CHAPTER III

MATERIAL

AND

METHODS
CHAPTER III

MATERIAL AND METHODS

3.1 SAMPLE SIZE AND POPULATION

In order to examine the inter-group anthropometric variations among the HIV/AIDS and pulmonary tuberculosis co-infected patients (Group I), only pulmonary tuberculosis patients (Group II) and healthy individuals (Group III) with respect to body composition, 300 Meitei males (100 each from Group I, II and III) having age range from 20-40 years representing the four valley districts of Manipur were randomly selected as the subjects. Manipur lies between 23°50' and 25°30' North and Longitude 93°10' and 94°30' East and consists of 7000 square miles of hill territory, and of 1000 square miles of level country forming the broad valley. The total area of Manipur state is 22,327 sq.km. Geographically, it is divided into two tracts viz. the hills consisting of five districts and plains with four districts. It is bounded by Myanmar on the east, Nagaland on the north, Assam and Mizoram on the west, and the Myanmar and Mizoram on the south. It is a country of Blue Mountains and green valleys. The valley which is 2600 ft above sea level is oval shape and surrounded by the hills on all sides. The valley inhabited by the Meiteis is one tenth of the total area of the state. The total population of the Manipur is 2,388,068 (Dinamani, 2001). The
state is inhabited by three ethnic groups, namely Meiteis including the Meitei Muslims and scheduled castes in the valley, and the Nagas and Kuki-Chin tribes in the hills. People are predominantly Mongloid. The main profession of the population is agriculture, weaving, fishing; and other cottage industries are the main supplements. Employment in the Government and Semi-Government establishments and institutions forms hardly 5% of the employment statistics. Meitei speaks Manipuri or Meitei lon which is belonged to Tibeto Burman family. Manipuri or Meitei Lon is the only language on the eastern border of India, which has its own script. Meiteis of Manipur are patrilineal, patrilocal and patriarchal in their social structure. They observed caste endogamy and clan exogamy. Meitei had their own tradition of worshipping their ancestors and local deities. However, after proselytisation majority of the Meiteis follow Hinduism as their religion. There is also a group of revivalists who follow pre-Hindu beliefs and practices. They are popularly known as “Meitei Marup” (Devi, 2008).

A structured research schedule was prepared to cater the aim and objectives of the study. This cross sectional sample was divided into 7 age groups of inclusive class intervals of 3 years each.

### 3.2 AGE WISE DISTRIBUTION

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Group I f (%)</th>
<th>Group II f (%)</th>
<th>Group III f (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-22</td>
<td>12</td>
<td>5</td>
<td>18</td>
</tr>
<tr>
<td>23-25</td>
<td>18</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>26-28</td>
<td>23</td>
<td>9</td>
<td>17</td>
</tr>
</tbody>
</table>
### 3.3 SET OF PARAMETERS

For the purpose of present study twelve direct somatometric measurements and two physiological measurements were taken on the subjects. Anthropometric measurements include six linear measurements, one ponderal measurements and four girth measurements. All the somatometric measurements were taken following the techniques suggested by International Biological Programmed (Weiner and Lourie, 1969). The physiological measurements viz. systolic and diastolic blood pressures were determined by auscultatory method with the help of a sphygmomanometer and stethoscope. Using the above somatometric measurements, eleven different derived measurements showing body dimensions, compositions and proportions were calculated by employing standard formulae. Following is the list of parameters considered for the study.

**Anthropometric Measurements**

1. Body weight
2. Height Vertex (Stature)
3. Sitting Height Vertex
4. Upper Extremity Length
5. Lower Extremity Length
6. Bi-acromial Breadth
7. Hip Breadth
8. Calf Girth
9. Arm Girth
10. Horizontal Circumference of Head
11. Chest Girth (Maximum inspiration)
12. Chest Girth (Normal respiration)

Physiological Measurements

1. Systolic Blood Pressure
2. Diastolic Blood Pressure

Body Composition

1. Body Fat percent
2. Height Weight Ratio
3. Body Mass Index
4. Ponderal Index
5. Body Surface Area
6. Blood Volume
7. Total Body Water

Somatometric Indices
1. Relative Upper Extremeties Indices.
2. Relative Biacromial Breadth Index.
3. Relative Chest Girth Index
4. Robusticity Index

3.4 MEASUREMENTS AND INSTRUMENT USED

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Instruments</th>
<th>unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stature</td>
<td>Martin’s anthropometer with least count of 0.5cm</td>
<td>Cm</td>
</tr>
<tr>
<td>Body weight</td>
<td>Portable weighing machine with least count of 0.5kg</td>
<td>Kg</td>
</tr>
<tr>
<td>Girths</td>
<td>Girth measurer of least count of 0.5cm</td>
<td>Cm</td>
</tr>
<tr>
<td>Blood Pressure</td>
<td>Sphygmomanometer and stethoscope</td>
<td>mmHg</td>
</tr>
</tbody>
</table>

3.5 DEFINITIONS AND FORMULAE OF DERIVED MEASUREMENTS

Body Fat Percent (%F): It is the percentage of the fat in relation to body components. Body fat is calculated by using the formula established by Abel-Malek et al. (1985) as follows:

\[ %F = \frac{W^{1.2}}{S^{3.3}} \times 3 \times 10^6 \]

(Where, W=Weigh, S=Stature)

Body Surface Area (BSA): It is the total surface area of the whole body. It is calculated by using the formula given by Sen (1975) for the males as:

\[ BSA = W^{0.425} \times H^{0.725} \times 74.66 \text{ Sq.m} \]
(Where, \( W = \) Body weight in kilogram, \( H = \) Height in meter)

**Body Mass Index index (BMI):** It is the measure of relative weight dependent on height. It is determined by dividing weight in kilogram divided by the squared value of height in metre as:

\[
\text{BMI} = \frac{\text{Body weight (Kg)}}{\text{Height (m)}^2}
\]

**Ponderal Index (PI):** It is calculated as height in centimeter divided by cube root of weight in kilogram as:

\[
\text{PI} = \frac{\text{Height (cm)}}{3\sqrt[3]{\text{Weight (kg)}}}
\]

**Blood Volume:** It is the volume of the blood present in the body. It is calculated by applying regression equation established by Allen et al.(1956) for adult male as:

\[
\text{BV} = 0.417(\text{HT in m})^3 + 0.0450\text{TBM} - 0.030 \text{ litre}
\]

(Where, \( H = \) Stature in metre, \( \text{TBM} = \) Total body mass in kilogram)

**Total Body Water (TBW):** As the name signifies, it is the total water present in the human body. It is estimated by using the following formula proposed by Mellitis and Cheek (1970) for males.

\[
\text{TBW} = 1.065 + 0.603(\text{Body Weight in kg}) \text{ litre}
\]

### 3.6 DEFINITIONS AND FORMULAE OF SOMATOMETRIC INDICES:

**Relative Upper Extremeties Indices:** It is calculated by using the formula

Relative Upper Extremeties Indices = \( \frac{\text{Total Arm Length}}{\text{Height Vertex}} \times 100 \).
**Relative Biacromial Breadth Index:** It is calculated by applying the formula
\[
\text{Relative Biacromial Breadth Index} = \frac{\text{Biacromial Breadth}}{\text{Height Vertex}} \times 100.
\]

**Relative Chest Girth Index:** It is calculated by using the formula
\[
\text{Relative Chest Girth Index} = \frac{\text{Chest Girth}}{\text{Height Vertex}} \times 100.
\]

**Robusticity Index:** It is calculated by applying the formula
\[
\text{Robusticity Index} = \text{Height Vertex in cm} - \text{Chest Girth in cm} + \text{Weight in kg}
\]

3.7 **ANALYSIS OF THE DATA**

The following statistical constants and test of significance are used for a systematic and meaningful comparison and presentation of the data. MS Excel software was used for calculation of the statistical values.

1. Average or Arithmetic mean
2. Standard Deviation
3. Standard errors of mean, standard deviation and co-efficient of variance
4. Co-efficient of variance
5. Test of Significance (student ‘t’ test)
6. Chi-square test