subjects of the present study was estimated with the help of socio-economic status scale devised by Bharadwaj (2001). The scale encompassed seven areas namely (i) Social, (ii) Family (iii) Education (iv) Profession (where fourteen profession were listed) (v) Caste (meant for ascribed status) (vi) Total assets and (vii) Monthly income. For each of the above factors there were several questions and statements in the scale for the purpose of eliciting responses. The scale purported to be used to measure the status of father, mother or self-contained compatible number of squares to record the responses in different columns.

The reliability of the test has been calculated by test re-test method. The correlation between two scores was calculated by Spearman-Brown formula. The reliability coefficients for various areas are as follows:
<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Area</th>
<th>Coefficient of correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Family</td>
<td>.76</td>
</tr>
<tr>
<td>2</td>
<td>Social</td>
<td>.68</td>
</tr>
<tr>
<td>3</td>
<td>Education</td>
<td>.86</td>
</tr>
<tr>
<td>4</td>
<td>Profession</td>
<td>.70</td>
</tr>
<tr>
<td>5</td>
<td>Caste</td>
<td>.94</td>
</tr>
<tr>
<td>6</td>
<td>Total assets</td>
<td>.69</td>
</tr>
<tr>
<td>7</td>
<td>Monthly income</td>
<td>.74</td>
</tr>
<tr>
<td>8</td>
<td>Scale (as a whole)</td>
<td>.76</td>
</tr>
</tbody>
</table>

The content validity of the scale, since areas and then item are solely based on research proven items is high and promising.

The consumable booklets of socio-economic status scale were administered to the subjects after giving them necessary guidance and instructions to answer the items. The filled in consumable booklet of socio-economic status scale were collected back and with the help of the original scoring stencil for socio-economic status scale scoring were done.¹

**Measurement of Physical Fitness**

Physical fitness of the subjects of the present study was measured with the help of a test battery which encompassed four basic components of physical fitness namely (i) Muscular strength (ii) Muscular Endurance (iii) Cardio-vascular endurance and (iv) Flexibility.

To measure muscular strength of the body, the researcher administered two tests, such as (a) Bench Squat test and (b) Standing vertical arm press test. To measure muscular endurance the researcher administered Burpee Test. To measure cardio-vascular endurance the researcher administered 12 minute Run and Walk test, to measure flexibility the researcher administered Scott and French Bobbing Test. The details of the tests and the method of administering them were as follows.

¹ ‘Socio-Economic Status Scale’ by R.L. Bharadwaj, Department of Psychology, D.S. College, Aligarh, National Psychological Corporation, 4/230, Kacheri Ghat, Agra, 282004 (India).
a. Bench Squat Test

Objective: To measure the strength of the legs and back.

Equipment and Procedure: A bench, a barbell, weight plates of weight ranging from two and one half kilogram to 25 kilogram and a thick towel to pad the bar.

After adjusting the amount of weight on the bar as desired by the subject two assistants placed the bar on the nape of the subject as he stood close to the bench in such a way that his back was towards the smaller side of bench. The feet were comfortably apart and the palms gripped the bar firmly. Then the subject lowered the hips to touch the bench and then without rocking back and forth he returned to standing position. If the subject succeeded in executing the said act, additional weight plates were loaded to the bar and the process was repeated. If the load was felt heavy, lighter plates were used. Maximum weight negotiated was considered as the score of the subject. Not more than five attempts were made by the subject in the same session. The weight negotiated was recorded in complete kilograms.

For safety, two assistants one at each end of the barbell stood and were ready to catch the barbell in the event of the performer over leaning forward or started to fall back.²

b. Standing vertical arm press test

Objective: To measure strength of arm extension in a vertical overhead press movement.

Equipment, materials and procedure: A standard weight bar 6 feet in length and enough weight plates weight ranging from two and one half kilogram to 15 kilograms.

After adjusting the desired amount of weight on the bar the subject assumed a standing position (feet a comfortable distance apart for balance), and two assistants placed the bar in the performers hands at the front chest position. With a forward grasp (palms facing away) the performer extended the arms upward pressing the bar to a “locked out” (elbows straight) position. The weight was held steady for a count of three to show control, after which it was lowered to the floor. The subject attempted additional loads each time following the afore said rules. Not more than five trails were given in a single session. The maximum weight pressed was recorded in whole Kgs. The weight negotiated was recorded in complete Kilograms.

For safety two assistants remained ready to catch the barbell at any time during the trial.

Additional pointer: The performers were asked to avoid flexing at the knees and hips during the press.3

3 Ibid. p.102.
c. Burpee (Squat Thrust) Test

Objective: To measure the general muscular endurance of the body.

Equipment, materials and procedure: Mat on the floor. The subject was asked to stand at the middle of the mat wearing shorts and banian. On the signal to start, the subject bent the knees and waist and placed the palms on the floor in front of the feet, then thrust both legs backward to assume a front leaning rest position, followed it with a spring on palms to assume squat position and then completed the cycle by returning to standing position. The process was repeated sequentially and continuously till exhaustion occurred. Each correct cycle was counted as one. If the subject paused in between, the counting was terminated. Incorrect repetitions were not counted. Total number of correct burpees executed were credited to the subject.4

d. Twelve Minute Run-Walk Test

Objective: To measure cardiovascular fitness.

Facilities, Equipment and procedure: A 400 mts. cinder track was used to administer this test. In order to recognize the distance covered by the subject, flags mounted on mat of five feet high were fixed at regular intervals of one hundred meters by the side of the curb. A whistle was used to start and to indicate the expiry of twelve minutes. A stop watch was used to keep the time.

Each subject was assigned a spotter who maintained a record of number of laps each subject covered and his position when the expiry of time was signaled. The subjects commenced running from starting line on receiving the signal and run and/or walked the course for twelve minutes, and stopped on hearing the second signal.

Scoring: The aggregate score in meters was determined by multiplying the number of complete laps the subjects ran and 400 meters plus the number of segments covered multiplied by 100, plus the number of meters stepped off between a particular segment.5

4 Ibid. p.133
5 Ibid. p.143
e. Scott and French Bobbing Test

Objective: To measure the flexibility of back and hamstring muscle while bending forward.

Equipment, materials and procedure: A bench and a 20 inch long scale. The scale was graduated in inches from center to the either side. The scale was fixed to the bench such that the middle of the scale coincided with the top surface of the bench, with half the length of the scale was above the top level of the bench and other half lied beneath the bench.

The subject in bare feet stood on the bench toes even with the front edge of the bench and touching the edge of the scale. On the signal to start the subject had to bent forward, keeping palms open, fingers extended on the scale. The subject then bent downward bobbing three or four times extending the fingers on the scale downward. The researcher observed the finger tips and the maximum reach was noted and recorded in complete inch. If the subject failed to reach the level of the bench the reading on the scale was noted with a negative sign preceding it. If the finger tips reached lower portion of the bench, the reading on the scale was observed and recorded with a positive sign preceding it.

Finally a combined score was calculated and each subject was assigned an index of fitness on 100 unit scale. The performance of each subject was checked against maximum performance in that particular subtest and percent performance/capacity of the subject was calculated. Following the same procedure for all the subtests percentages were calculated and these percentages were again reduced to 100 units scale.⁶

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General Health Status (Dimensions of Symptomatology)

General Health status of subjects of the present study was measured by administering “General health questionnaire – 28 (GHQ – 28) scale” selected from a users guide to the general health questionnaire (GHQ) devised by David Goldberg and Paul Williams.

The General health questionnaire (GHQ) was designed to be a self-administered screening test aimed at detecting psychiatric disorders among respondents. The questionnaire was designed to be easy to administer, acceptable to respondents, fairly short, and objective in the sense that it did not require the person administering it to make subjective assessment about the respondent. It aimed at detecting those forms of psychiatric disorders, which may have relevance to a patient’s presence in a medical clinic, so that its focus must be on psychological components of ill health.

This has been tested in about 38 languages, including India.

The scale encompassed four areas namely,

- Somatic symptoms
- Anxiety/Insomnia
- Social dysfunction
- Severe depression.

There were seven statements under each factor and response to each statement was scored on a four point rating scale.

The reliability of the test varied from .84 and .93 with the mean for GHQ version was .87, which is sufficiently high.

The validity of the subscales based on 200 subjects Following are the correlation coefficients between GHQ scale scores and independent clinical measures.
<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>Total scores (GHQ-28)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Somatic symptoms</td>
<td>.32</td>
<td>.28</td>
<td>.23</td>
<td>.21</td>
<td>.32</td>
</tr>
<tr>
<td>Anxiety, worry, depressed</td>
<td>.47</td>
<td>.70</td>
<td>.43</td>
<td>.51</td>
<td>.67</td>
</tr>
<tr>
<td>Despondency, depressed</td>
<td>.49</td>
<td>.71</td>
<td>.54</td>
<td>.56</td>
<td>.73</td>
</tr>
<tr>
<td>Psychiatrist’s severity</td>
<td>.55</td>
<td>.75</td>
<td>.56</td>
<td>.51</td>
<td>.76</td>
</tr>
</tbody>
</table>

A- somatic symptoms:: B-Anxiety/Insomnia:: C-Social dysfunction:: D-Severe depression.  

**Sports Performance**

To measure sports performance a suitable tool was necessary. Therefore the researcher held several rounds discussions with his guide and specialist sports coaches. The consultations led to identify thirty-nine factors under six headings as possible contributors for the better performance of sports persons. A letter of request to several sports coaches was addressed asking them to rank the thirty-five factors in the order of importance for better performance of sportspersons. They were also requested to add the contributory factors for better performance in addition to the ones listed. The researcher tabulated the factors and identified several factors. This has paved the way for listing thirty-nine factors as possible contributors for better performance of sportspersons. These thirty-nine factors were brought under six headings as noted below.

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I. **Physical Fitness**
   - Strength
   - Speed
   - Endurance
   - Co-ordination
   - Agility
   - Mobility and flexibility

II. **Psychological**
   - Love for the game
   - Motivation
   - Withstanding of stress
   - Emotional stability
   - Self confidence
   - Concentration

III. **Sportsmanship**
   - Accepting the win/defeat equally
   - Competence
   - Adherence to rules
   - Self expression
   - Inter-personal relations
   - Personal factors
   - Social factors

IV. **Attitude towards the following**
   - Game/sports
   - Training
   - Coach
   - Opponent
• Official
• Audience/Spectators
• Opposite sex

V. Technical skills
• Knowledge of Basic skills
• Knowledge of Advanced skills
• Proficiency over skills
• Ability to adopt strategies
• Adjusting himself to tempo of the game

VI. Personal/Discipline
• Habits
• Health
• Discipline towards the game
• Regularity to training
• Selfishness
• Selflessness
• Discipline toward time
• Leadership quality

The concerned sports coaches were requested to assess each subject in each factor on a scale of 0, 1, 2, 3 and 4 points. The aggregate of points from 39 factors was the sports performance of the subjects.

Proneness to Disorders

Proneness to disorders of the subjects of the present study was measured with the help of Short Interpersonal Reactions Inventory (SIRI). This scale was constructed on the premise that personality and stress are casually related to cancer, and other diseases. This tool developed by Grossarh-maticek and Eysenck (1990), consisted of seventy (70) questions.
These seventy questions were divided into six groups, which define six different disorders. Type-I was Cancer prone, Type-II was Coronary heart disease prone, Type-III was psychopathic behaviour, but was unlikely to die of cancer or coronary heart disease, Type-IV was a healthy type characterized by autonomous behaviour, Type-V was prone to depression and cancer, Type-VI was prone to addiction. The scale has adequate predictive validity and reliability (test retest correlation in excess of 0.80).

The questionnaire was administered to each subject by the researcher with suitable instructions to the candidates. The scoring was done according to the manual provided with the scale/inventory.\textsuperscript{8}

**Statistical methods applied**

Following statistical methods were applied for the data collected in the present investigation.

- Descriptive statistics
- Cross-tabs procedure
- Pearson’s product moment correlation
- Analysis of Variance-2 way

The details of the statistical methods applied, and the interpretation would follow in the next chapter.

\textsuperscript{8} Short Interpersonal Reactions Inventory (SIRI) consisted of seventy questions. This tool developed by Grossarth-maticek and Eysenck (1990)