Chapter-I
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Introduction

1.1. Introduction

Studies on biological anthropology have been carried out on different population groups in different parts of the world since the beginning of the twentieth century. It can be defined as the scientific studies of inter- and intra-populations. The fascinating facts regarding this study is its variability characterized by innumerable characteristics which can be looked from different angles depending upon the interest of the researcher and observer. Physical anthropologists and other human biologists are interested in those genetic or biological characteristics of human species whereas social anthropologists and other social scientists are interested in social, political, economic and cultural aspects. Biological anthropologists have in recent years become increasingly concerned with the dimensions, proportions, and shape of man’s immediate physical environments and theorized about how the globe has become populated with human as well as tried to explain geographical human variation and race.

Human beings although belong to the same species which presumably share with alike morphological features as to characterized a single population, had gradually evolved into different sub-populations in course of the ongoing evolutionary process leading to variation. Today, such variation is considered a natural phenomena and the extend of human variability is enormous, that no two individuals can ever be exactly the same not only in terms of physical appearance like skin colour, size, eye and hair characteristics etc, but also in other social and cultural aspects.

Beauty of human species lies in its variations, such that human variation in phenotypic (morphological) and genetic traits at the population level has been a major focus of attention in physical anthropology or biological anthropology. Biological anthropology quest to determine the biological status of human population, genetically studies a morphological, serological and a number of genetic traits. Hence, biological anthropology as it stands today is an investigation of micro-
evolutionary adaptation process, dialectically related to natural and cultural environments, which determined the survival value of the population (Singh and Bhasin, 2004).

1.2. Present Study

The most common and singular goal of biological anthropology is the total understanding of the biological contour of the population. That is why, the present study has confine itself into the depth study of a particular tribe namely Simte tribe (detail in chapter ii) which has been looked from different angle of parameters. The parameters studied included anthropometry (somatometry and somatoscopy), ABO blood groups, Rh blood group system, phenyl-thio-carbamide (P.T.C), colour blindness, cerumen and dermatoglyphics. A number of prominent researchers and scholars who worked on these selected parameters have been describing one by one as follows.

i. Anthropometry

Biological relationships and distances between human individuals and group can be assessed by the use of anthropometric data at least as successfully at this can be done by the used of serological traits with known modes of inheritance (Spielman and Smouse, 1976). The obvious reason is that anthropometric dimensions are also genetically determined even if the polygenic nature of the genetic control and the environmental effect on the development of their phenotypic manifestation cannot be spelled out in detail (Brace and Hunt, 1990; Brace et al., 1991).

The anthropometric studies on the Indian populations started in 1868 (Bhasin et al., 2004). But, systematic surveys were carried on all Indian level by Risley (1915), Eickstedt (1926) and Guha (1935). The main emphasis on these studies was to classify the people of India into various ‘racial types’. They recognized the existence of more than one ‘racial type’ and a great deal of anthropometric heterogeneity among the people of India. Later, a number of surveys were conducted and some of the exemplify works on the study of the anthropometric variation can be propounded from different populations of India. Majumdar and Sen (1949) worked among the people of Gujarat, followed by the
population of Uttar Pradesh (Mahalanobis et al., 1941), Maharastra (Karve and Dandekar, 1951), Bengali (Majumder and Rao, 1960), Tamil Nadu (Malhotra et al., 1981) and among others. Besides these, a good number of other studies are available, and about 1200 population groups reported by different authors are listed by Bhasin, Walter and Danker-Hopfe (1992).


ii. **ABO Blood group**

Karl Landsteiner (1900) recognized the existences in human ABO blood groups system comprising ‘A’, ‘B’ and ‘O’ groups. Decastello and Sturli (1902) discovered the fourth group ‘AB’, of system. In later studies, it was possible to subdivided blood group ‘A’ into A₁ and A₂ (Dungern and Herszfeld, 1911) and A₃ (Friendenreich, 1936). The mode of inheritance of ABO blood groups (Bernstein, 1924) and further A₁ and A₂ subgroups (Thomsen et al., 1924; Friedenreich and Zacho, 1931) has been well established. It has been found that O is recessive to both A and B whiles both A and B is co-dominant to each other. In the case of subgroups of A, A₁ is dominant over A₂ and O while A₂ is dominant over O. The ABO locus is assigned to the distal end of the long arm of human chromosome no. 9. (Ferguson-Smith et al., 1976; Westerveld et al., 1976). Existences of differences in the allele’s frequencies of ABO blood groups from one population to another was
first noted by Hirszfeld and Hirszfeld (1919) and followed by many extensive studies on various populations of the world for this system. In general, the allele frequencies of the total population of the world is found to be $O=0.623$; $A=0.215$ and $B=0.162$ (Mc Arthur and Penrose, 1950-51). The alleles frequencies stated by Bhasin, Walter and Danker-Hopfe (1994) in their book ‘People of India’ shows that the European population have more than 0.25 of A allele (varies from 0.25 to 0.35) and B allele frequency below 0.10. Among Negroid of Africa, allele O is present in high frequency and the frequencies of alleles A and B fall between 0.10 and 0.20 respectively. From Asia continent like China, Japan, Mongolia and Korea, the frequency of allele A is generally high (more than 0.20) as compared to allele B (less than 0.20) except among the population groups studied from Mongolia, where allele A (0.15) is less than allele B (0.22).

In India, the importance of human blood groups for anthropological studies was first recognized by Sarkar between 1908 and 1969. But, the studies of ABO blood groups in India was first carried out by Malone and Lahiri (1929), in which, they analyzed the distribution of ABO blood groups of various population from Northern India. As a result, they observed clear differences in the frequencies of alleles ABO blood groups. Sarkar (1937) worked on some population of Santal Parganas in Bihar. In continuation, numerous anthropologists and serologists take up such blood groups studies in various regions and parts of India. From the trend of allele’s frequencies of ABO blood groups system in India as compiled by Bhasin, Walter and Danker-Hopfe (1994), the average value of allele B (0.233) is more as compare to allele A (0.186), whereas the allele frequency of O is 0.581. In different zones of India, i.e. East India, West India, North India, South India, Central Indian and Islands where in their distribution of alleles frequencies were A (0.201), B (0.228), O (0.570); A (0.197), B (0.216), O (0.587); A (0.183), B (0.263), O (0.554); A (0.171), B (0.205), O (0.624); A (0.194), B (0.243), O (0.563) and A (0.142), B (0.148), O (0.710) respectively.

In the North Eastern states of India, There is a wide range of variation in the distribution of ABO blood group frequencies. The frequency ranged of blood group A started from the state Assam (18%) to Mizoram (30%) through Nagaland (20%), Meghalaya (23%), Tripura (23%), Arunachal Pradesh (26%) and Manipur (28%). However, blood group B predominate blood group A in Assam (21%) and Tripura
(28%). The other B blood group distribution shows 10% in Nagaland, 16% in Meghalaya, 17% in Arunachal, 19% in Mizoram and Manipur. The O blood group frequency ranged from Tripura (49%), Mizoram (51%), Manipur (54%), Arunachal Pradesh (61%), Meghalaya (61%) and the highest frequency of 70% in Nagaland (Bhasin et al., 1994; Bhasin and Chahal, 1996).

According to the book ‘People of India’, Manipur had average gene frequencies for the three alleles of the ABO blood group system approximately 0.535 for O, 0.284 for A and 0.181 for B (Bhasin et al., 1994). Bhattacharya and Nanda (1980) studied the blood group of Paite in Manipur. They observed the absence of A2 gene and the predominance of A1 over B. Devi and Singh (1990) reported the gene differentiation at two loci between the Muslims of Manipur and Assam. Singh and Kapaiwo (2002) noted the distribution of ABO blood groups and Rh (D) among the Tangkhul of Manipur. From further studies of ABO blood groups by different scholars, the most predominant allele of the ABO system is allele O. The frequency varies from 0.477 among the Lamkang (Singh R.K. and Shah, M.L., 1999) to 0.742 for the Koirao (Singh, 2008). With regard to alleles A and B, most Mongoloid population of Manipur shows a preponderance of allele A over B. Some exceptions so far to this trend are, however, noticed. The Muslim and Chiru population show greater frequency of allele B than A (Shah and Singh, 1986; Singh and Shah, 1997). The unique feature is the greater frequency of allele B than A. The frequency of rare group AB is also elevated.

iii. **Rh (D) Blood group**

One of the greatest advancements in the history of human serology was the discovery of Rhesus (Rh) blood groups (Landsteiner and Weiner, 1940) and its role in erythroblastoses foetalis (Weiner and Peters, 1941; Levine et al., 1941). The studies of Rh blood system is not only important clinically but also for population variations. The discovery was made by immunizing guinea pigs with the blood of the rhesus monkey, and thus obtained a serum containing antibodies to the rhesus monkey. This serum, later on known as the anti D, not only reacts with the blood of the rhesus monkey but also with some human blood. Those person whose blood agglutinate with the antibody were designated as Rh (+ve) as they carry a similar antigen to that of the rhesus monkey, while those persons whose blood does not
agglutinate with the serum are termed as Rh (-ve). Studies of the families indicate that Rh (+ve) condition depends on a dominant autosomal gene and the double recessive condition results to Rh (-ve). The dominant and recessive alleles are represented by D and d respectively and the Rh loci have been assigned to the short arm of autosomal chromosome 1.

In Europe, there is a steady declined in D frequency from about 0.70 in the east to 0.55 in the west. Among the population groups from Africa, the frequency of D alleles varies around 0.80 though it is much higher in a few populations. In Southwest Asia, the frequencies of D alleles are in between 0.68 and 0.75 in most of the population groups. But in Southeast Asian population, allele D is around 0.90. The allele d is rare and absent in most part of Central Asia, but is more than 0.20 from Tajikistan and Uzbekistan. However, the allele is absent among Australia aborigines (Mourant et al., 1976; Tills et al., 1938). From the different States and union territories of India, the frequency of allele D are quite high among the populations with mongoloids affinities from Assam (0.913), Meghalaya (1.000), Sikkim (0.917), states of Eastern Himalayas region and in Andamanese (Negritos) of Andaman (0.996) and populations with Mongoloid affinities of Nicobar (1.000) islands. The frequency is highest in the East and starts declining towards North and West India and then gradually starts increasing towards South India. In the Islands, the frequency of allele D achieved maximum as stated by Bhasin, Walter and Danker-Hopfe (1994). In respect of Rh (D) factor, the Rh (D) negative frequency is low and not encountered among some population. Such trend was observed among the Khurkhul (Singh, M.R., 2007). The frequency of Rh (D) negative show almost similar picture in other populations, viz: Thado (0.132), Muslim (0.210), Kabui (0.136) and Koirao (0.0784) according to Singh (2007).

iv. Phenyl-Thio-Carbamide (P.T.C)

The importance of the ability to taste phenylthiocarbamide (P.T.C) was realized long back in 1932 by Fox, when he fails to taste out of it, while his colleague found it to be bitter. Thereafter, he showed that the inheritance of the ability to taste P.T.C was depended on a single autosomal dominant gene. The simple model, however, has been complicated by other factors like sex (Blakeslee and Salmon, 1931; Falconer, 1947), age (Harris and Kalmus, 1949a; Mohr, 1951;
Kalmus, 1958), the presence or absences of the saliva of the subject (Cohen and Ogden, 1949) and also the strength of the test solution (Harris and Kalmus, 1949b). These factors invariably modify the phenotypic expression and their genetic relationships to testing and non-tasting are not yet determined. Incomplete dominance and penetrance of the taste was suggested by Das (1958) and he estimated the degree of penetrance of taste gene to be 80 percent, but it may be less (Das, 1966). He further added that the variation in the expression of the taste allele including its complete suppression could be due to estrogenic factors. The degree of penetrance might difference in different persons, places, age, etc.

Today, it has been established beyond doubt that the ability to taste P.T.C. exhibits a strong dimorphism in human populations. The frequency of taster allele T is about 0.50 among European populations. Among mongoloid populations of East Asia and South East Asia, the frequency of allele T is very high about 0.70 ranges from 0.55 to 0.95. The frequency of allele T was also high among Africans, despite being less than Mongoloids (Mourant et al., 1976; Roychoudhury and Nei, 1988). From the list compiled by Bhasin, Walter and Danker-Hopfe, 1994, frequency of allele T among Indian populations was 0.457 which was ranged from 0.108 among Munda of Ranchi-Bihar to 0.912 in scheduled caste of Andhra Pradesh. The study on the taste sensitivity is meager in the state Manipur. Further numerous research is needed to know the of taste sensitivity of Manipur so as to fill the gap of literature and present scenario of taste sensitivity.

v. Cerumen

Ear wax, also called cerumen, can be annoyance, but it helps to protect your ears from bacteria, dirt, microbes and other foreign particles. A healthy amount of ear wax is essential to maintain a clean environment in the ear. Ear wax also provides lubrication, keeps the area moist and protects the ear canal from water. It is usually not a cause for concern, but excessive wax blockage can affect hearing or indicate a serious condition. Normally, ear wax or cerumen are of two types- dry and wet and is consider important marker in an anthropological research. Attention of human cerumen dimorphism and population variation in this regard could be traced back as early as 1934 in Japan. But, Adachi (1937) was perhaps the first to formally report on ethnic variation on earwax types. His data on the incidence of
cerumen types as well as auxiliary odour from various parts of Japan and
neighboring populations were of great anthropological importance. Matsunaga
(1962) and Omoto (1974,1975) compiled a large reference on mongoloid population
groups of Fareast Asia, Southeast Asia and Pacific population, while Kalmus et al.,
(1964) and Petrakis et al., (1967) reported data on cerumen types on the American
Indians. Ibraimov (1991) presented data on the high frequency of dry cerumen in
Mongoloid populations and low frequency among Europeans. Intermediate
frequencies were found among peoples of sub-equatorial Africa. But, no qualitative
differences in chemical composition have been identified (Kataura and Kataura,
1967a and 1967b). As a result, it has been observed that the frequency of the allele
for dry cerumen is very high among Mongoloids population while its frequency is
low in Caucasians and Negroes.

Studies on cerumen types in India were carried out by many scholars,
Chakravartti and Chakravartti (1978) proposed a three-tier ratio regarding the gene
frequencies of cerumen types among the Indian populations. They worked on five
North Indian populations as well as five South Indian populations. It was observed
that Muslim of both North and South India have 30:70 (wet: dry) ratio; 40:60 (wet: dry)
ratio to Christians and Hindus of South India and 25:75 (wet: dry) ratio to Sikhs and the Hindus of North India. Many scholars studied the cerumen types in
Northeastern India. Das (1975, 1977) reported the inheritance patterns of the trait
and also studied cerumen types of 790 individuals of both sexes belonging to nine
different populations of Assam viz the Brahman, Kalita, Kaibarta, Koch, Muslim,
Bodo, Hmar and the Kuki. His study reveals that the Hmar and Kuki tribe
(Mongoloid) show high preponderance of dry type while the other Caucasoid caste
represent high frequency of wet earwax. Deka (1984) studied the cerumen and other
 genetic markers among the four mongoloid population groups of Garo Hills
(Meghalaya) and the dry type was found to be more frequent. Chakravartti (1986)
studied on cerumen type among eleven populations of Manipur and two populations
of Nagaland. He observed high frequency of dry cerumen that range from 0.80 to
0.97. Also, Singh (2007) studied six populations in Manipur and observed polymorphism among them. The dry type, which is common in mongoloid
populations, was found to be greater among Kabui (0.843) followed by Thadou
vi. **Colour Blindness**

The difficulty in identifying and recognizing different colours and shades is known as color blindness. Many people in this world suffer from colour blindness. Those with normal colour vision have photoreceptors that are called as cones, which are concentrated in the center of the retina. These cones have 3 types of photosensitive pigments namely blue, red and green. These photosensitive pigments allow the identification on reorganization between different colors and shades. It has been established that colour vision defect is inherited as X-linked traits with the normal colour vision dominating over colour vision defect. Clement’s (1930) work is one of the earliest accounts available for the population differences in colour blindness. Subsequently, the gene for colour blindness has been studied extensively and exhaustively throughout around the world. The frequency of colour blindness is around 0.08 among Europeans. In African populations, the frequencies are about 0.01 to 0.06 with an average around 0.04. Among Southwest Asian populations, the frequencies of colour blindness are 0.02 to 0.07 with an average of 0.05. In East Asian and Southeast Asian regions the frequencies are 0.03 to 0.06. Among South American Indians and Eskimos the average frequency is about 0.01 (Mourant et al., 1976a; Roychoudhury and Nei, 1988).

According to Bhasin, Walter and Danker-Hopfe (1994), the frequency of colour blind males among Indians populations was 0.036(varies from complete absence to 0.231 among Kshatriyas of Andhra Pradesh). The average frequencies in West, East and Central zones are similar (0.032, 0.033 and 0.033 respectively), as compared to South and North zones from where high frequencies are observed (0.040 and 0.038 respectively). The frequency is lowest among scheduled tribes (0.026, varies from complete absence to 0.128 among Todas of Tamil Nadu studied by Clements, 1930) as compared to other ethnic groups- scheduled caste (0.035), community (0.045) and caste (0.049) and almost similar pattern is also observed from different zones of India. Among the populations with Mongoloid affinities from the states of Nagaland, Mizoram, Tripura and Sikkim of Eastern Himalayan region the frequency are low (0.00, 0.018, 0.015, 0.026, respectively) from where
most of the populations studied are either agriculturists of pastoralists. In Manipur, studies on colour blindness have been done among different populations by Singh (1983), Shah (1990) and Singh (2008). Its frequency varies from 0.002 (Koirao) to 13.21 (Khangabok) through 2.97 (Mao), 3.64 (Kabui), 6.72 (Tangkhul), 7.20 (Andro), 8.57 (Meitei) and 10.67 (Muslim).

vii. **Dermatoglyphics**

In an anthropological research, especially in physical anthropology, dermatoglyphics of the palm, sole, fingers and toes are very often considered to be one of the important biological parameters for the study of population variation (Biwas, 1963; Mukherjee and Chakravertti, 1964; Chai, 1972; Malhotra, 1987 and Katayama, 1982) as dermatoglyphic configurations are generally believed to have a strong genetic bearing (Murkherjee, 1984). Many investigations are conducted in different parts of the world in different population and sub-population so as to find out the similarities and differences among the populations (Micle and Kobyliansky, 1986; Malhotra, 1987). The Chinese have been using finger print as a means for personal identification as early as for two hundred years ago. Several authors contribute to the literature of dermatoglyphics in the beginning of the 19th century.

In India, the earliest finger print samples were obtained by Schlagin Haufen (1906) and Collins (1913) except for a few more studies on small heterogeneous sample by Biwas, 1936. But, the real dermatoglyphics researches in India populations began in early fifties (Basu, 1985). However, immense development have taken place in India both in the methodological approaches and empirical studies after the first International Symposium on Dermatoglyphics, organized by the department of Anthropology, Delhi University in 1966. Ever since, more than six hundred seventeen publications have appeared (Kapoor, 1991). As per the directory of dermatoglyphics prepared by Prof. Malhotra in the early part of 90’s, there are about 120 Scientists. In his compilation at Indian Statistical Institute reveal that about 1000 studies have been conducted so far in India. A good numbers of researches in this regard have increased ever since then. In addition, a good number of works came up from the Indian statistical Institute under K.C. Malhotra and his associate. Mostly, Indian dermatoglyphic studies have been concentrated more on tribal populations from diverse regions and a few sporadic studies on caste samples.
from the states like Maharashtra, Andhra Pradesh, Tamil Nadu, Himachal Pradesh, Rajasthan, Assam, Manipur, Jammu and Kashmir, Punjab, Kerala, Orissa and Haryana (Basu, 1985).

In Northeast India, some works on finger and palmer dermatoglyphics have been carried out on the Riangs of Tripura (Basu, 1959; Roy Choudhury 1957; Chakravartti and Basu, 1960). In Assam, dermatoglyphics works are carried out in Abor tribe (Bhattarcharjee, 1955), in Miri tribe (Chakravartti and Mukherjee, 1961; Srivastava, 1969; Sharma, 1962 and Dutta, 1976) and in Tai population (Shyamacharan and Phookan, 1991). A study on Pnar Khasi, War Khasi and Bhoi Khasi is also made by Das (1978). Chakravartti and Murkherjee (1963) have also conducted studies on some tribe and caste of Nagaland and Manipur states. In Manipur, a few works on finger and palmer dermatoglyphics have been carried out on the Meitei, Andro, Anal, Mao and Khangabok populations (Singh, 1991). Three populations of Muslim (Shah, 1990), Meitei population (Singh, 1991), Kom tribe (Singh, 2002) studied were carried out. The study carried out on the people of Khurkhul caste population not only includes the finger and palm prints but also the sole and toe (Devi, 2002). Singh (2008) also worked on Koirao population.

1.3. Objectives of the study

In the present research work, the Simte tribe of Manipur has been selected and an attempt has been made on bio-anthropological study. So far none of the scholar has undertaken such types of studies among the Simte tribes of Manipur. The absence of such research study on one hand and with the intention of filling the gap in its literature on the other hand demands for undertaking an immediate exhaustive study of this population. Therefore, the present study will be focusing on physical features and social-cultural aspect of the people wherein more emphasis will be giving on the biological aspects of this population. Such an empirical bio-anthropological study which considers different aspects of parameters has been best suited to show physical and biological picture of a particular tribe. Also, in this study, the data will be compared with the available data of other population of Manipur who share more or less similar ecological niche and socio-cultural background to see their relative proximity if there be any. Accordingly, the objectives of the present studies are as follows:
1. To assess the physical as well as morpho-genetic constitution, social-cultural aspect and biological qualities of the Simte Tribe of Manipur.

2. To ascertain biological variation between the Simte and other neighboring populations.

3. To find out the variation between rural and urban Simte population in respect of the physical features.

1.4. Chapter scheme

The finding of the present study are presented in six chapter in the following scheme viz Introduction, Land and people, Materials and Method, Results and discussion, comparative study and summary and conclusion.

In the first and foremost chapter of the present thesis, the author gives information on bio-anthropology and brief review of the literature on every parameter. The author’s aim and objective of the study, reason behind selection of the topic are also highlighted. Most importantly, chapter scheme is also highlighted for better understanding of every chapter of this thesis. The following chapter, i.e. chapter II gives a picture of the state of Manipur- Its geographical background and the people. In this chapter, more emphasis is given to the Simte- their origin, migration and geographical distribution of Simte people in different location. A detailed social-cultural account and demographic profile of the Simte population are also being highlighted. Materials and method used in the present study has also been discussed in the third chapter of this thesis. Primary and secondary data has been used. Interview technique was chiefly employed for collection of data relating to social-cultural aspect. Data on somatoscopy are collected through visual observation while those somatometry, blood groups, P.T.C, cerumen, colour blindness and dermatoglyphics were collected by adopting universally standard techniques, materials and methods. Having undergone analyses, the author seeks to interpret these analyzed data in the forth chapter. Attempt has been made to compare the present finding with other available data on chapter V. The report concludes with a chapter wherein summary of the whole research has been highlighted. A reference containing all the sources cited within the text in the present thesis has been listed immediately after the last chapter of the thesis.