CHAPTER II

MATERIAL AND METHOD
The material for studying variation, if any, among normal and afflicted individuals with various diseases, namely, Cancer, Tuberculosis and Leprosy, is classified as follows:

(1) Random collection of individuals caste-wise.

(2) Persons affected by various diseases representing both the sexes in equal proportions.

Palmar and finger prints were obtained from four thousand randomly chosen Brahman, Thakur and Jain individuals. Out of these, two thousand individuals were affected by Cancer, Tuberculosis and Leprosy (Table 2.1).

It may be further added that the finger configurations are also included in the present study.

The palmar and finger prints were obtained from amongst the Jain, an endogamous community, to study variation, if any, in respect of dermatoglyphic features in the control population and the persons afflicted with cancer. The study is mainly concentrated on cheek, throat, lung cancer and leukemia. The number of patients suffering from these types is greater than those suffering from other types of cancer.
<table>
<thead>
<tr>
<th>Jain Caste</th>
<th>Cancer Male</th>
<th>Cancer Female</th>
<th>Tuberculosis Male</th>
<th>Tuberculosis Female</th>
<th>Leprosy Male</th>
<th>Leprosy Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cheek cancer</td>
<td>100</td>
<td>100</td>
<td>Brahman with T.B.</td>
<td>100</td>
<td>100</td>
<td>Brahman with Leprosy</td>
</tr>
<tr>
<td>Controlled</td>
<td>100</td>
<td>100</td>
<td>Brahman controlled</td>
<td>100</td>
<td>100</td>
<td>Brahman controlled</td>
</tr>
<tr>
<td>Throat cancer</td>
<td>100</td>
<td>100</td>
<td>Thakur with T.B.</td>
<td>100</td>
<td>100</td>
<td>Thakur with Leprosy</td>
</tr>
<tr>
<td>Controlled</td>
<td>100</td>
<td>100</td>
<td>Thakur controlled</td>
<td>100</td>
<td>100</td>
<td>Thakur controlled</td>
</tr>
<tr>
<td>Lung cancer</td>
<td>100</td>
<td>100</td>
<td>Jain with T.B.</td>
<td>100</td>
<td>100</td>
<td>Jain with Leprosy</td>
</tr>
<tr>
<td>Controlled</td>
<td>100</td>
<td>100</td>
<td>Jain controlled</td>
<td>100</td>
<td>100</td>
<td>Jain controlled</td>
</tr>
<tr>
<td>Leukemia</td>
<td>100</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Controlled</td>
<td>100</td>
<td>100</td>
<td></td>
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</tbody>
</table>
It may be further added that the number of patients belonging to this community is greater than that in other communities, in the population studied. Therefore, this caste is specifically chosen for the present study.

The palmar and finger prints were collected from the Medical College of Jabalpur, Indore, and the Tata Memorial Cancer Institute, Bombay.

The data for Tuberculosis have been collected from the Brahman, Thakur and Jain communities. The data on the disease have been collected from Sagar, Nowgaon, Jabalpur and Chhindwara Sanitoria. The palmar prints of 100 males and 100 females of each community were obtained. The controlled samples also constitute equal number of individuals (Table 2.1). This study is confined to Pulmonary Tuberculosis only.

The palmar prints of the Leprosy patients were collected at the Jalma Leprosy Research Institute, Agra.

The data for this study are collected from amongst Brahman, Thakur and Jain with 100 males and 100 females from each community. The controlled sample also consisted of an equal number of individuals.

The results based on the random material are further compared with those obtained on the persons affected with various diseases in order to identify difference, if any.
The present work incorporates both qualitative and quantitative dermatoglyphic features. The qualitative features include the palmar main line formula and the other configurations available on the palmar region. The qualitative features included are ridge counts between successive digital triradii of the palm. In order to have some broad conclusions finger configurations are also included in the present study.

The techniques employed and the equipment used for taking palm prints are those described by Cummins and Midlo (1961).

The prints were examined under a magnifying glass and various qualitative dermatoglyphic features of the palmar and finger prints analysed according to the revised method of Cummins and Midlo (1961). For studying quantitative dermatoglyphic features, the ridge count of successive digital triradii is incorporated. The digital triradii a, b, c, and d were connected by fine straight lines in a-b, b-c, c-d, and a-d sequence, and all ridges were counted between these triradii. Every ridge crossing or touching this line is represented in the count, except for the interstitial ridges. The a-b, b-c, c-d and a-d counts of an individual are the sum of the counts on the two palms.

The data, thus analysed, are further subjected to statistical treatment. The tests employed for this purpose are briefly described here:
't' TEST:

This device is employed to find out whether the difference between mean values of two types of observation really existed in the population, or is due to sampling fluctuations. The formula noted below is based on the assumption that the two samples are independent of each other and the variables have equal variance (Fischer, 1954):

\[
t = \frac{x_1 - x_2}{\sqrt{\frac{n_1 s_1^2 + n_2 s_2^2}{(n_1 + n_2 - 2)} \left( \frac{n_2}{n_1} + \frac{1}{n_2} \right)}}
\]

\[
\frac{n_1^2 + n_2 s_2^2}{(n_1 + n_2 - 2)(n_1 - n_2)}
\]

where, \(x_1\) and \(x_2\) are the two sample means, \(s_1^2\) and \(s_2^2\) are sample variances, and \(n_1\) and \(n_2\) are the corresponding sample sizes.

If the calculated value of 't' exceeds the value given in the standard tables (for a pre-determined level of significance), the difference is significant. It is not significant, if the value is less than the one given in the tables. The number of degrees of freedom to be taken is \(n_1 + n_2 - 2\).
CHI SQUARE TO TEST THE SIGNIFICANCE OF THE ATTRIBUTES:

In order to examine whether an association really exists between two attributes in the population, we have to allow for possible sample fluctuations. For this purpose, large sample $x^2$ test of significance is used. The calculation for $x^2$ is as follows:

$$x^2 = \sum \frac{(o_i - e_i)^2}{e_i}$$

where, $o_i$ represents the observed frequencies in the $i$th cell, and $e_i$ represents the frequencies in the same cell that are expected to arise, if the two attributes are independent. In other words, $e_i$ represents the expected frequencies in the $i$th cell on the hypothesis of independence.

Values of $x$ are then looked up in the standard tables available for this purpose. If the calculated value exceeds the one given in the tables, the association is not significant.

STANDARD DEVIATION:

It is essential in statistical investigations to calculate the variability of the size of items around an average to throw more light on the composition of a series.
This variability is best measured with the help of standard deviation.

Standard deviation could be defined as the square root of the arithmetic average of the squares of deviations measured from the mean:

\[ \sigma = \sqrt{\frac{\sum d^2}{n}} \]

where, \( \sigma \) stands for the standard deviation, \( \sum d^2 \) is the sum of the squares of deviations measured from the actual arithmetic averages, and \( n \) = number of items in the series.

However, if we want to compare the dispersion in two series, we cannot use the absolute dispersion which we get above, but we have to calculate the relative dispersion which is free from the unit of measurement. Thus, in a comparison of the variability of the two or more series, it is the relative dispersion that has to be taken into account, as the absolute dispersion may be unfit for comparison, if the series are originally expressed in different units. For this purpose, we have to take the help of coefficient of variation.

The mechanism of distribution of the qualitative and quantitative dermatoglyphic features among afflicted individuals with various conditions and normal individuals
is studied to find out the difference, if any, in respect of these features among them. In this way, an assessment is made of the extent to which these features exhibit variation among affected and normal individuals.