CHAPTER I

INTRODUCTION
The human palmar and planter surfaces are covered with a number of minute ridges. This ridged skin is confined to the palmar finger balls and digital margins. These ridges form varied configurations which are collectively termed Dermatoglyphics. Thus, the dermatoglyphics can be defined as the study of delicately sculptured skin surface, inclusive of single ridges and their configurational arrangements (Cummins and Midlo, 1961).

Dermatoglyphic studies could be used to great advantage in classifying populations into various ethnic categories, because dermatoglyphic traits have a genetical basis and, except in total size, they do not undergo any postnatal changes. These traits are also non-adaptive, thus eliminating the effects of natural selection and mutation.

The traits usually employed in the study of ethnic variations include both qualitative and quantitative dermatoglyphic characters available on palmar, planter and finger regions.

The dermatoglyphic material on various populations help in recording ethnic variations on the basis of these traits. Values for finger and toe patterns are usually calculated
from indices of pattern intensity, palmar patterns from percentage frequencies and palmar main lines from main line indices. The palmar and planter patterns are calculated individually and collectively too. The data are analysed qualitatively and also on the basis of quantitative methods, which include the counting of ridges and several other linear and angular measurements.

The study of dermatoglyphics is of great value in the diagnosis of the zygosity of twins. Among several dermatoglyphic areas, MacArthur (1938) consider finger ball features are more reliable than palmar features in distinguishing between the two types of twins. His dermatoglyphic methods for the diagnosis of twins are largely based on ridge counting.

Stocks (1930) method for diagnosing the type of twins is based on a bilateral comparison of finger prints. If seven or more digits have similar patterns the twin pair is considered monozygotic otherwise dizygotic.

Advance knowledge of dermatoglyphics can be utilized in establishing paternity too. The method would be the analysis of dermatoglyphic features in the child and the parents.

Dermatoglyphics has also been found to be helpful in understanding certain medical syndromes. Finger palm and sole configurations show that the frequency of dermal patterns vary significantly in Mongoloid patients compared with normal individuals.
These anomalies or irregularities in the skin patterns among affected individuals are due to several reasons. The most important cause for this condition is a disorder caused by burns or skin disease. These anomalies may be inborn. They may also appear in the aberration of the papillary ridge patterns. It is found in some cases that such an anomaly is associated with some affliction. Some individuals have imperfect ridges by birth. This imperfection or mutilation in the ridges takes place when the human embryo is in the stage of development. It only happens when there are disturbances in the embryo. Abel (1936) noticed some irregularities within the epidermal tissue occurring between the second and fourth fetal months. Fursch and Schweichel (1973) have suggested that irregularities of ridge pattern can be secondary. It is the result of disturbance in the nervous system. There is a distortion, both qualitative and quantitative in the sub-epithelium. In this disturbance or distortion, the nerve branches do not take the normal course but rather deviate, therefore, there is ridge disturbance. The cause of this may be traced to the special arrangement of the nerves.

There are reasons for disturbance in the pattern of the epidermis, when disruptive factors start working. The conclusion is drawn only by seeing and observing the type of damage done in the dermatoglyphic pattern. The unusual formation of the ridge pattern does not confine itself to a particular size of pattern-breaks. It has been observed that
these may be as small as a dot and sometimes they may envelop the entire surface of the ridge skin of fingers, palms, toes and soles.

There are several reasons such as congenital malformation of the epidermal ridges. One of these is decidedly ridge aplasia. It is, however, very rare. Wherever this happens, the absence of ridge over the entire volar surface of hands and feet is observed. This phenomenon was observed by Baird (1964).

Cook (1955) also made a very remarkable observation. A severe hand malformation is seen in a person; it was noticed that there were obvious dissociated and missing ridges on the tip of fingers.

The distortion is not confined to a particular area. It can be observed in any dermatoglyphic region. These dissociated ridges can affect any epidermal area, and may differ in size. Sometimes it takes the form of a nominal or minimal lesion which occur in a very small area within the pattern (Cummins, 1961, 1970; Nettles, 1963; Safara, 1969). This may increase; sometimes it has been found on the total volar surface of the fingers, palms, soles and toes (Cook, 1950, 1962; Cummins, 1970a and Dodinval, 1972).

Abel (1936) found a very interesting fact about dissociated ridges. According to him, there is a close relation between ridge distortion and the individual finger tip. Furuya (1964)
found among normal Japanese population that the decreasing frequency of finger tip is II, III, IV and V but he observed that this order changes in person, who are of unsound mind or mentally deficient. The sequence among the afflicted individuals is V, II, III and IV. Large families were found to have tapering finger nail dystrophy, and very troublesome and painful chapping of finger prints. This anomaly becomes hereditary and is transmitted to successive generations.

The ridge dissociation is always associated with certain disorders. Abel (1936) found some connection of aberrant ridges with certain diseases. These are albinism, oxycephaly, malformation of extremities (e.g. polydactyly, syndactyly, oligodactyly, perodactyly, spina bifida, deafmutism, familial amaurotic idiocy and mental deficiency. Other investigators have also done considerable work in this field, the important work, among these, those by Schade (1937) and Grebe (1940). They found that people having aberrant ridges were suffering from limb malformation or unspecified mental retardation.

It can now be said with confidence that people who are having dissociated ridges suffer from various disorders, but the evidence available from the above statements, it cannot be inferred that a certain type of epidermal anomaly is always the result of certain disease.

Ridge dissociation is apparently sometimes reversible. David (1973a) reported complete disappearance of 'dotted ridges'
over a period of six months in a girl with a small intestinal obstruction. Cook (1958) and David (1971) coined the term 'ridge of the end syndrome'.

David (1973b) gives an example of another dermatoglyphic syndrome, which he propounds to call the Nelson syndrome. This disease is also inherited as an autosomal dominant trait, the affected person has deep interdigital loop, a distally displaced axial triradius and a vertical crack in the hypothenar area.

Anomaly in skin pattern is associated with various types of disorders. It can only be concluded that the dermal features are abnormal among afflicted person. Before arriving at a definite conclusion it should be taken into consideration that dermatoglyphic features exhibit variability among various ethnic strains. Thus a definite relationship cannot be formulated.

PRESENT WORK

This study is based on the qualitative and quantitative dermatoglyphic features among persons who are afflicted with various types of cancer and tuberculosis. These features are again compared with normal individuals. The individuals who are affected with leucoderma are also included in the present
study. The data on controlled sample and affected individuals was collected from amongst three endogamous ethnic strains. The dermatoglyphic characters are studied among normal and affected persons to find out association, if any, among these individuals.

Various configurations on the palmar and finger dermatoglyphic regions and palmar main line formula are dealt with here. In order to have some broad conclusions regarding variability among afflicted and controlled sample quantitative dermatoglyphic features are also substituted.

Quite a good deal of literature is available in the field of quantitative dermatoglyphics. The important work, among these, is by Fang (1950) who finds association with Mongolism in a-b ridge count. Other studies relating to various afflicted conditions on a-b ridge count include Holt Lindstein (1964), Pfeilffel and Kiera (1968), Cushman et al. (1969), Shiono H. and Kadowaki (1971) and Furuya (1974). These studies have proved in ample measure the fact that quantitative dermatoglyphic characters display variation among normal and affected person. Hoefugel and Gerald (1966) have found that the mean a-b ridge count increased in affected individuals of brachydactyly. Holt (1968), Shiono and Kadowaki (1971) found the mean a-b ridge count of Japanese patients with Down syndrome are slightly lower than in controls, but the differences are not significant. Hunters (1968) and Cushman and Soltan (1969) reported significant difference in the mean a-b ridge counts in XXY patients and the
controlled sample.

Many abnormal qualitative dermatoglyphic features were studied by Pfeiffer and Schattle Berge (1964) among children affected with Thalidomide embryo. They show decrease in transverse flow of palmar ridges double digital triradii, abnormal course of main lines, and ridge dissociation. McKurick (1969) and Goodman et al. (1972) reported that the campodactyly patients displayed vertically oriented main lines.

Erne (1953), Coeffler (1969), Plato et al. (1973), in a study of Down syndrome, have found significant difference in frequencies of hypothenar and ulnar types of pattern. Holt (1966) and Shiono and Kodowskki (1971) have observed that the hypothenar area shows an increased frequency of patterns in the Down syndrome.

Penrose (1963), Forbes (1964), Hunter (1968) and Cushman and Soltan (1969) reported that the palm shows distal axial triradii mostly in right position among XXY patients. According to Holt (1970), the D line terminal could be traced to the radial border of the hand in Down syndrome.

The disease related to the finger dermatoglyphic features has been dealt with to study the type of variation among normal and affected individuals. Purvis Smith (1972) observed an increase in finger tip whorl in cytomegalic inclusion patients. Purvis Smith (1969), Rosner (1969) and Verbot (1969) reported an increase of arches and decrease of ulnar loop in the finger
tip with case of acute blast cell leukemia.

Shiono and Kodawaki (1971) pointed out that the increased frequency of whorls among Rubinstein-Taybi syndrome patients are noticed. Alter (1965) investigated that in XXY patients the frequency of arches is greater than the controlled sample. Jones and Thompson (1973) noticed three radial loops on the finger tips of a patient with triphalangeal thumbs and congenital hypoplastic anemia.

The present study deviates from its predecessors, in as much as it incorporated three diseases among Indian urban populations to study variation, if any, in normal and affected individuals regarding dermatoglyphic traits. Finally, a brief description of these diseases is dealt with to study association, if any, available regarding their pathology.

Leucoderma and tuberculosis both are chronic granulomatus diseases which are caused by the organism of same group, Mycobacterium leuco and M. tuberculosis respectively. The pathogenicity of both diseases is different. The resemblance of these diseases can be shown on the basis of Tubercular lesion and lesion of Tuberculoid leucoderma; where there is infiltration of epitheloid cell and hangharis giant cells. Both mentioned bacteria come from the same group having same properties. Mycobacterium leucoderma resembles with Mycobacterium tuberculosis in morphology and staining, but M. leucoderma decolorized more easily by acid than M. tuberculosis.
Several factors are believed to account for the variation in susceptibility to leucoderma, for example, nutrition, occupation, hygiene and economic status.

Regarding tuberculosis William boy (1961) reported individual immunity seems to be largely genetic in character. The chance of developing tuberculosis increase in proportion to the degree of genetic relationship with the affected individuals. Thus it is known that the chances of developing the disease is more than 3 times as high in twins when the relation is identical rather than non-identical.

There are many factors responsible for cancer, such as chemical reaction (Hydrocarbon benzpyrene) radiation, special types of viruses, hormones, environmental and occupational factors as working in radium factory, tobacco-smoking, etc.

Anderson (1977), Borgaonkar et al. (1984), Chernezemsky Petkove (1985), Lynch et al. (1977) have proved that there is a genetic factor involved in the transmission of this disease from one generation to the next.

It has already been established and shown that xeroderma pigmentosa, Retinoblastoma and multiple polyposis of the colon are due to strong hereditary factors. The cancer of breast, uterus, rectum and leukemia also show marked hereditary tendencies.

Cancer has no direct or indirect relationship with
tuberculosis and leucoderma. The worst thing about cancer is that it is a chronic disease and it is diagnosed in the later stage of affected person.

AIMS AND OBJECTIVES

The literature reviewed so far establish a definite trend regarding the fact that the diseases under study have a genetical base. Therefore the present study deals with the nature of distribution of qualitative and quantitative dermatoglyphic features among persons who are affected with cancer and tuberculosis. To obtain certainty, if any, among the affected person two diseases are categorised into 7 categories. For studying the difference regarding various dermatoglyphic traits, they are finally compared with normal individuals. For this purpose controlled sample is substituted. This sample is collected from the families of affected persons. In those cases where the data from these families are not available, it is collected from close relatives, so that there may not be much genetic difference among normal and affected persons.

Another group of subjects which have been studied are the patients of leucoderma who are belonging to three different endogamous units. It was observed that the number of patients of these units namely Bhangi, Chamar and Kori was quite large. This may be due not to the membership of a particular caste,
but to the occupation associated with caste. This is why
caste is considered in leucoderma control sample were also
taken from the family members of the patients. The dermatoglyphic
features are dealt to study the nature of distribution among
affected persons. Further these traits are also compared with
the individuals of controlled sample to find out differences
in these features.

In the following chapters, all the three diseases and
dermatoglyphics characters are dealt to study affinity, if any,
regarding any trait available among normal and affected persons.
It can further be added here that the present study deals with
the diseases and palmar and finger dermatoglyphic features with
a view to studying the nature of distribution of these features.
In this way, an assessment is made the extent to which the
variability is available among normal and affected persons of
the aforesaid diseases.

Finally in the light of discussion made above the present
study will also be compared on which such data are available
else where. In this respect only pulmonary T.B. patients are
compared. Unfortunately no data are available on other diseases
namely cancer and leucoderma, because of this fact only
comparison has not been made.