CHAPTER III
METHODOLOGY

The present study was undertaken with the view to compare the skill performance of the handball players measured by standardized handball test battery with the skill performance measured by rating scale, from Maharashtra.

The basic method of this research was the survey method which was complemented by in-depth interviews and the analysis of documents. After tabulation of raw data various statistical tools such as percentage, weighted average, etc. was used to prepare table. The data collected was analyzed using standard statistical tools to draw inferences and the results obtained after analysis has been presented in graphical presentation. As research is a systematic process of collecting, recording and analyzing data the present research work was of descriptive type and deals with relationship between variable, Hypothesis testing and development of generalizations, principles, theories having universal validity and is concerned with functional relationship. Descriptive studies are not limited to only one method of data collection, these may employ any or all the methods like, observation, questionnaire, interviewing, scaling techniques etc. Hence taking in consideration all these facts the present researcher conducted the study on topic “A STUDY OF SKILL TEST & ACTUAL MATCH PERFORMANCE OF HANDBALL PLAYERS”.

The researcher followed step-wise methods for comparing the performance. The detailed procedure is presented in this chapter. The step-wise methods are as below:

**Selection of Data:**

Qualitative and Quantitative approach has been used to do research for this study. Qualitative researchers are concerned with context because of assumption that human behavior is significantly influenced by the setting in which it occurs, Bogdan et al. (2007). Therefore, qualitative researchers prefer to go to the location of the subject of their research. As the actual findings of the study may be beyond anticipation of the researcher, qualitative approach for this study will try to find out the answer of the research questions. This research focuses on the existing problems of Physical
Education colleges and is expected to be inductive and exploratory in nature. In qualitative study there is flexibility where researcher enjoys freedom in using theories and hypothesis to change as event unfold. As the survey was related to Sports professional Institutions, scholar has taken large efforts to collect maximum opinions, personal observations and views collected by the scholar during survey helped research scholar to prepare questionnaire on the “A STUDY OF SKILL TEST & ACTUAL MATCH PERFORMANCE OF HANDBALL PLAYERS” in consultation with Guide.

**Tools for collection of Data:**

For collection of data major source was from Principals of Physical education Institutions and the students who have passed degree from the various Physical education Institutions from Maharashtra. Also views and opinions from retired Faculty’s / Heads where taken. In this study the scholar tried to collect maximum data from each every respondent irrespective of age, caste, creed and gender. Both Qualitative method and Quantitative method were used for collecting data.

**Research Design:**

Since this is a normative survey, it follows the principles of developmental research (Hubbard, 1973). A “Test Battery” for Handball has been formulated, developed and standardized, and the norms of the same were established scientifically (Cotton, 1986; Lam, 2001; Meitei et al., 1996; Millonzi, 1973; Safrit& Wood, 1987; Waghchoure&Bera, 2000; Wangwad, 2001; Wan- ka& Hong, 2001).

The design has been implemented considering following stages (Bhattacharyya identification of dimensions representing Handball performance variables.

- Selection of test-items for each dimension & their measurements.
- Administration of test items on try-out basis.
- Administration of test items on large sample.

**Population:**

The study was confined for the male junior level state handball players, aged between 15 to 19 years (i.e., under 19 years) from Maharashtra therefore, all the players of different districts of this age group playing Handball was the population of the study. Each handball team consist twelve players. There are total 28 districts in this age
group affiliated to Maharashtra Handball Association (As per the record of District Sports Office) (N=336)

The design of the study was random group design. The subjects were handball players selected from the different districts of Maharashtra state.

Research Methodology refers to more than a simple set of methods; rather it refers to the rationale and the philosophical assumptions that underlie a particular study. This section attempts to outline the researchers methods by explaining what the researchers formal representation of a set of concepts within a domain and the relationships between those concepts. Properly conceived methodologies, provide the substantial backing to the applied logic and coherence, which withstand peer review, as well as their fundamental approach to reality.

**Sample and Sampling procedure:**

The players aged between 15 to 19 years (i.e., under 19 years) from the Maharashtra were considered for this study. Every player, playing in this match was considered as a sample. Total twenty eight teams had participated at district level Handball tournament. Out of these all the players from seventeen teams were tested and rated. Thus the cluster sampling method was used for selecting the sample (n=200).

**Procedure of the Study:**

The detailed procedure of above stages has been explicitly presented as follows:

**Identification and Composition of Dimension-wise Test Items:**

The investigator, on the basis of several research reports, has considered five major dimensions (Table 3.1) that compose the "Test Battery" with a view to discriminate talented players for composing a standard State level Handball team, as follows:
<table>
<thead>
<tr>
<th>No.of dimensions</th>
<th>Name of test items &amp; Measurement unit</th>
<th>Tools Used</th>
<th>Recommended measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>PSYCHOLOGICAL</td>
<td>Intelligence Mental Health Creativity (pts.)</td>
<td>Standard Questionnaires</td>
<td>General intelligence, mental abilities and creative ability</td>
</tr>
</tbody>
</table>
Table 3.1  Test items to represent each dimension of the Test Battery Continued
<table>
<thead>
<tr>
<th>No.of dimensions</th>
<th>Name of test items &amp; Measurement unit</th>
<th>Tools Used</th>
<th>Recommended measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>HANDBALL SKILLS (E) (Brandao, et al., 2000; Keogh &amp; Weber, 2000; Muzumdaar &amp; Edwin 2000; Richardson, 1977; Riding, &amp; Al-Salih, 2000; Shondell, 1972; Takeuchi et al., 1988; Tokunosuke et al., 1988)</td>
<td>Front shoot (pts.) Speed pass (pts.) Accuracy throw (pts.) Agility dribble (pts.) Foot work (pts.)</td>
<td>Standard field measurements</td>
<td>Shooting ability Passing ability Throwing ability Dribbling ability Defensive foot work</td>
</tr>
</tbody>
</table>

Rating Scale

The above test-items were further confirmed to be included in the test, after taking opinions of various experts in the area of Physical Education and Sports and considering the long-standing professional experience of the present investigator. This, in fact, ensured the content validity of the test.
‘First try-out’ of these new test-items was conducted on thirty (n=30) male handball players, below 19 yrs. The limitations, if any, in administering each test-item were recorded.

Administration of Test-Items on Large Sample:

Date-wise Data Collection Schedule:

The details schedules of data collection have been presented in the following tables

A) **Association’s** state level junior handball championships held at –

1. Chalisgaon- October 2013, and

**Table 3.2. Field Test Schedule for Chalisgaon& Aurangabad Districts**

<table>
<thead>
<tr>
<th>DAY</th>
<th>TIME</th>
<th>TEST-ITEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>9.00 am To 1.00 pm</td>
<td>Front shoot, Speed pass, &amp; Foot work</td>
</tr>
<tr>
<td>Day 1</td>
<td>2.30 pm To 6.30 pm</td>
<td>agility dribble, Accuracy throw</td>
</tr>
</tbody>
</table>

**Table 3.3 Paper Pencil Test Schedule for Chalisgaon& Aurangabad Districts**

<table>
<thead>
<tr>
<th>DAY</th>
<th>TIME</th>
<th>TEST-ITEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day 1</td>
<td>1.00 pm To 2.30 pm</td>
<td>General Intelligence &amp; Non Verbal creativity</td>
</tr>
<tr>
<td>Day 2</td>
<td>1.00 pm To 2.30 pm</td>
<td>Mental health &amp; Verbal creativity</td>
</tr>
</tbody>
</table>

The direction about the process of test-administration, rules for participation in each skill and scoring principles were explicitly determined.

**Instrumentation:**

Standard tests were administered to measure the items of each dimension (see Table 3.6) for the collection of data. Based on the nature of the variables (i.e. handball skill variables, and psycho-physiological variables) and criterion measures, the investigator collected proper equipments. However, these equipments were thoroughly
checked and their functional status has been verified to ensure accuracy in data collection. The checklist of the equipments has been presented as follows:
Table 3.4 Checklist of the equipments/ instruments

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Item</th>
<th>Quantity</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Electronic split stop watch</td>
<td>11</td>
<td>Functional</td>
</tr>
<tr>
<td>2.</td>
<td>Measuring tape</td>
<td>03</td>
<td>Usable</td>
</tr>
<tr>
<td>3.</td>
<td>Measuring tape (Tailor)</td>
<td>04</td>
<td>Usable</td>
</tr>
<tr>
<td>4.</td>
<td>Portable weighing machine</td>
<td>02</td>
<td>Usable</td>
</tr>
<tr>
<td>5.</td>
<td>Handball</td>
<td>06</td>
<td>Usable</td>
</tr>
<tr>
<td>6.</td>
<td>String (Linedori)</td>
<td>01 Bundle</td>
<td>Usable</td>
</tr>
<tr>
<td>7.</td>
<td>Pencils</td>
<td>50</td>
<td>Usable</td>
</tr>
<tr>
<td>8.</td>
<td>Pens</td>
<td>11</td>
<td>Usable</td>
</tr>
<tr>
<td>9.</td>
<td>Pads</td>
<td>08</td>
<td>Usable</td>
</tr>
<tr>
<td>10.</td>
<td>Chalk Box</td>
<td>01</td>
<td>Usable</td>
</tr>
</tbody>
</table>

Criterion Measures and Tools Used:

a) Rating Scale:
   Rating Scale is a tool used for evaluation or rating the things (e.g. Performance, Skill, Quality and Progress etc).

Reliability of the Rating Scale:

Test retest was conducted to establish the Subject's reliability Vincent (1995). The coefficient of correlation of the Rating scale performance was considered for the same. The test and retest administered for this purposes was conducted keeping minimum 5 days gap in between. Pearson’s product moment method was taken in to consideration to determine relationship between the rating scale scores of the first and second handball match of the subjects in each test.

Test-retest reliability coefficient of samples on the skills i.e. Shoot, Pass, Dribble, Dodge, Defense were calculated .90, .82, .81, .91 and .88 respectively.
b) Handball Skills:

Skills were measured on the basis of J.L. Zinn and G.I. Neil Team Handball Individual skill test battery as follows:

- Front shoot was performed by succeeding the jump and set shoot at a particular place within the goalpost in 5+5 (10) trials and points awarded according to the zone.
- Accuracy throw was performed by successful repetition of throws at a particular circle of target on the wall in ten trials and points awarded according to circle.
- Speed pass was done by successful repetition of volley the handball on solid smooth wall within thirty-second with the help of shoulder or push pass. The score was recorded the total of the two trials.
- Dribble was tested with the help of Agility dribble (figure of 8) with a distance 6.1M. The score was recorded in sec. Two trials were allowed.
- Defensive foot work was tested using foot work test. Total number of marks touched during twenty second was the score.

c) Psychological Variables:

- Mental Health was assessed in administering a Questionnaire as developed by Agase&Helode (1988).
- General Intelligence was measured by a test developed by Bhattacharyya (1982) and standardized by Bera (1993).
- Creativity (verbal and non-verbal) was assessed with the help of two questionnaires as developed by Bager Mehdi (1985).

The score of all the above psychological tools was recorded in points.

Reliability of Data & Subjects’ Reliability:

The subjects’ reliability was established by ‘test-retest' coefficient of correlation of the scores obtained from said test-items. The gap between the test and retest was
minimum one month. However, retest was completed upon 10% of the total target sample. By employing Pearson Product Moment Method, relationship between the scores of the first and second measurements of the subjects in each test was determined.

**Testers’ Reliability:**

Eight specially trained M.Ed. (Physical Education) students and three physical education experts assisted in collecting data on different items and paper pencil tests. The assistants were oriented with training in the procedures of accurate measuring and recording the scores in each test. After the Specialized training, all the assistants were asked to measure the performance of 15 subjects in each specified test on trial basis. The testers’ reliability coefficients were determined statistically, which were ranged from 0.88 to 0.93. It is interesting to note that all the coefficients were found statistically significant at the 0.01 level. Therefore, the final measurements taken with the help of these assistants were considered reliable and fully justified.

The research instrument for the data collection was prepared using standard methods. The reliability and validity (content validity, construct validity, criterion validity, etc) of the questionnaire was assessed prior to its actual use for data collection. All the standard procedures was employed to check the reliability (Cranach’s alpha procedure and test-retest methods) and validity of the questionnaire.

**Description & Measurement of Test-Items:**

**Psychological Test-Items:**

**Mental Health:**

Mental health inventory (MHI), as developed by Agase and Heloda (1988), was used for assessing mental health status of the junior level handball players. In fact, the original MHI has been prepared in Hindi. Many psychological tools are available for measuring negative aspects of mental health. However, the MHI as developed by Agase&Helode, in fact, conceived the term “mental health in its positive
perspective. Agase & Helode followed the tripartite model of mental health as initiated by Stupp and Hadley's (1977).

This model considered *self-acceptance, ego-strength and philosophies of human nature as the major components of positive mental health*. This MHI includes 36 statements, 12 for tapping self-acceptance, 12 for assessing ego-strength and the remaining 12 were for measuring philosophies of human nature.

Since all the subjects participated in this study, were well versed with Marathi language, the MHI of Agase and Helodi (Hindi Version) has been translated into the Marathi language. Then both the Hindi version and Marathi version of the questionnaires have been administered after a gap of one month on 60 subjects.

The test re-test reliability of the MHI was found as 0.742 (p<0.01) with an accepted content validity.

**Purpose:**

To measure positive mental health of the subjects.

**Tool:**

Mental Health Inventory (MHI)

**Procedure:**

All the subjects were instructed to seat comfortably. The MHI was administered after explaining the instructions printed on its front page. Helpers were asked to distribute pencils and MHI to each subject. After completion of the filling up the MHI, the helpers collected them from all the subjects. The helpers were trained in such a way so that in case of any query, they are able to help the subjects.

**Scoring:**

While scoring the responses, as obtained from the MHI, it has been kept in mind that there were 36 items, where the Nos. 1, 7, 9, 15, 17, & 18 are negatively and 6, 8, 14, 16, & 27 are positively worded, which were belonging to *ego-strength* component of positive mental health.
Similarly, the items 2, 10, 20, 28, 29, & 31 are negatively worded and 4, 11, 22, 24, 26 & 34 are positively worded, which constitute the *self-acceptance* component of positive mental health.

However, the items 5, 13, 21, 25, & 36 are negatively worded and 3, 12, 19, 23, 30 & 32 are positively worded, which are meant for tapping the *philosophies of human nature* component of the positive mental health.

Further, assigning a numerical credit of 1 point to each response given in the keyed direction and a credit of 0 point to each response given in the anti-keyed direction, the responses of each subject on 36 items of MHI were scored and composite score on the whole inventory was worked out the constituted the subjects’ total score on MHI indicating the magnitude of positive mental health. The maximum possible score of this inventory is 36 while the minimum possible score is zero. Thus, higher the score greater the degree of positive mental health, is the direction of the scoring of this inventory.

**Creativity (Verbal Test):**

Verbal test for creativity, as developed by Bager Mehdi (1985), was used for assessing verbal creativity of the subjects of this study.

The verbal test of creativity includes four sub-tests, namely, *consequences test, unusual uses test, similarity test, and product improvement test.*

In consequences test the subject is required to think as many consequences of these situations as he can, and write under each situation in the space provided. The situations being hypothetical, minimizing effect of experience and also provide the subject with an unlimited opportunity to make responses.

The test encourages free play of imagination and originality. Unusual uses test measures the subjects’ ability to retrieve items of information from personal information in storage. Evidently, it measures also the subjects’ ability to shift frames of reference to use the environment in an original manner. New relationship test provides an opportunity for the free play of imagination and originality. Product improvement test suggests addition of new things.
Since all the subjects participated in this study, were well versed with Marathi language, the verbal creativity test of Bager Mehdi (English version) has been translated into the Marathi language. Further, both the English and Marathi version questionnaires have been administered after a gap of one month on 60 subjects.

The test-retest reliability of the Verbal Creativity test was found 0.78 (p<0.01), which also assured the content validity.

**Purpose:**
To identify the creative and talented junior handball players.

**Tool:**
Verbal Creativity Questionnaire.

**Procedure:**
All the subjects were instructed to seat. The test was administered after explaining the instructions printed on the first page. Helpers were asked to distribute pencils and questionnaire to each participant. After completion of the test the helpers collected them from all the subjects. The helpers were trained in such a way so that in case of any query, they are able to help the subjects.

**Scoring:**
As there is no right or wrong response for the test, much care has to be exercised at the time of scoring. The following points have to be kept in mind while scoring:

- Each item is to be scored for fluency, flexibility, and originality. The number of relevant and unrepeated ideas, which the subject produces, represents fluency. Flexibility is represented by a person’s ability to produce ideas which differ in approach or thought trend. Originality is represented by uncommonness of a given response.

- The scores may be directly entered on the answer sheet by closely following scoring guide.

- In scoring for fluency, the scorer should go through the responses to the item in question carefully and strike off those which are irrelevant and/or have been repeated. He should then count the remaining number of responses and enter this number as the fluency score for the item.
• In scoring for flexibility, the scorer should first acquaint himself with the categories of responses given for each item in the scoring guide. For convenience sake, he should note the bracket against each response, the alphabet serial of the category to which it belongs. All ideas which fall under one category of approach or though trend are treated as one for purpose of flexibility scoring.

• In the scoring guide, the originality weights have been mentioned for all the original responses, and should be use as such. The composite creativity scores should be entered after converting the summarized raw scores of fluency, flexibility, and originality into standard scores. This is necessary because the standard deviations of the three scores sometimes markedly vary and if raw scores are added up then the ranking will be greatly affected.

Non-Verbal Creativity:

Non-verbal test of creativity, as developed by Bager Mehdi (1985), was administered for assessing non-verbal creative ability of the subjects.

The non-verbal creativity test is intended to measure the individual’s ability to deal with figural content in a creative manner. Three types of activity are used for this purpose, viz., picture construction, picture completion, and triangles and ellipses. The three activities taken together provide ample opportunity to the subject to use his imagination with different types of figural tasks and come out with novel ideas. The subject is also asked to give an interesting and suitable title to each picture.

Since all the subjects participated in this study, were well versed with Marathi language, to the non-verbal creativity test of Bager Mehdi (English version) has been translated in to the Marathi language. Then both the versions of the questionnaire have been administered after a gap of one month on 60 subjects.

The test-retest reliability of the Non-verbal Creativity test is 0.81 (p<0.01) with an accepted content validity.

Purpose:

To measure the individual’s ability to deal with figural content in a creative manner.

Tool:
Non-Verbal Creativity Questionnaire.

**Procedure:**

All the subjects were instructed to seat. The test was administered after explaining the instructions printed on the first page. Helpers were asked to distribute pencils and questionnaire to each participant. After completion of the test the helpers collected them from all the subjects. The helpers were trained in such a way so that in case of any query, they are able to help the subjects.

**Scoring:**

As there are no right or wrong responses for the test, much care has to be exercised at the time of scoring. Test user has to acquaint himself fully with the method of scoring and the use of scoring sheet. The following points have to be kept in mind while scoring the test:

- Each item is to be scored for elaboration and originality. Elaboration is represented by a person’s ability to add pertinent details (more ideas) to the minimum and the primary response to the stimulus figure. Originality is represented by in commonness of a given response. It has been to be kept in mind that titles too are to be scored for elaboration and originality.

- In scoring for elaboration the scorer to see that the primary and minimum response is meaningful and relevant to the stimulus before it is scored. If the figure is not relevant and meaningful, it should be ignored. The total elaboration score will consist of a score of one for the primary and minimum response plus one score each for all the additional new ideas. In the scoring guide, the originality weights have been given for all the original responses, and should be used as such.

- The composite creativity scores should be entered after converting the summarized raw scores of elaboration and originality for both the pictures and for titles into standard scores. This is necessary because standard deviations of the two scores sometimes markedly differ and if the raw scores are added up, then the remaining will be greatly affected.

**General Intelligence Test:**
General Intelligence inventory, as developed by Bhattacharya (1982) and standardized by Bera (1993), was used for assessing general intelligence of the subjects of this investigation.

The seven dimensions (viz., classification, analogy, arrangement, number series, logical section, inferences and differential aptitude) taken together in providing ample opportunity to the subject to use his logic, analogy, aptitude, and intelligence with different types of tasks.

The test retest reliability of the general intelligence test is 0.84 (p<0.01) with an accepted content validity.

**Purpose:**

To measure the general intelligence of the junior handball players.

**Tool:**

General Intelligence Questionnaire.

**Procedure:**

All the subjects were instructed to seat. The test was administered after explaining the instructions printed on the first page. Helpers were asked to distribute pencils and questionnaire to each participant. After completion of the test the helpers collected them from all the subjects. The helpers were trained in such a way so that in case of any query, they are able to help the subjects.

**Scoring:**

Assessing a numerical credit of 1 point to each correct answer and a credit of zero point to each incorrect answer given in the keyed direction. The response of each subject on 72 items of the test was scored and composite score on the whole inventory was worked out. This constituted the subjects’ total score on general intelligence. The maximum possible score of this test is 72 while the minimum possible score is zero. Thus, higher the score greater the intelligence is the direction of the scoring of this general intelligence test.

The Aggression and Frustration levels was determined by using following standardized tests.
Reactions to Frustration Scale:(B.M. Dixit and D.N. Srivastava)

It measures reaction to frustration in 4 modes.

(I) Aggression
(ii) Resignation
(iii) Fixation
(iv) Regression

This test contains 40 items and is standardized on 200 college going students of both the sexes.

Aggression Inventory:(M.K. Sultania)

This inventory consists 67 items of 8 sub-tests. It is standardized 1000 (Adult Male and Female)

(I) Assault
(ii) Indirect Aggression
(iii) Irritability
(iv) Negativism
(v) Resentment
(vi) Suspicion
(vii) Verbal Aggression
(viii) Guilt.

(I) A Pilot study was conducted to collect data for estimating the reliability and validity of the research instrument.

Cronbach’s alpha procedure was employed to estimate reliability (Internal consistency) of the different scales.

(II) The validity of a measure refers to the extent to which it measures what it was intended to measure. Three different types of validity was determined:
(i) **Content Validity**: Content validity depends on how well the researchers created measurement items to cover the content domain of the variable being measured. The contents of the instrument was selected on the basis of comprehensive literature survey.

(ii) **Construct Validity**: A measure has construct validity if it measures the theoretical construct or trait that it was designed to measure.

(iii) **Criterion-related validity**: The criterion-related validity of the instrument was evaluated by examining the correlation coefficients.

. **Handball Skills:**

**Front Shoot:**

**Purpose:**

To measure the shooting ability in team handball.

**Equipment:**

A marked level floor or ground with a smooth surface, a stop watch, a standard inflated handball, rope or string, measuring tape, marking tape, score cards or recording sheets, and pencil. The front surface area of a team handball goal is divided with rope or string into eight parts. Each part is assigned a certain number of points reflecting the difficult of shooting the ball into that area.
Description:
The player gets ten shoots, five when executing a jump throw and five when executing a set shoots. The player can take three steps before releasing a ball but the last step must be executed outside the free throw line (9-meter line). If ball hits the court surface before it reaches the goal, no points are scored.

Rules:
1) All shoots must be made from behind the free throw line (9-meter line)
2) If ball hits the court surface before it reaches the goal, no points are scored.

Scoring
The score for ten shoots is the sum of points awarded on each shoot or attempt. A maximum of forty points is possible.

```
<table>
<thead>
<tr>
<th></th>
<th>50 cm</th>
<th>200 cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
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<td>1</td>
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<td>1</td>
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<td></td>
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<tr>
<td>3</td>
<td></td>
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</tr>
</tbody>
</table>
```

50 cm
200 cm
110 cm
40 cm
**Accuracy Throw:**

**Purpose:**
To measure the accuracy with which a player can make throws at the target in team handball.

**Equipment:**
A stop watch, a standard inflated handball, measuring tape, marking tape, score cards or recording sheets, and pencil, a level floor or ground and a solid smooth surface wall with a painted or marked target. The target should be properly measured and marked as in the accompanying.

**Description:**
The player, with a handball, stands behind a line on the floor parallel to and fifteen meters from solid smooth wall. On the signal “go”, the player throws the ball at the target, using one-armed throw. Ten throws are made and all must be executed from behind the restraining line. A two-practice throw is allowed. The target is circular with three concentric circles separated by two cm wide white or black lines. The inner circle is 50 cm in diameter, the second circle is 100 cm in diameter, and outer circle is 150 cm in diameter. The bottom of the outer circle is 100 cm above the floor.

**Rules**
1) The ball may be caught and throw by one armed overhand throw.
2) To be scored all throws must be made from behind the line.

**Scoring:**
Three points are scored for each throw hitting the center circle, two points for hitting the next circle and one point for hitting the outer circle. Ball hitting on a line was counted as hitting in the area of the higher score. The points scored on each throw are
recorded and then added to arrive at a score of that trial. The score is the total for ten throws. A maximum of thirty points is possible.

**ACCURACY THROW:**

**Speed Pass:**

To measure the speed with which a player can continue to pass and catch a ball in team handball.

**Equipment:**
A level floor or ground and a wall with a solid smooth surface, a stop watch, a standard inflated handball, measuring tape, marking tape, score cards or recording sheets, and pencil.

Description:

The player stands behind a line on the floor parallel to and four meters from solid smooth wall. On the signal “go”, the player throws the ball against the wall about a head high. Catches the rebound and continues passing against the wall as rapidly as possible for thirty seconds and is told to stop. Any method of passing may be used, but overhand pass is recommended. Some warm-up practice is allowed.

Rules:

1) All passes must be made from behind the line.
2) The ball cannot be batted. It must be caught and pass.
3) If the ball is dropped, the player must recover it and continue from behind the line.
4) The ball may hit the wall at any height.
5) Two complete trails are recommended with approximately a thirty second rest between them.

Scoring:

Each throw to the wall that is caught or retrieved is counted as “one”. The score on each trial is the accumulation of those completed from the time timer says “GO” until he says “STOP” after thirty seconds have elapsed. The score is the total of the two trials.
Agility Dribble:

Purpose:
To measure the speed with which a player can dribble a handball around obstacles in team handball.

Equipment:
A level floor or smooth surface ground, a stop watch, a standard inflated handball, two chairs, measuring tape, marking tape, score cards or recording sheets, and pencil.

Description:
The player stands behind a starting line with a ball in hand and on the signal “go”, starts with a dribble on the right side of the first chair [No.1] and continues to dribble to the left of the second chair [No.2] and around it, back to the right side of chair No.1, around it and back to the left side of chair No.2, around it and back across the line from which he started. The chairs are one in front of the other with their outer most edges being 6.1 meters apart. The starting line is perpendicular to an imaginary line directly between chair No.1 and chair No.2.

Rules:
1) The ball may be dribbled with either hand but legal dribbles only are allowed.
2) Each player is given two trials, one to follow the other after about thirty seconds rest.

Scoring:
The score is the time in seconds and tenths that it takes to dribble around between the chairs and back. Time is started on the signal “GO” and stopped the instant the player crosses the finish line at the end of the circuit. Two trials are the player’s score on the test.
Foot Work:

Purpose:

To measure defensive foot work and maneuverability in team handball.

Equipment:

A level floor or ground on which there are marks. 5 by 30 cm in size, three meters a part arranged as in the accompanying, a stop watch, measuring tape, marking tape, score cards or recording sheets, and pencil.

Description:

The player begins by starting with both feet touching the center mark \textbf{A} and facing mark \textbf{C}. On the signal “go”, the player moves laterally to the right to touch mark \textbf{B}, then back to \textbf{A}, then forward to \textbf{C}, back to \textbf{A}, to the left to \textbf{D}, back to \textbf{A}, to the left to \textbf{D}, back to \textbf{A} and then repeats the sequence until he is told to stop. He is instructed to touch as many marks as possible in twenty seconds while following the prescribed sequence.
Rules:
1) All steps to either side must be of the shuffle or a side step nature.
2) To be counted, each mark must be clearly touched with at least foot.
3) The described sequence must be followed.
4) Two twenty second trials are recommended with thirty second interval between them.

Scoring:
The score is the total number of marks touched during one twenty second trial. The subject's best score will be used to represent his footwork.

Procedure of Test Administration:
The direction about the process of test-administration, rules of participation in each test item, time limit of performing each fitness factor and scoring principles were determined explicitly. Proper planning was done well in advance and the helpers were exposed to different trials prior to actual test administration.

In order to get the best out of the subjects, permission from the Organizing Secretary, Maharashtra State Association Secretary, DSO, Coach & Manager and help from the coaches of the respective district teams were sought.
Since the investigator had to measure five components of handball performance i.e., psychological, rating and skill of each subject of the sample of 200 cases, proper sequence in test administration was followed for smooth data collection. The test items were conducted strictly following standard procedure.

All the test items were administered with the help of the professionally qualified personnel who were fully acquainted with testing procedures. The schedule of the data collection has been prepared well in advance.

The subjects were explained all the test items systematically prior to conducting the actual tests, in which they had to participate. They were also informed that performing these tests will no way harm them in their performance, rather it would help them to know their own status of performance.

Before the actual administration of the tests the subjects were given an opportunity to participate in each of the test items, on trial basis, if desired by the participants, so that they were well acquainted with the testin

**Statistical Techniques used:**

The data, after collection, has to be processed, tabulated and analyzed in accordance with the outline laid down for the objectives of the study. This is essential for a research study to ensure that we have all relevant data for making contemplated comparisons and analysis. The tabulation of collected data is amenable to analysis.

The term analysis refers to the computation of certain measures along with searching for patterns of relationship that exist among data groups. Thus, G.B. Giles pointed out “in the process of analysis, relationships or differences supporting or confliction with original or new hypotheses should be subjected to statistical test of significance to determine with what validity data can be said to indicate any conclusions”.

Dealing with interpretation Prof. C. William Emroy has rightly pointed out, "In one sense, interpretation is concerned with relationship within collected data; partially overlapping analysis."

Thus through the task of interpretation, researcher studies the different factors involved in the research and explains what has been observed by the researcher in the course of the study. It can be better understood and at the same time it also provides a theoretical conception, which can serve as a guide for further research.

The purpose of the present investigation was to study the impact of psychological factors, aggression and frustration on sportsperson's ability to pursue sports as a career. Hence, the present researcher collected the data regarding aggression, frustration and ability to pursue sports as a career by administering standard psychological tools viz. (i) Aggression Inventory by M.K. Sultania and (ii) Relations to Frustration Scale by B.M. Dixit and D.N. Srivastava. The obtained data were scored according to instructions given in the manual of respective standard tools.

The ability to pursue sports as a career was measured by employing self-made opinionnaire consists of 30 statements with five alternatives viz. Strongly agree, Agree, Undecided, Disagree and Strongly disagree. Likert's five point scale was used to scoring the opinionnaire.

By using these tools the data were collected from (50 players each) 16-19 age group hand ball state level players. In this way total 200 players were taken for the present study.

Obtained data were statistically analyzed by using mean, standard deviation, t-ratio, F-ratio, LSD (Post Hoc Test) and Pearson’s correlation coefficient technique. Tabulation and interpretation of results are presented in this chapter.

STATISTICAL PROCEDURE

't' - Ratio was calculated to find out difference between the means of different groups for significance with the help of following formula:-
Critical Ratio:

where,

\[ X_1 = \text{mean score of group I.} \]
\[ X_2 = \text{mean score of group II.} \]
\[ \sigma_1^2 = \text{standard deviation of the group I.} \]
\[ \sigma_2^2 = \text{standard deviation of the group II.} \]
\[ N_1 \text{ and } N_2 = \text{total number of respondents in group I & II respectively} \]

Coefficient of Correlation:

where,

\[ \sum_{xy} = \text{Sum of product of deviation of group I and group II.} \]
\[ \sum x^2 = \text{Sum of square of deviation of the group I.} \]
\[ \sum y^2 = \text{Sum of square of deviation of the group II.} \]

Applying descriptive statistics the data was processed primarily. Pearson product moment correlation was used to analyze the data.

All the statistical procedures were done with the help of SPSS 11.5 version p.

Descriptive Statistics:

The primary data collected from the samples was analyzed following standard statistical tools. The descriptive statistics, such as mean, standard deviation, frequencies, mode etc was used to check the data quality.

Inferential Statistics:

The collected data was analyzed using inferential statistics, such as Correlation Co-efficient, 'Z” test of proportion, Factor analysis and Multivariate analysis (multiple regression analysis).

SIGNIFICANCE LEVEL:
The significance level was 0.05 (or equivalently, 5%) by keeping in view the consequences of such an error. That is we want to make the significance level as small as possible in order to protect the null hypothesis and to prevent, as far as possible, from inadvertently arriving at false conclusions.

**Measurement And Evaluation:**

In sport and physical education as in life, teachers and coaches are constantly measuring and evaluating. They measure their students, players associates opponents programs, teaching strategies, coaching techniques and many other facets of the hunches or calculated guesses. The most valid form is the use of well established criteria as a basis for comparison. Usually this is done by means of tests and measures that have been developed through research and validated against suitable criteria. Physical educators like educators in general should be prepared to submit to those who need or request it objective evidence obtained through valid measurements that physical education really educates educates in the sense that the degree of attainment can be shown in the goals, both general and specific, that have been established. Measurement techniques can be applied in both the product and the process.

Measurement Applied to the Product: Effective utilization of evaluation occurs in physical education in 2 ways. First, it occurs when measurement procedures are applied directly to the product in order to measure accomplishment in a hierarchy of objectives that have been agreed upon historically by practically all authorities in the field. These objectives are:

1. Organic development including fitness.
2. Psychomotor development with emphasis on sport skills.
3. Cognitive learning, including knowledge and understandings concerning sport and exercise, and
4. Affective development, including social learning involving sports and participation with emphasis on sportsmanship. Basically a good program of physical education includes skills fitness, knowledge and values to be evaluated.
Measurement Applied to the Process: Second evaluation occurs when special techniques are used to measure the process of physical education directly. The teacher administrator must know the degree to which the program and other aspects of the process met acceptable educational standards. In evaluation of the process, techniques are used to measure the procedures of education and these procedures should be investigated at all educational levels according to the required program, the individual program the intramural program and the inter school program. Process measurement has several approaches, all of which provide the means for an improved service to the product. However, it should be pointed out here that the evaluation of the product is one of the best means of assessing the quality of the process. These approaches should improve the overall process by making instruction and administration more efficient and program more effective and in the final analysis should enhance the growth an development of the student.

How Measurements are Applied: Measurement can be applied in several ways. In evaluating the product the teacher and coach can do the evaluating or the students may evaluate each other. In some cases the students may evaluate themselves. This student participation in the evaluation procedure is one of the great challenges in the field of teaching. When the process is evaluated, evaluation techniques may be applied by the administrator, by teachers, or by an evaluation team. In some cases, students and parents participate.

Measurement in physical education can be applied for two basis purposes. First it may be used to measure status. However when this same measurement is repeated on the same group I or more times, then progress or achievement ma be noted. Generally both status and progress are compared with other values such as norms, standards or criteria. Thus a status measurement repeated at any given time not only reveals how students have progresses, but also how they relate to goals and to other students. In both the product and the process, measurement can show status, changes and significances.

In measurement of the product evaluation becomes a temporal matter. For example tests may be given during the ongoing instructional program where they
become a part of the procedures of instruction. On the other hand they may be administered at the end of the instructional unit or term where their resulting data can only be used to evaluate the process or to inform the students of their final status or achievement. When tests are sundering the learning period. They become an integral part of the learning process.

Their results are diagnostic and therefore can be used in formative evaluation, whereas tests administered at the end of a term are useful only for summative evaluation. Formative measures can better serve the immediate needs of the students because their results are diagnostic and can become feedback and input into the learning cycle as they provide the means for self analysis and self knowledge. Formative evaluation furnishes students a realistic assessment of their present status and if given often enough can reveal successive stages of progress. This feedback showing progress provides the students with the self knowledge and motivation needed for self satisfaction and therefore provides more effective reinforcement and identification of errors leading to correction.

Summative measurement at the end of the unit or period is important for evaluating the final status of the students and the worth of the process, but it loses much of its value as a feedback mechanisms for positive learning on the part of the students. Since evaluation of the product is perhaps the most viable way to judge the worth of the process, cumulative results are valuable in process evaluation. If the product is shown to be satisfactory through cumulative measurement, the need for process measurement directly may not be necessary.

**Need for selecting appropriate Tests:**

Selection of appropriate tests is necessary if wise application of results is to be realized. The little time allotted for measurement activities should be spent wisely. The choices of tests should be made in light of the objectives sought. If the tester is a researcher a detailed, technical measurement may be desired. The teacher is just as concerned about the accuracy and honesty of the results, but needs to find a test that is easy to use and appropriate to the group situation present in most schools. The theme of this test is centered on helping the teacher get the best answers with the best tools. The
pressure of time probably should not be the deciding factor, but it must be considered. A test should serve the student directly and indirectly, but it must do so with efficiency. Some selection has been made in choosing the tests to be included in this book. Further selections need to be make by the teacher in light of each teaching situation. Judgments about test selection will continue to be needed as new tests become available.

**Reliability of the Test:**

Reliability is related to the test performance itself. The tester is the same the students are the same and the test is the same. Assume that the test is administered and then re-administered. If the students scores fall in the same positions the test is reliable. The student who performed best the first time is still best, the poorest performer is still poorest, and all in between are approximately in the same order. A test is given to position students on a ladder so to speak. If their positions are true indications of their skill then the test is said to be valid; if their positions are dependable and consistent then the test is considered to be reliable.

Countless factors influence reliability. The equipment used in the test may not be of sufficient quality to produce consistent results. The instrument recording the measurement may be too gross, such as a 100 pound spring scale to measure inflection of the wrist. The number and length of the trials needed to get a stable measure are important. Usually the best of 3 broad jumps is considered adequate, whereas most accuracy tests require about 20 trials. Generally the longer the test the more reliable it is. The test may be so long, however as to introduce a fatigue factor. Averaging scores usually produce more reliable results than taking only the best score because averaging has a leveling influence on the scores.

The directions may be so complicated that the student cannot remember the procedure. The student may be in a different motivational frame from one day to the next. The teacher may present the test in a different way. But if all things are standardized as much as practically possible, the test should prove to be reliable and therefore worthy of confidence.
Methods of Establishing Reliability:

Reliability is also interpreted by using the statistical technique called a correlation coefficient. The reliability coefficient is obtained by correlating one measure of the test with another measure of the same test and thus is judged by an internal and dependent measure. Consequently, reliability coefficients are generally higher than validity coefficients. Reliability coefficients may be derived either by the interclass method suggested by the product moment correlation or by the intra class approach employed in analysis of variance.

Test-Retest: One method of establishing reliability is to administer the test completely one time and then to give it another time. Usually the second administration is on the next day or two under very similar conditions and certainly before forgetting practicing and learning factors become too influential in the results. This method is time consuming and sacrifices some of the interest factor of the students during the second administration. The scores of the first and second administrations are correlated to determine the coefficient.

Split Halves: An alternative time saving method is to administer the test only once and then correlate the total of the even numbered trials with the total of the odd numbered trials. In a 10 trial test, the 3rd, 5th, 7th, and 9th trials totaled provide 1 score and the 2nd, 4th, 6th, 8th, and 10th trials total provide the second score for the correlation problem.

Validity of the Test:

Validity is the most important of the technical standards because it tests the honesty of a test. The teacher wants to have confidence that a test selected to use as measure of the tennis serve, for example is indeed just that and not a test of shoulder girdle strength or of general motor ability, It must be a measure of a rather specific skill namely, the tennis serve. It would be unfair to use a fitness test as one basis for assigning grades if the test were so complicated that an intelligence factor weighed heavily in the performance score of each student. If a test is presented as a measure of the volleyball volley, then to be valid, it must measure volleying ability and ideally it must measure it to such a degree that other influencing factors such as height and weight are
Logical Validity:

Logical validity is a more precise term for what has formerly been referred to as face validity or empirical judgment. The obviousness of what a test is measuring is supplemented by a stated, clear-cut definition of the skill to be measured. Then if the skill test satisfies that definition a logical validity can be inferred. The 50 yard dash is considered to be a measure of running ability if speed in running also means excellence in running. The tester considers the dash and defines it as a measure of running. He she concludes this on the basis of logic, common sense, and judgment; one can see inherently what it is measuring. For example, the basketball wall pass may be measure of shoulder girdle strength, reaction time, ball handling ability, basketball playing ability and height. It is perhaps related to each of these factors to some degree. On the other hand the dash, while influenced by reaction time, weight, and the like, is basically a measure of running ability and there is very little controversy over that definition. It is generally accepted to be such a measure and thus the dash is an example of a test that is said to have logical validity. Logical validity involves no statistical procedure, it is useful at times, and often recommended for use in conjunction with ways of establishing concurrent validity.

Concurrent Validity:

Concurrent validity measures the degree of relationship between 2 measures taken at approximately the same time. For example, if a group of tennis serve test, the relationship between the 2 performances would be an indication of the concurrent validity of the new test. Did the new test measure about the same thing as the old one at about the same time. There are several ways of ascertaining concurrent validity. Each way involves the comparison of the new test with some external standard, called a criterion which has already been established. This results in 2 sets of scores: 1 for the
new test being developed, and 1 for the criterion measure. These sets of scores, I set for each student are correlated. If the relationship is close, the test is considered valid. If the standard chosen for making the comparison is poor, then the validity reported is often misleading. The standard or criterion used as the comparison factor must be the best possible. Several have been used to establish the validity of various motor tests and reach will be discussed. They may be used in combination as well as separately. For example, a new test aybe compared with tournament standings as well as will subjective ratings. This multiple use of criterion measures is an attempt by researchers to make doubly sure that the new test is valid.

Subjective Ratings: Subjective Ratings are given by the teacher sometimes to use in grading. When used for establishing validity however, they are given by at least 3 judges and often 5 to 7. Ratings generally involve judgments on the form of a performance. The tennis serve provides an example. The technique of the serve, its execution, force, form accuracy and the like are noted for each student by 3 distinguishing points between a performance worth 5 points and one worth only 2 points, for instance. As a second step, these same students are given a service placement test. Then the composite or average of the 3 judges ratings is compared with the objective service placement test score for each student. Two assessments are available for each student. They are correlated and the resultant coefficient is used as the basis for interpreting the validity of the service placement test. If the scores on the test rank the students in approximately the same order that the judges evaluate them, the coefficient is relatively high and the service test said to be valid on the basis of the criterion of judges ratings. The opinion of experts is often a more accurate measure than a poor test. No apologies need be made for the use of subjective ratings. Care should be taken, however, that the skill is well-defined, that the rating scale is refined, and the ratersar competent, Ratings can be poor criteria, but if carefully done they may be relied upon to yield dependable results.

Many of the motor tests reported in the professional literature have been validated on the basis of subjective ratings. Many others have been validated on the basis of other objective measures. The teacher needs to realize that the objective test used as a criterion was probably itself validated by subjective ratings were poorly
executed and this emphasizes the need for constant revaluation of the object give test that are available in the measurement literature. There is one other controversial point about the use of subjective ratings: they make a judgment on the process of the skill when the product or result o the skill is what counts in the game. Some would argue that good performance is high related to good form. Others would argue that it does not matter how the performer looks when executing the skill as long as the results are effective. This might imply that the proper use of subjective ratings would be reserved for establishing test for gymnastics routines or diving.

Where a highly objective score is not available. It is not possible to settle the argument here, but only to alert the user of tests about this reservation regarding subjective ratings as a criterion for establishing concurrent validity.

Previously Validated Tests: Some skill tests are created as refinements of other tests already available. The test may be simplified, shortened, or revised in some way. The old form of the test is administered to a group and then the new form is given to the same group. If the standings of the people in the group remain similar, then the new test may be said to measure appreciably what the old test measured. And, if the old test was reputed to be a measure of the badminton clear, for example, then the new test may assume validated tests as criteria for establishing concurrent validity because the tests yield objective scores as opposed to subjective ones. Care should be taken that the previously validated test was itself carefully and accurately validated before it is accepted as a standard for measuring the validity of a new test.

Composite Scores: Composite scores have been used as a criterion when tests for a broad type of ability such as fitness or motor ability have been developed. Validity for such measures, however, should probably be established by construct validity, a concept to be discussed subsequently. Composite scores might be used wisely as the criterion when the development of a test battery is anticipated instead of a single test item.

A composite score is achieved by administering a gamut of tests, each supposedly related to the measurement area in question. The scores are put into some type of comparable form, such as T-Scores, and are added to get 1 total or composite
score. Other tests or perhaps even some that were in the composite listing are then correlated with the composite score, each in turn, and in various combinations. The composite score is then used to help select the battery of tests that comes closest to measuring whatever all the individual tests collectively were attempting to measure. The composite score uses the “buck shot” theory which implies that if enough related tests are given, some of them will be measures of the skill in question. This particular standard for establishing validity is somewhat in question for this reason. It may encompass too broad a base of skills to identify anything but very general kinds of ability. If, on the other hand, the test items are carefully selected, the composite score theory has merit.

**Construct Validity:**

Construct validity is used to establish validity of tests for complex ideas such as overall playing ability in some sort or fitness. The isolated, specific and well defined motor acts can be validated with concurrent validity. The more obscure, general less easily defend motor acts can be validated by construct validity. Occasionally a new test appears in the measurement literature which uses a combination of these approaches to establish validity. This procedure adds further credence to the validity or honesty of the new test. Concurrent validity usually involves the statistical technique of the correlation to measure the relationship; of one measure to another. Construct validity, on the other hand, is determined by comparing the differences in performance of groups.

**Comparison Over Time:** Assuming that a test battery claims to measure validity of overall playing ability in tennis, the battery is administered to a group of players early in the unit, but not until a reliable in tennis, the battery is administered to a group of players early in the unit, but not until a reliable measure of skill development can result. Toward the end of the unit, after considerable time has been provided for skill acquisition to occur, a second administration of the test battery is given. The mean performance of the group of the 2 administration is compared and if statistically different, the group can be assumed to have gained something they did not have early in the unit: the ability to play tennis. Consequently, construct validity can be claimed for
the test battery. This is a comparison between groups essentially because the original group has changed, is different, by the time of the second administration of the test battery.

Comparison With Levels: Assuming that the same test battery is under study for validity purposes, it might be administered to a group completing a beginning class in tennis and to another group completing an intermediate course in tennis. If the comparison of means scores revealed a statistically significant difference, then it would be assumed that the test was able to distinguish between those who could be expected to perform better and those who could be expected to perform with less skill. Sometimes such validation procedures use varsity groups as one of the comparison groups to be sure those who should be :good: are clearly distinguishable from those who could not be expected to perform as well.

The inference is that some construct, in this case tennis playing ability, is present in one group which is not present to such a degree in the other group. Construct validity is more indirect than concurrent validity because it infers the presence of some quality whereas the latter shows a direct relationship.

To day there has been a keen awareness of the need for physical fitness on a nation wide scale and it is in this context that method content and aim of physical education have to be visualized. The development of fitness is one objective of physical education which is widely understood and appreciated. Physical fitness is a very desirable quality to be possessed. The amount of fitness factor differs from State to State with geographical condition race and so on. The present researcher’s experienced that the needs merely that, various district have developed their own physical norms, and they differ from another.