CHAPTER-III
METHODOLOGY

A sound methodology is a pre-requisite to the systematic analysis of the stated problem and to draw realistic, unbiased and meaningful conclusions from the results of the study. This chapter describes the choice of study area, sampling procedure, sources and nature of data and analytical tools used in the present study.

3.1. Selection of Subjects

As the study was intended to focus mainly on the impact of recreational programme, the handicapped children between the age group of twelve to eighteen years, studying in the special schools namely Lilane school for Physically Handicapped, Nilakottai and Clara Olive CSI Polio school for physically handicapped in Madurai and Dindigul District, respectively, were considered as the universe for the study. Taking into consideration the objectives of the study and the time availability for the conduct of study, it was decided to limit the sample size to 140 orthopeadically handicapped children. Analysis of Variance were conducted to test the homogeneity between orthopeadically handicapped male and female children and between the two schools and the results are presented in Appendix - A.
3.2. Sampling Procedure

A simple stratified random sampling was adopted to select the subjects meant for the study. All the handicapped subjects falling between fourteen to eighteen years of age in the two schools mentioned above were stratified into two strata namely male and female and from the two strata an equal sample of seventy children were selected, thus constituting a total sample size of 140 subjects comprising seventy males and seventy females. There is no variation between the two schools with respect to the location, climatic condition, dietary administration, school atmosphere age wise distribution of subjects and teaching methods. The school wise distribution of subjects is furnished in Table 2.

**TABLE - 2**

**SCHOOL WISE DISTRIBUTION OF SELECTED SUBJECTS**

<table>
<thead>
<tr>
<th>S. No</th>
<th>Name of the school</th>
<th>Number of subjects selected</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>1.</td>
<td>Lilane school for Physically Handicapped, Nilakottai</td>
<td>35</td>
<td>35</td>
</tr>
<tr>
<td>2.</td>
<td>Clara Olive CSI Polio School, Melur</td>
<td>35</td>
<td>35</td>
</tr>
</tbody>
</table>
3.3. Selection of Variables

Based on the review of past studies and in consultation with the experts in the field of study it was decided to explore the improvement in selected psychological variables namely self concept, personality and social adjustment in orthopeadically handicapped subjects by administering recreational programme consisting of physical exercises with pre and post evaluation using the standardized Mukta Rani Rastogi self-concept scale, Cattell's High School Personality Questionnaire and Adjustment inventory of Beenah Shah. The construction procedures, inventories, scoring and the administration procedures are presented in Appendices - B to D.

3.4. Self Concept, Personality and Adjustment Scales

3.4.1. Self-Concept Scale of Mukta Rani Rastogi

A variety of methods and techniques have been developed to index self concept. Few important techniques are Q sort value, Semantic differential techniques, other rating methods, questionnaire and adjective checklists. The self concept scale of Mukta Rani Rastogi consists of 51 items related to 10 constructs of self concept like health and sex appropriateness, abilities, self confidence, self acceptance, worthiness, present past and future, belief and
conviction, feeling of shame and guilt, sociability and emotional maturity. It is a standardized self concept scale developed under Indian context involving the process of item selection, item analysis, and it is tested for content validity, item discriminability, homogeneity and reliability. It contains 51 positive and negative items having a five point continuum. The scale has a maximum score of 255 and a minimum score of 51. It is a self-administered scale. It can be administered individually as well as on a group. There is no time limit, but all the items can be responded within the time limit of 30 minutes.

3.4.2 Cattell and Cattell High School Personality Questionnaire

Personality is a multifaceted phenomenon and the measurement of this psychological variable is a difficult task. Many scales have been developed in the past to measure the personality traits. Cattell’s 16 PF Questionnaire measures the personality dimensions of adults, whereas Early School Personality Questionnaire (ESPQ), Children’s personality Questionnaire (CPQ) measures the personality traits of children at different age groups. In the present study the High School Personality questionnaire - Form A was employed.
The High School Personality questionnaire (or HSPQ) developed by Cattell and Cattell (1969) is an instrument that gives an objective analysis of the individual personality. The reading level of the test is adapted to ages ten or twelve years through eighteen years. The HSPQ is a standardized tested scale that can be administered on a single individual or groups. The scale was tested for internal consistency, reliability and homogeneity, conceptual and concrete validity. It has been attenuated to variations in sex, race and religions and has got universal application.

The HSPQ measures fourteen distinct dimensions or traits of personality, which have been found by psychologists to come near to covering the total personality. They are Reserved Vs warm hearted (A), Low Intelligence Vs high Intelligence (B), Affected by feelings Vs Emotionally stable (C), Undemonstrative Vs Excitable (D), Obedient Vs Assertive (E), Sober Vs Enthusiastic (F), Disregards rules Vs Conscientious (G), Shy Vs Adventurous (H), Tough minded Vs Tender minded (I), Zestful Vs Circumspect individualism (J), Self Assured Vs Apprehensive (O), Socially Group dependent Vs Self-sufficient (Q2), Uncontrolled Vs Controlled (Q3) and Relaxed Vs Tense (Q4). Two poles or extremes define each dimension. The left hand one is a score at the low end (1-3) and the right hand at the high end (8-10) and middle (3.1 to 7.89) represents the average level of the personality trait concerned. The raw scores on the fourteen dimensions of personality will be converted into normal stens for further
analysis and comparison. For the derivation of secondary source traits of personality, the raw scores of the selected primary traits were converted first into standard scores (S stens) and weighted by using appropriate weights as given in (Table 31) the Handbook for the HSPQ to derive the secondary source traits of personality. The secondary source traits thus derived were then converted to percentiles to identify the relative standing of individual subjects. The secondary source traits of personality considered under the study are Extraversion Vs Introversion (Q I), Anxiety Vs Adjustment (Q II), Cortertia Vs Pathemia (Q III) and Independence (Q IV).

3.4.3. Adjustment Inventory of Beena Shah

The term adjustment may be used to imply the process by which a person changes his behaviour to achieve a harmonious relation between himself and his environment.

Adjustment Inventory of Beena Shah has been designed for use under Indian context. The Inventory seeks to discriminate the well adjusted secondary level students (age group 14 to 18 years) from their mal-adjusted counterparts in three areas of adjustment: Home, School and Emotional. The Inventory consists of 75 items equally distributed over three areas of adjustments. The negative and positive statements of the adjustment
inventory are scored by using the value 0/1 and 1/0 for yes / no responses, respectively. The maximum score is 75 and minimum is 0 for total adjustment and it is equally distributed among three dimensions with a score of 25 each. It is a standardized adjustment scale developed by following the process of item selection, item analysis, and tested for discriminability, homogeneity, validity, and reliability. It is a self-administering inventory. There is no time limit for answering its statements. Ordinarily about 25 minutes are sufficient for answering all statements.

3.5. Accuracy of Data

Accuracy of data was ensured by using appropriate and reliable instruments for administering the exercises and testing the subjects and the standardized questionnaire/scales for test-retest reliability with respect to the measurement of psychological variables.

3.6. Pre testing the standardised questionnaire

Before data collection, the Tamil version of standardised Mukta Rani Rastogi self-concept scale, Cattell’s High School Personality Questionnaire and Adjustment inventory of Beenah Shah were subjected to reliability test by administering the same to a sub sample of respondents. In order to test the
reliability of the measurement tools, the questionnaire were administered twice to a set of ten subjects in each school with an interval of fifteen days and the responses were collected. The reliability coefficient was worked out using the following formula

\[ r_{tt} = \frac{2 \ \text{roe}}{1 + \text{roe}} \]

where,

\[ r_{tt} = \text{reliability coefficient}^{101}, \]
\[ \text{roe} = \text{correlation between scores on the questionnaire on a particular date and scores on the same questionnaire of the same ten respondents after fifteen days.} \]

The reliability coefficient computed for test and retest scores on the administration of self concept, personality and adjustment inventories were 0.86, 0.93 and 0.89, respectively, and found significant. In addition the translated Tamil version of the standardized self concept, personality and adjustment scales were given to the subject specialists in Tamil and Physical education for its content validity, clarity and contextual rightness. The modifications suggested by the specialists were incorporated in to the respective testing scales. Apart from the computation of reliability of the

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questionnaire, a pilot survey was also conducted to ascertain the clarity and simplicity of the Tamil versions of the standardized questionnaires.

3.7. Orientation of Subjects

The researcher personally interviewed the respondents included in the sample. The objectives and the importance of the study were clearly explained to all the orthopeadically handicapped children to win their confidence and to ensure their cooperation in the study. The data were collected in a free atmosphere without creating any stress to the subjects. The researcher attempted to contact respondents at their schools concerned for filling of questionnaires and conducted interview sessions in a friendly and informal manner.

3.8. Recreational Programme

3.8.1 Design of the Programme

A series of programmes were developed for orthopeadically handicapped children in India and other advanced countries like USA, England, Germany, Japan, and USSR. Taking into consideration, the Indian conditions, social environment and paucity of resources and the degree of
disability in the orthopaedically handicapped polio myelitis subjects meant for the study, a special recreational programme comprising of eight stations was formulated in consultation with the specialists in the field of medicine and physical education. The recreational programme was administered to a few subjects in the presence of specialists to ascertain the suitability and appropriateness of the programme to the orthopaedically handicapped children. The suggestions of the specialists were incorporated into the training programme sequence. The programme is designed with the principle of progressive loading by loading one station additionally per fortnight to the initial stations of three at the beginning of the recreational programme. The recreational programme designed with the sequential loading of stations is furnished in Table 3. The detailed day wise programme schedule is furnished in Appendix-E.

**TABLE-3**

RECREATIONAL PROGRAMME FOR ORTHOEPEDICALLY HANDICAPPED CHILDREN

**WEEKLY SCHEDULE**

<table>
<thead>
<tr>
<th>WEEK</th>
<th>Station 1: Free arm exercises (10 min)</th>
<th>Station 2: Ball throwing &amp; catching (10 min)</th>
<th>Station 3: Calisthenics-wands (10 min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRST</td>
<td>Free arm exercises (10 min)</td>
<td>Ball throwing &amp; catching (10 min)</td>
<td>Calisthenics-wands (10 min)</td>
</tr>
<tr>
<td>WEEK</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SECOND</td>
<td>Free arm exercises (10 min)</td>
<td>Ball rolling &amp; passing (10 min)</td>
<td>Calisthenics-wands (10 min)</td>
</tr>
<tr>
<td>Week</td>
<td>Station 1</td>
<td>Station 2</td>
<td>Station 3</td>
</tr>
<tr>
<td>------------</td>
<td>-----------------------------------</td>
<td>---------------------------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>THIRD WEEK</td>
<td>Free arm exercises (10 min)</td>
<td>Ball passing (10 min)</td>
<td>Calisthenics – wands (10 min)</td>
</tr>
<tr>
<td>FOURTH WEEK</td>
<td>Free arm exercises (10 min)</td>
<td>Ball passing (10 min)</td>
<td>Calisthenics – wands (10 min)</td>
</tr>
<tr>
<td>FIFTH WEEK</td>
<td>Free arm exercises (10 min)</td>
<td>Ball passing (10 min)</td>
<td>Calisthenics – wands (10 min)</td>
</tr>
<tr>
<td>SIXTH WEEK</td>
<td>Free arm exercises (10 min)</td>
<td>Ball passing (10 min)</td>
<td>Calisthenics – wands (10 min)</td>
</tr>
<tr>
<td>SEVENTH WEEK</td>
<td>Free arm exercises (10 min)</td>
<td>Ball passing (10 min)</td>
<td>Calisthenics – wands (10 min)</td>
</tr>
<tr>
<td>EIGHTH WEEK</td>
<td>Free arm exercises (10 min)</td>
<td>Ball passing (10 min)</td>
<td>Calisthenics – wands (10 min)</td>
</tr>
</tbody>
</table>
3.8.2. Administration of the Recreational programme

To analyse the efficacy of intervention in any research, two scientific methods namely “with and with out” and “before and after” are usually employed. Under ‘with and with out’ situation, intervention will be
administered to an experiment group and a control group will be maintained with out intervention. The comparison of experiment and control groups in such situation takes into consideration the influence of external factors and avoids any bias arising out of it. On the other hand, 'before and after' method requires the conduct the experiment in a controlled environment by avoiding the external influences and may also provide similar result as that former method.

In the present study "before and after method" was adopted by maintaining the experiment environment and the subjects as the same. As the present study involves intervention by way of recreational programme, full control on the dietary regime, time and duration of the recreational routine for the subjects were followed unscrupulously. Apart, restriction on any other physical activity except the recreational programme meant for the study was imposed very regessively to avoid the influence of external factors on the performance of subjects with respect to the psychological variables tested. More over, the experiment duration is too short (12 weeks) for any extraneous variables like history and maturation to introduce bias into the experiment and it is also long enough to avoid reactivity problems of the scales arising out of the subjects. The recreational programme was conducted by the researcher and same trained experts at every day evening after the school for 12 weeks as per the schedule for all the subjects. The photo plates depicting the administration of recreational programme are furnished below.
Figure I. Free Arm Exercise (Station-1)

Figure II. Ball Passing and Throwing (Station-2)
Figure III. Calisthenics - Wands Exercise (Station-3)

Figure IV. Ball Relays- Upper Hand Ball Pass Relay (Station-4)
Figure V. Calisthenics – Dumb bells Exercise (Station-5)

Figure VI. Minor Games – Finding the leader (Station-6)
Figure VII. Aerobic Dance (Station-7)

Figure VIII. Autogenic Training (Station-8)
3.9. Procedure for collection of data

Since the present study is an experimental research work, collection of data on the psychological variables such as self-concept, personality and social adjustment of the orthopedically handicapped subjects were made in pre and post training periods that is before administering recreational programme and after administering recreational programme. To enable this, the Tamil versions of Mukta Rani. Rastogi self-concept scale, Cattell's High School Personality Questionnaire and Adjustment inventory of Beenah Shah were administered to the subjects at Lilane school for Physically Handicapped and Clara Olive CSI Polio school before taking up recreational programme and the pre scores on self-concept, personality and adjustment were collected by the trained experts simultaneously.

After the collection of pre scores, the recreational programme was implemented for a period of three months. After imparting recreational programme for three months, post test was administered to the same subjects by using the same questionnaires and the post scores on self-concept, personality and adjustment were obtained simultaneously. The pre scores and post scores of the orthopedically handicapped subjects were subjected to statistical analyses to study the effect of recreational programme on the self-concept, personality and adjustment.
3.10. Tools of Analysis

3.10.1. Analysis of Variance (ANOVA) was used to test the homogeneity of the sample with respect to sex and the special schools meant for data collection.

3.10.2. Simple average, percentage and frequency analyses were used to study the pre and post raw scores on the self concept, personality and adjustment of the male and female orthopedically handicapped children.

3.10.3. Coefficient of Variation was employed to analyse the variations in the improvement on self-concept, personality and adjustment among orthopedically handicapped male and female subjects between pre and post training periods. Coefficient of Variation is a better measure when compared to standard deviation since it takes into account the variation between standard deviation and mean as a percentage and thus adopted in the study. Coefficient of Variation (CV) is worked out by employing the following formula.

\[ CV(\%) = \frac{SD}{Mean} \times 100 \]

where, SD= Standard Deviation

3.10.4. Paired ‘t’ Test: In the ‘t’ test for difference of small sample means, it is assumed that the samples are independent of each other. There might be
situations where the samples are not independent and the values of the second sample depend on the values of the first sample.

In small samples every often the values of the two samples are paired together. In the present study the researcher was interested to know the effect of the recreational programme on the self concept, personality and adjustment of the orthopaedically handicapped children between pre and post training periods by keeping the same subjects. Thus, the score values of the two samples with respect to self concept constructs, primary and secondary personality factors and the three dimensions of adjustment (Home, School and Emotional) are paired and the value of the post period scores is dependent on the pre period scores. In such cases the paired 't' test can be applied. The significance test applied in such cases for small samples is

\[
t = \frac{(d \cdot 0) \times \sqrt{n}}{s} \quad \text{or} \quad t = \frac{d \times \sqrt{n}}{s}
\]

where "d" is the mean of the differences of the paired values. S is the standard deviation of the difference.

\[
S = \sqrt{\sum (d - d)^2} \quad \text{or} \quad S = \sqrt{\sum d^2 - (d)^2 \times n}
\]

n - 1
n - 1

The significance of calculated 't' value was tested for 5 % and 1 % levels of probability. By using 't' table values, if \( t_{\text{calculated}} > t_{\text{table values}} \), the means

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of the samples were considered as significantly different from each other and vice versa.

3.10.5. Correlation analysis

Pearson's product moment correlation co-efficient was calculated to find out the degree of association between the ten constructs of self concept, fourteen primary traits and four secondary factors and the three dimensions of adjustment of the orthopaedically handicapped subjects gender wise for pre and post training periods separately for each category. Two factors or constructs or dimensions were considered at a time under each category by using the following formula.

\[
r = \frac{\sum xy - (\sum x)(\sum y)}{n} \sqrt{\frac{(\sum x^2) - (\sum x)^2}{n} \frac{(\sum y^2) - (\sum y)^2}{n}}
\]

Where,

\[
\sum xy - (\sum x)(\sum y)/n = \text{Sum of product of 'x' and 'y'}
\]
\[
\sum x^2 - (\sum x)^2/n = \text{Sum of squares of 'x'}
\]
\[
\sum y^2 - (\sum y)^2/n = \text{Sum of squares of 'y''}
\]

The significance of calculated 't' values was tested for five percent and one percent levels of significance. The correlation co-efficient thus worked out
would reveal the strength of association between the different constructions of self-concept, primary personality factors, secondary personality factors and between different dimensions of adjustment. The comparison of correlation coefficients between these variables in pre and post physical training periods would indicate the improvement in the association of the above said psychological variables if any, which in turn indicate the magnitude and direction of improvement in the psychological variables considered for the study.

3.10.6. Functional Analysis

Regression analysis\textsuperscript{104} was employed to study the functional relationship between the total self-concept score as dependant variable and its constructs as independent variables expressed as percentage to their maximum scores. Likewise a regression function relating the total score of adjustment as dependent variable and its dimensional variables as independent variables expressed as percentage to the concerned maximum score was also specified to analyse the quantitative relationship between total adjustment and its dimensional variables. Separate regression functions were specified for pre and post training periods with respect to male and female children.

The functions specified for self concept and adjustment in male and female children are given below.

**Self concept**

\[ Y_{S\text{ pre}} = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + \ldots + b_{10} X_{10} + \mu \]
\[ Y_{S\text{ post}} = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + \ldots + b_{10} X_{10} + \mu \]

**Adjustment**

\[ Y_{A\text{ pre}} = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + \mu \]
\[ Y_{A\text{ post}} = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + \mu \]

where,

\[ Y_{S\text{ pre}} = \text{Dependent variable - Total self- and concept expressed as percentage in pre and post periods, respectively} \]
\[ Y_{S\text{ post}} \]
\[ Y_{A\text{ pre}} = \text{Dependent variable - Total and adjustment expressed as percentage in pre and post periods, respectively} \]
\[ Y_{A\text{ post}} \]
\[ b_0 = \text{Intercept} \]
\[ X_1 \cdot X_n = \text{Independent variables- self concept constructs and adjustment dimensional variables} \]
\[ b_1 - b_{10} \]

and \[ b_1 - b_3 \] = Partial regression coefficient of self concept and adjustment dimensional variables

\[ \mu \] = Error term

The pre and post functions were estimated and the influence of independent variables on total self concept and total social adjustment of orthopeadically handicapped male and female children were analysed.

3.10.7. Chow Test:

The chow test\(^{105}\) was employed to study the change in total self concept and total social adjustment between the pre and post periods because of the recreational programme. The assumptions underlying the chow test are two fold.

(a) \[ \mu_{11} \sim N(0, \sigma^2) \] and \[ \mu_{21} \sim N(0, \sigma^2) \]

That is, the two error terms are normally distributed with the same (homoscedastic) variance $\sigma^2$ and

(b) $\mu_{1t}$ and $\mu_{2t}$ are independently distributed.

With the above assumptions the chow test proceeds as follows.

**Step-1.** Combining all the $n_1$ and $n_2$ observation of pre and post period, estimate the regression and obtain its residual sum of squares (RSS), say $S_1$ with df = $(n_1 + n_2 - k)$, where $k$ is the number of parameters estimated in the regressions.

**Step-2.** Estimate pre and post regressions individually and obtain the RSS, say $S_2$ and $S_3$ with df = $(n_1-k)$ and $(n_2-k)$, respectively. Add these two RSS, and call it as $S_4 = S_2 + S_3$ with df = $(n_1 + n_2 - 2k)$.

**Step-3.** Obtain $S_5 = S_1 - S_4$.

**Step-4.** Given the assumption of the Chow test it can be shown that

$$F = \frac{S_4 / k}{S_4 / (n_1 + n_2 - 2k)}$$
It follows the ‘F’ distribution with df \((K, n_1 + n_2 - 2k)\). If the computed ‘F’ value from step-4 exceeds the critical ‘F’ value at the chosen level of significance, reject the hypothesis that the pre and post regressions are the same. In other words it is concluded that there is significant difference exists in self concept and adjustment of the orthopedically handicapped children between pre and post recreational programme periods because of the physical training programme.