Chapter III

PROCEDURE

In this chapter the procedure adopted for selection of subjects, selection of anthropometric and psychological characteristics, criterion measures, reliability of data, collection of data, design of the study and statistical techniques for analysing the data have been described.

Selection of Subjects

One hundred and twenty soccer players belonging to high fitness group (n = 60) and low fitness group (n= 60) were selected as subjects for the purpose of this study.

For selecting these high and low fit soccer players AAHPER Youth Fitness Test was administered to 180 soccer probables, who took part in the selection trial of the Burdwan University either in the year of 1987 or 1988 with the intention and possibility of being selected in the university soccer team.
In the year 1987 scholar was able to conduct the test only on 88, who came, out of 169 soccer probables and join the selection trials and in the year 1988 out of 172 soccer probables only 92 could be given the test. During 1988 those soccer players were not tested, who were tested in the year 1987. Thus the total number of 180 soccer probables were initially tested. AAHPER Test and anthropometric and psychological characterization of these subjects were measured. Average age of the subjects was 21.42 years ranging from 18 years to 24 years.

AAHPER Youth Fitness Test was administered to the subjects strictly in accordance with the instructions given in the test manual. Details of administering the test are given in Appendix-A.

The scores in individual items of the Test Battery for each subject were converted into Standard Deviation scores and the scores arrived

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at by such conversion were added together to get the composite score of physical fitness for each subject.

The soccer probables were tanked in the order of composite physical fitness scores - highest to lowest. The first sixty of them were taken as belonging to high fit and the bottom 60 of them were taken as belonging to the low fit soccer players.²

Selection of Anthropometric and Psychological Characteristics

The selection of anthropometric and psychological characteristics was done by using the following criteria:

1. Through review of all the available scientific literature pertaining to the anthropometric and psychological characteristics which are related and likely to contribute to better soccer performance.

2. Series of discussions were held with the experts and adviser of the scholar regarding the effectiveness of the chosen variables to the soccer performance.

3. Feasibility in terms of availability of instruments and measuring techniques and acceptability of the test items to the subjects.

Based on the above mentioned criteria the following anthropometric and psychological characteristics were selected:

**Anthropometric Characteristics**

1. Standing Height
2. Leg Length
3. Foot Length
4. Foreleg Length
5. Thigh Length
6. Calf Girth
7. Thigh Girth
8. Hip Width
9. Shoulder Width

**Psychological Characteristics**

1. Personality
2. Self-concept

**Criterion Measures**

1. Standing height was recorded to the nearest half centimeter with the help of wall scale.
2. Leg length was recorded correct to the nearest half centimeter with the help of a flexible steel tape.

3. Foot length was recorded correct to the nearest half centimeter with the help of spreading calipers.

4. Foreleg length was recorded correct to the nearest half centimeter with the help of flexible steel tape.

5. Thigh length was recorded correct to the nearest half centimeter with the help of flexible steel tape.

6. Calf girth was recorded correct to the nearest half centimeter with the help of flexible steel tape.

7. Thigh girth was recorded correct to the nearest half centimeter with the help of flexible steel tape.

8. Hip width was recorded correct to the nearest half centimeter with the help of spreading calipers.
9. Shoulder width was recorded to the nearest half centimeter with the help of spreading calipers. In case of bisegmental variables the measurements of right segments were taken.³

Psychological Characteristics

1. Scores obtained by the subjects on 16 P.F. Questionnaire test was considered as personality scores of the individual.

2. Scores obtained by the subjects on self-concept questionnaire test was considered as self-concept scores of the individual.

Reliability of the Data

The reliability of the data was ensured by establishing the tester competency, subject reliability and instrument reliability.

Tester Competency

To ensure that the investigator was well versed with the techniques of conducting the tests

³Carter, Physical Structure of Olympic Athletes, pp. 151-152.
and taking the measurements, the investigator had a number of practice sessions in testing procedures under the guidance of an expert. All the measurements and tests were conducted by the investigator with the assistance of Lecturers in Physical Education and Soccer Coaches who were also well acquainted with the tests and measurements.

Tester reliability in conducting AAHPER Youth Fitness Test and measuring anthropometric characteristics was established by test - retest process whereby consistencies of results were obtained by him and the scores obtained by an expert on randomly selected sample of 20 subjects. The coefficients are presented in Table 1 and 2.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>AAHPER Youth Fitness Test</th>
<th>Co-efficients of Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Pull-up</td>
<td>.9459</td>
</tr>
<tr>
<td>2.</td>
<td>Bent Knee Sit-up</td>
<td>.9079</td>
</tr>
<tr>
<td>3.</td>
<td>Standing Broad Jump</td>
<td>.9585</td>
</tr>
<tr>
<td>4.</td>
<td>Shuttle Run</td>
<td>.9199</td>
</tr>
<tr>
<td>5.</td>
<td>50-Yard Dash</td>
<td>.9289</td>
</tr>
<tr>
<td>6.</td>
<td>600-Yard Run/Walk</td>
<td>.9095</td>
</tr>
</tbody>
</table>

TABLE 1
CO-EFFICIENTS OF CORRELATION FOR TESTER RELIABILITY IN AAHPER YOUTH FITNESS TEST
### TABLE 2
CO-EFFICIENTS OF CORRELATION FOR TESTER RELIABILITY IN ANTHROPOMETRIC CHARACTERISTICS

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Anthropometric Characteristics</th>
<th>Co-efficients of Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Standing Height</td>
<td>.9956</td>
</tr>
<tr>
<td>2.</td>
<td>Leg Length</td>
<td>.9985</td>
</tr>
<tr>
<td>3.</td>
<td>Foot Length</td>
<td>.9959</td>
</tr>
<tr>
<td>4.</td>
<td>Foreleg Length</td>
<td>.9934</td>
</tr>
<tr>
<td>5.</td>
<td>Thigh Length</td>
<td>.9925</td>
</tr>
<tr>
<td>6.</td>
<td>Calf Girth</td>
<td>.9917</td>
</tr>
<tr>
<td>7.</td>
<td>Thigh Girth</td>
<td>.9921</td>
</tr>
<tr>
<td>8.</td>
<td>Hip Width</td>
<td>.9918</td>
</tr>
<tr>
<td>9.</td>
<td>Shoulder Width</td>
<td>.9916</td>
</tr>
</tbody>
</table>

**Subject Reliability**

AAHPER Youth Fitness Test was conducted on two consecutive days, in the case of 20 per cent of subjects, who were selected at random, so that test - retest co-efficients of correlation might be computed to establish reliability of the data. The obtained r's are given in Table 3.
TABLE 3
TEST-RETEST RELIABILITY CO-EFFICIENTS OF SUBJECTS
IN AAHPER YOUTH FITNESS TEST

<table>
<thead>
<tr>
<th>S.No.</th>
<th>AAHPER Youth Fitness Test</th>
<th>Co-efficients of Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Pull-up</td>
<td>.9535</td>
</tr>
<tr>
<td>2.</td>
<td>Bent Knee Sit-up</td>
<td>.9491</td>
</tr>
<tr>
<td>3.</td>
<td>Standing Broad Jump</td>
<td>.9696</td>
</tr>
<tr>
<td>4.</td>
<td>Shuttle Run</td>
<td>.9398</td>
</tr>
<tr>
<td>5.</td>
<td>50-yard Dash</td>
<td>.9291</td>
</tr>
<tr>
<td>6.</td>
<td>600-yard Run/Walk</td>
<td>.9099</td>
</tr>
</tbody>
</table>

Anthropometric measurements namely, standing height, leg length, foot length, foreleg length, thigh length, calf girth, thigh girth, hip width, and shoulder width were made three times at the beginning of the experiment. The co-efficients of correlation of the scores made in the first and second measurements of each of the above variables, were taken as the measures of reliability. The obtained r's are given in Table 4. All the obtained r's are almost 1, thus indicating high reliability.
TABLE 4

TEST-RETEST RELIABILITY CO-EFFICIENTS OF SUBJECTS
IN ANTHROPOMETRIC CHARACTERISTICS

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Anthropometric Characteristics</th>
<th>Co-efficients of Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Standing Height</td>
<td>.9942</td>
</tr>
<tr>
<td>2.</td>
<td>Leg Length</td>
<td>.9955</td>
</tr>
<tr>
<td>3.</td>
<td>Foot Length</td>
<td>.9959</td>
</tr>
<tr>
<td>4.</td>
<td>Foreleg Length</td>
<td>.9977</td>
</tr>
<tr>
<td>5.</td>
<td>Thigh Length</td>
<td>.9962</td>
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<tr>
<td>6.</td>
<td>Calf Girth</td>
<td>.9945</td>
</tr>
<tr>
<td>7.</td>
<td>Thigh Girth</td>
<td>.9939</td>
</tr>
<tr>
<td>8.</td>
<td>Hip Width</td>
<td>.9952</td>
</tr>
<tr>
<td>9.</td>
<td>Shoulder Width</td>
<td>.9969</td>
</tr>
</tbody>
</table>

Instrument Reliability

The steel tape used for anthropometric measurements namely standing height, leg length, foreleg length, thigh length, calf girth and thigh girth and to measure the performance of the subjects in standing broad jump was non elastic and flexible which was calibrated and approved for use by the
Research Laboratory of the Lakshmibai National College of Physical Education, Gwalior.

The anthropometric rod (spreading calipers) was used to measure anthropometric variables namely foot length, hip width and shoulder width of the subjects, which is a standard equipment, designed and manufactured in Anand Agency, Poona.

The stop watches used for measuring performance of subjects in 50 and 600 yards Runs and shuttle run were all calibrated, Swiss made and supplied by Krishna Watch Co., Bombay.

**Collection of Data**

**Anthropometric Characteristics**

The subjects were assembled in a class room. They were explained the importance of conducting this test. The scholar motivated the respondents by promising to send a separate abstract of his conclusion of study to each of them. Before taking the measurements, the expected postures in measuring anthropometric characteristics under-taken for this study that are standing height, leg length,
foot length, foreleg length, thigh length, calf girth, thigh girth, hip width and shoulder width were demonstrated and explained in details. The test was administered strictly in accordance with prescribed procedures.

**Standing Height:**

The standing height was taken with the subject standing erect without shoes, against a marked scale on a wall touching the heels, buttocks and backs. The subject was instructed to keep the heels together, head level without tilt and to take and held a full breath while measurement was taken. A stiff hard board was held horizontally on his head, slightly pressing his head and touching the scale marked on the wall. The subject was asked to step out and the reading indicated by the hard board was read on the scale. Height was recorded correct to the nearest half centimeter.\(^4\)

**Leg Length:**

Leg length of the subject was measured with a flexible steel tape from the bottom outside edge of the

\(^4\)Ibid., p. 151.
centre of the foot to the upper edge of the greater trochanter. It was recorded to the nearest half centimeter.⁵

Foot Length:

With the subject standing, the distance between the most posterior point of the heel and the tip of the longest toe was measured with the spreading calipers. The inside edge of the fixed arm of the calipers was kept resting on the most posterior point of the heel and the moving arm of calipers was brought inward until inside edge of the moving arm rest on the tip of longest toe. The foot length was recorded correct to the nearest half centimeter.⁶

Foreleg Length:

Foreleg length of the subject was measured with the help of flexible steel tape vertically from the bottom outside edge of the centre of the


⁶Carter, Physical Structure of Olympic Athletes, p. 152.
foot to the most protuberant part of the petalla bulge (coinciding with the centre at the knee bend at the back). Foreleg length was recorded correct to the nearest half centimeter.  

_Thigh Length:_

Thigh length of the subject was measured with a flexible steel tape vertically from the most protuberant part of the petalla bulge to the upper edge of the greater trochantor. Thigh length was recorded correct to the nearest half centimeter.  

_Calf Girth:_

Calf girth was taken with the flexible steel tape at the maximum circumference of the calf in a plane at right angle to its long axis. The leg was held dangling over a table top, so the tape

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8Ibid.

measure was in a horizontal plane. In this position the calf muscle is quite relaxed. Calf girth was recorded correct to the nearest half centimeter.\textsuperscript{10} Thigh Girth:

Thigh girth was measured with a flexible steel tape placed around the thigh horizontally with its top edge just under the fold of the buttocks. The subject stood with his weight equally distributed on both feet. Thigh girth was recorded correct to the nearest half centimeter.\textsuperscript{11}

Hip Width:

The subject stood with his heels together and the arms of the spreading calipers were brought into contact with the top of the hip bone (iliac crest) at the place where it sticks out most, that is, at the place which gives the greatest hip width. Hip width was recorded correct to the nearest half centimeter.\textsuperscript{12}

\textsuperscript{10} Tanner, The Physique of the Olympic Athlete, p. 26.
\textsuperscript{11} Ibid.
\textsuperscript{12} Ibid.
Shoulder Width:

The subject stood with his shoulder relaxed. The inside edge of the fixed arm of the spreading calipers was kept resting on the outside edge of the acromial process of one shoulder blade, and the moving arm of spreading calipers was brought inward until inside edge of the moving arm rested on outside edge of acromial process of the other shoulder blade. The shoulder width was recorded correct to the nearest half centimeter. 13

Psychological Characteristics

Personality:

The Cattell's 16 Personality Factors Questionnaire (Form-A) developed by Raymond, R. Cattell and Herber, W. Eber and supplied by Psychocentre New Delhi was employed to evaluate personality characteristics of the subjects. The 16 P.F. Questionnaire was selected because it is an objective test and employs simple means based upon research in Psychology. It measures the personality characteristics of an individual in an extensive manner and is economi-

13 Ibid.
cal in time. The test was administered strictly in accordance with the prescribed procedures.¹⁴

All the respondents were called into a classroom when they were not busy and had enough time to answer the questionnaire. The scholar motivated the respondents by promising to send relevant information and conclusions of study to each of them. It was assured to them that their responses would be kept confidential and would not be used for any other purpose than the present research study, and therefore they could give honest responses without any sense of fear or apprehension. After that, one questionnaire along with an answer sheet was given to each subject. Following all the instruction they answered all the 187 statements.

Scoring of the Questionnaire:

The scoring of completed answer-sheets was done according to the method described in the manual.¹⁵

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Two card board stencil scoring keys were used; one covered factors (traits) A, C, F, H, L, N, Q₁ and Q₃ and the other factors B, E, G, I, M, O, Q₂ and Q₄.

Before using the scoring stencils each answer-sheet was checked to ensure that there were no odd, unscorable responses. After checking, stencils were made to fit over the answer sheets and the scores visible through holes were counted, as indicated by numbers printed adjacent to the holes. Those scores were summed up and total scores was entered in the space indicated by the arrow on the stencil for each factor.

The raw scores were converted into "stens" with the help of norms in the test-manual.¹⁶

Methods to Plot Profiles:

For plotting the profile the readymade profile chart was used. In profile the crossed line and ordinary line were used to represent the personality factors of the high and low fit soccer players.

¹⁶Ibid.
respectively. Personality profile was latter used to interpret the personality characteristics of high and low fit soccer players.

**Self-concept.**

Self-concept Questionnaire developed by Raj Kumar Saraswat was administered to evaluate self-concept dimensions of the subject. This Questionnaire covers six dimensions (physical, social, temperamental, educational, moral and intellectual). It is an objective test which employs simple means based upon research in psychology and can be administered economically. The test was administered strictly in accordance with the prescribed procedures.\(^{17}\)

All the subjects were assembled in a classroom and were seated according to their allotted roll number. A model answer-sheet with examples of answers was shown to the subjects so that everyone could clearly see the entries in it. The subjects were explained the purpose of the test. They were assured that the scores obtained in the test would

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be kept confidential. The doubts or questions arising about the purpose and use of this test were answered, frankly and honestly. Questionnaire of Raj Kumar Saraswat was described to them. They were asked to fill in all the entries on the answer-sheet. After making sure that identifying entries were made by everyone, the research scholar read about the instructions clearly, from the test booklet. Then the research scholar marked his answer for sample items on the model questionnaire and explained the procedure of recording answers to the subjects. It was ensured that the instructions have been understood by all correctly. Doubts or queries on procedure were invited and cleared before the subjects started to respond to the items of the test. Then the subjects were asked to proceed with recording answers. The research scholar and his assistants went around checking that the subjects were recording answers sequentially and all of them completed all the 48 items. However, they were not hurried into completing the test within any stipulated time.
Scoring of the Questionnaire:

The answer-sheets were scrutinised before scoring, so that no item was answered with more than one response. The scoring was done as prescribed in the manual of self-concept, developed by Raj Kumar Saraswat. The raw scores for all the six dimensions were counted and entered in the space provided for it in the answer-sheet itself. The total raw score was generated by adding all these dimensional scores and entered in the space provided for it in the score-sheet, which was studied as the total self-concept score.

Design of the Study

Static group comparison design was adopted in this study. Subjects belonging to high and low fitness groups were tested for anthropometric and psychological characteristics. The two groups were compared in different anthropometric and psychological characteristics (personality and self-concept), adopting 't' test.
Statistical Techniques for the Analysis of Data

To determine the significance of differences between high and low fit soccer players in each of the anthropometric and psychological characteristics uncorrelated 't' test was applied.

Level of Significance

For testing the mean differences of high and low fit soccer players in anthropometric and psychological characteristics the level of significance was set at .05 level of confidence.