DENTAL ANTHROPOLOGY OF THE MIZO OF AIZAWL TOWN, MIZORAM

ABSTRACT

“Dental anthropology is defined as a study of people (and their close relatives) from the evidence provided by teeth” (Hillson, 1996). Dental anthropology is a subfield of physical anthropology under the broad discipline of anthropology which is concerned with the study of human teeth - one of the anatomical systems of man. One of the main themes of dental anthropology has been a study of variation in size and shape of the teeth, as recorded in casts of living mouths or seen in the skulls of archaeological and fossil collections. Dental anthropology studies the variation in size and shape of the teeth, the development of teeth in relation to age, their appearance in the mouth, and the processes of wear and other changes that occur once they are in place. It also includes the microscopic traces, preserved inside the tissues of the teeth, of the growth and ageing processes. Yet another area of interest is the study of dental diseases in relation to diet and other factors, and the most recent development is the study of the biochemistry of dental tissues (Hillson, 1996).

Dental anthropology is academically located within the human bone biology studies. Its main goal is to recognize attributes in the teeth form which can help us create bicultural dynamics of human populations, specially related to health–illness state, feeding habits and micro evolutionary transformations, related themselves to the ethno genesis of current and ancient times. In Dental anthropology, teeth are used to obtain information on culture, health, diet, variability and evolutionary trends as well as eruption and dental pathologies in the past and modern populations.
The abundant published literature available on the Southeast Asian, East Asian and Pacific populations demonstrates the existence of similarities and dissimilarities in the distribution of frequencies of different dental characteristics among different populations which are as notable and significant as those that can be encountered in other biogenetic markers such as blood-groups and red cell enzymes, demographics, etc. that greatly render it possible to compare and classify populations. More such work is, however, necessary to substantiate these hypotheses.

Dental anthropology much like those of other subfields of anthropology can be applied to the welfare of mankind in the areas of dental development, pathology, morphology, forensic deontology and odontometry. The area of dental development can be used in the application of tooth eruption times and calcification standards in the nationwide nutritional survey, in the diagnosis and treatment of children with growth disturbances, in solving a number of orthodontic problems including malocclusion, in the age estimation of skulls of unknown age, in the evaluation of racial differences and primate evolution, in the determination of personal identity or individuality of persons involved in different crimes-accidents-explosions etc. and tooth formation standards based on the study of crown and root development of teeth in clinical assessment of early or late dental maturity.

While the area of dental morphology is generally used in the understanding of biological history and racial classifications of human populations as also in micro-evolutionary studies, it is necessary to assess the incidence of malocclusion cases in relation to a number of genetic and non-genetic factors to plan and gear up treatment
needs. It is urgently needed to undertake carefully planned research investigations into the dental anthropology of the people to obtain and standardize the findings for application to different situations concerning their oral health, forensic and related problems in India in general and Northeast India in particular. Tooth morphology provides few clues as to age, sex, body size, elapsed time since death, etc., so its primary usage is in discerning the ethnic affiliation or race of an individual (Scott and Turner II, 2000).

In the area of dental pathology, dental caries and periodontal disease are the most common oral problems of man. In view of the alarming increase in the prevalence rates of these diseases in the human populations, it is of outmost importance to study these diseases in relation to different demographic, socio-economic, environmental and hereditary factors to delineate standards and levels of health for the public health planner to devise and extend preventive and treatment services to the well-being of one and all.

With this end in view we have undertaken a study on the dental anthropology of the Mizo of Aizawl, Mizoram with the following objectives:

1. To assess the eruption pattern of different types of teeth, both deciduous and permanent, their eruption age and order, in both boys and girls.

2. To record the various morphological patterns of teeth.

3. To assess the prevalence of dental pathology and impact of food habits, including chewing of betel nut, tobacco and smoking on dental health.
4. To find out the relationships of eruption pattern, dental pathology and frequency occurrence of various morphological traits with certain demographic and socio-economic variables such as age, sex, income and education.

The fieldwork for the present study was conducted among the Mizo of Aizawl town, Mizoram. The term ‘Mizo’ is a collective name for the people inhabiting Mizoram, possessing one language, same origin and a common way of life. The Mizos are racially belonging to the Mongoloid stock and linguistically belong to the Tibeto-Burman linguistic group. Etymologically, the word ‘Mizo’ means Hillman. The word is derived from two Mizo words ‘Mi’ and ‘Zo’, means man and hill respectively (Nag, 1993).

A total of 69 localities in Aizawl town have been identified and listed out. Seven (7) localities were selected from the above 69 localities by adopting systematic sampling method and a house to house survey was conducted. The subjects were drawn only from the Mizo households for collecting data on dental anthropology.

Data were collected on eruption of the deciduous and permanent teeth, dental and oral pathology and dental morphology. All the educational background information of the parents as well as the subjects, their age, occupation, income of the family, the number of family members, food habits and dental care of the subjects was recorded with the help of interview schedule.

**Dental eruption**

Dental *eruption* is generally defined as the time when any part of the crown has emerged through the gingival surface (Rami Reddy, 1986). The term *emergence* refers
to the moment any portion of the crown pierces the gingiva. Actual penetration of the gingiva is merely a transitory stage in the total process of tooth eruption. It refers to the movement of a tooth towards its final occlusal position.

Unlike in permanent teeth eruption times there is no significant difference in the eruption times of deciduous teeth in children of same physical health in many ethnic groups as well as between males and females, through the role of genetic factors has been shown by twin studies.

**Dental caries**

Dental caries is a pathological condition of the teeth resulting in the decalcification of the dentine or enamel and the disintegration of the remaining organic material often leading to the loss of the teeth and occurs in association with other conditions such as periodontal disease, which causes recession of the alveolar bone resulting in loosening of the teeth and their subsequent loss; dental enamel hypoplasia, which is a developmental enamel defect is the deciduous and permanent teeth seen as transverse lines, pits, and grooves on the enamel surface; ante-mortem or tooth loss; and attrition, which is the gradual wearing away of the hard parts of the teeth.

The extra-oral causes are hereditary; high sugar intake, nutritional deficiency in calcium, phosphorous, fluorides, vitamins A, C and D and proteins, soft foods, and bottle feeding. Laus (1981), however, reduces them only to four to five well known factors which cause dental caries; low fluoride levels in drinking water, food products containing large quantities of sugar, bad childhood health in general, and inadequate quantities of
saliva and disturbance of its optimal composition. Hereditary predisposition of dental tissue to caries appears to be another factor. The most important factors that contribute to the disease are consumption of food products with increased quantities of sugar and fluoride-lacking drinking water. When the disease acquires a high degree of severity the affected individual finds it difficult to eat and swallow and at times resulting in speech problems and fever.

**Periodontal disease**

Periodontal disease is the most common oral health problem of man and also a major problem in modern dental practice. Palaeopathological studies indicate that man has been subject to periodontal disease since prehistoric times, and our earliest historical records reveal an awareness of periodontal disease and need for treating it.

Pyorrhea or periodontal disease unlike dental caries is the disease of the periodontium or the supporting structures of the teeth namely the gum, alveolar bone, periodical membrane and cementum.

Gingivitis, inflammation of the gingiva, is the most common form of gingival disease. Inflammation is almost always present in all form of gingival disease because of the bacterial plaque, which cause inflammation and irritational factors that favour its accumulation and are very often present in the gingival environment.

**Dental Morphology**

Tooth morphology is defined as the subject which deals with the external and internal structure, morphology, function, eruption and shedding of all the teeth in the
mouth. The mouth is called as oral cavity in medical term. Human beings have two jaws in which all the teeth are fixed. (Kumar, 2007).

**Supernumerary Teeth:** Supernumerary teeth or hyperdontia are extra teeth beyond the normal number unlike hypodontia or decrease in the number of teeth both representing numerical variations in the teeth.

**Carabelli’s Cusp:** The cusp of Carabelli’s is an accessory cusp that develops as an elevation or tubercle on the lingual surface of the mesiolingual cusp (protocone) or surface of the maxillary molars particularly the first one. Regarding the location of the trait, it may be stated that the cusps occurs on the mesial half of the lingual surface of the deciduous second molars and permanent first molar whereas on the permanent second molar the structure is more distally located.

**Shovel-Shaped Incisors:** The term shoveling, first introduced by Muhlreiter in 1870 according to El-Najjar and Mc Williams (1978), is used to described a condition resulting from a combination of a concave lingual surface and elevated mesial and distal marginal ridges enclosing a central fossa in the upper and lower incisor teeth.

**Diastema:** Diastema is a space or gap present between the maxillary central incisors or between the maxillary lateral incisors and canines. The former one is called median diastema which is more frequently observed in the maxilla while the second type, the lateral diastema is occasionally combined with lack of or a reduction in the size of the lateral incisors.
**Crowding:** Crowding is another non-metric trait; which is complex in nature. There is unanimity as to whether this trait which is prominent in modern man, as an inherent constitutional variable, Lasker (1950), but the fact is that the crowding of teeth results due to the inheritance of large teeth from one parent and small jaw from the other, which are determined before birth. This is unlike in the case of spacing which occurs between teeth when the jaw is large and teeth are small. Thus, the existence of crowding as also spacing indicates that the tooth size need not be in complete accord with the jaw size.

**Cingulum or Lingual Cusp:** El-Najjar and McWilliams (1978) following Black and Wheeler define cingulum as “the lingual cusp known of an anterior tooth. A self or swelling which is found on the tooth just above the cervical line is the site of the development of many supernumerary cusps”. According to Segal (1963), “the ridge found on the lingual lobes of the incisors and the canine is termed the ‘cervical ridge’, or the ‘cingulum’. It is more specifically in the cervical portion of the lingual surface.

**Occlusion:** Dental occlusion is the relationship between the masticatory surface of the maxillary and mandibular teeth, when the mouth is closed. Individuals with correct or normal occlusion have their teeth of either jaw arranged in well-formed arches, elliptic maxilla and parabolic mandible, presence of contact between individual teeth and between each tooth of one jaw with two teeth of opposing jaw barring the mandibular central incisors and maxillary wisdom teeth, all forwardly placed mandibular teeth but central incisors, smaller arch than the upper one to facilitate the occlusion of the former
inside the latter showing the upper incisors covering the lower incisors and the coincidence between the two jaws in the midline.

**MATERIALS AND METHODS**

**Dental eruption**

The recommendation of Wheeler (1988) for morphological features was followed to study differences between deciduous and permanent teeth.

For the eruption of the deciduous teeth, observations were made on both the sexes of age group between 3 1/2 months and 33 months keeping ±3 months to the range of eruption.

For the eruption of permanent teeth, observation was made on both the sexes of age group between 4 years and 23 years keeping ±2 years to the range of eruption.

Dental eruption of the subject was examined with the help of dental mirror in sufficient day light. If any part of the crown has pierced the gum to become visible, the tooth was considered emerged. Some missing teeth were counted as erupted when the subject could recall their emergence and/or extraction. Standard techniques of data collection on dental eruption as given by Weiner and Lourie (1981) were followed.

**Dental and oral pathology**

For Dental Pathology samples were collected from all the age groups of both the sexes.
a. **Dental Caries**: Since dental caries has to be assessed for the entire dentition, all the teeth of the subjects were examined. Following WHO's (1977) recommendations, the teeth in either type of dentition was examined and diagnosed sound when they are unaffected by caries, and decayed, filled and missing owing to caries. Dental probe, dental mirror, spatula and torch are used to examine the subject’s teeth. The method of direct visual observation was followed during the investigation.

b. **Periodontal Diseases**: The method detailed by Russel (1976) is used to score periodontal index per person.

c. **Oral Hygiene**: Simplified oral hygiene index given by Greene and Vermillion (1964) was applied.

**Dental morphology**

The occurrence of supernumerary teeth or hyperdontia and hypodontia, carabelli's trait, shovel-shaped incisors, diastema, crowding, cingulum and occlusion were recorded as suggested by Weiner and Lourie (1981).

**Socio-economic categories**

In the present study, certain socio-economic variables were classified arbitrarily into different groups and/or categories with a view to understanding their influence on demographic variables. Our classification may be briefly described as follows:

a. **Income groups**: Data on household income were collected directly from the heads of the households. The per capita monthly income of the households was classified as follows:
Below 50th percentile (below Rs. 7500) = Low income group.
50th to 75th percentile (Rs. 7500-13300) = Middle income group.
Above 75th percentile (above Rs. 13300) = High income group.

b. Educational level: Data on educational attainment of individuals in the present study were arbitrarily classified into three categories such as:

i. Illiterate – are those individuals who were unable to read and write and those who had no education.

ii. Literate – those who can read and write and had formal education.

c. Family size: The family size was classified into three categories. The individuals who lived in a household with less than 5 family members were considered as having a Small Family Size. The Medium Family Size includes those individuals who lived in a household with 5-6 family members and the individuals who lived in a household with more than 6 family members were grouped in Large Family Size.

DATA ANALYSIS

The data collected for the present study were quantified and analysed statistically, using Microsoft office excel worksheet and by manually. The age of an individual was calculated (according to the decimal age calendar given by Weiner and Lourie, 1981) from his/her date of birth to the date of investigations. Median age of eruption is computed by Probit transformation method suggested by Fisher and Yeates (1957). The probit values were then plotted on graph paper, and the visually best fitted slope was obtained through a series of iterations. The regression line thus obtained was used to determine the estimated age of emergence (read as a projection of the probit value 5 on
the horizontal scale) and estimated standard deviation (difference between the projection of the probit values 5 and 4). To find out the association between the prevalence of dental pathology and variables such as age, sex, income, education and dental caries, chi-square test is used.

**FINDINGS OF THE PRESENT STUDY**

The findings of the present study may be briefly summarised as follows:

**Dental eruption**

1. The first deciduous tooth to erupt is the mandibular central incisor in boys, whereas in girls, the central incisor is erupted at the same time in both the jaws.

2. The deciduous teeth completed eruption at 37-42 months of age in both the sexes.

3. The first permanent tooth erupts at 5 years of age, in both boys and girls.

4. Except the third molar, all the permanent teeth completed eruption by 15 years of age, in both the sexes.

5. The third molar starts erupting at 14 years and 15 years of age in females and males respectively.

6. By 24 years of age, more than 50% of the third molars are found erupted in both the jaws and sexes.
7. The median age of eruption is lower in females except in the mandibular canine and first premolar and the maxillary central incisor and second molar, whereas, the maxillary first premolar is erupted at the same time in both the sexes.

8. The eruption of all the permanent teeth except the third molar takes place between the median ages 6.1 (± 0.15) years to 12.1 (±0.10) years in males and 5.9 (±0.15 years to 12.2 (±0.20) years in females.

9. The order of eruption of the permanent teeth is as follows:

   Male:  \[ M_1 > I_1 > M_1 > I_2 > I_1 > P_1 > P_1 > C_0 > P_2 > C_0 > P_2 > P_2 > M_2 > M_3 > M_3 \]
   Female: \[ M_1 = M_1 > I_1 > I_1 > I_2 > P_1 > P_1 > C_0 > C_0 > P_2 > P_2 > M_2 > M_2 > M_3 > M_3 \]

**Dental pathology**

10. Prevalence of dental caries was observed earliest at the age group of 13-18 months in both the sexes, where, only mild and moderate forms of caries were recorded.

11. The severe form of caries is first observed at 37-42 months and 43-48 months age groups, in males and females respectively.

12. In both the sexes, the frequency of caries affected found higher in posterior teeth than that of the anterior teeth.
13. Prevalence of dental caries is higher among the illiterates compared to the literate subjects.

14. Prevalence of dental caries is observed highest in the low income group among the Mizo.

15. Prevalence of caries is found to be less among the *kuhva* (betel nut and leaf with lime) chewers, compared to the non-chewers in both the sexes.

16. Difference between the smokers and non-smokers, and tobacco chewers and non-chewers are statistically insignificant in respect of the prevalence of dental caries.

17. The incidence of gingivitis decreases as the age increases till 16-20 years and then gradually increases.

18. No poor form of OHI (DI-S) is observed in the 16-30 years age group in both the sexes.

19. Prevalence of poor form of OHI (CI-S) decreased from 6-10 years to 21-25 years age group and from 6-10 years to 16-20 years age group in males and females respectively, and then again increases with the increase of age.

20. More than 70% of the subjects are under the score of Good (0.0-1.2) in both the sexes in respect of the prevalence of OHI-S.
21. Periodontal disease is observed higher among the non-chewers of *kuhva* (betel nut and leaf with lime) than the chewers and, the same is observed higher among the smokers than the non-smokers.

22. The prevalence of periodontal disease is observed higher in males than female subjects irrespective of the tobacco chewers and non-chewers. Out of 1631 individuals belonging to the tobacco chewers, 1005 (61.62%), and out of 3520 non-chewers, 1470 (41.76%) have periodontal disease.

23. Lowest prevalence of the OHI (CI-S) was found in males (9.32%) belong to the large families and the females (8.41%) belong to the medium families.

24. No significant differences were observed in the prevalence of OHI (DI-S) in respect of the family size.

25. Highest prevalence (21.94%) of the OHI (S) was observed among the individuals who belong to the large family size, followed by the small family size (21.25%) among the males and the same trend was observed in the females also. However, the differences in respect of family sizes are not significant.

26. Highest percentage of gingivitis in males is observed in large family size (18.46%) followed by the medium family size (18.42%) and lowest was recorded in the small family size. Same trend was observed in the females also. However, no significant difference was observed between the sexes.
27. In both males and females, the percentage of periodontal diseases is recorded highest in the low income group followed by middle income group.

28. The percentage of individuals having OHI (DI-S) is highest in the lower income group (12.95% in males; 13.22% in females) and lowest in high income group (7.41% in males; 8.29% in females).

29. Females show less prevalence OHI (CI-S) than their male counterpart. In both the sexes, the prevalence of OHI (CI-S) found highest among the individuals belonging to the low income group (male 10.70%; female 10.51%) followed by the middle income group (9.93% in males; 9.56% in females) and lowest in the high income group (male- 7.89%; females- 7.32%).

30. The prevalence of OHI (S) found to be highest in the low income group followed by middle income group and lowest in the high income group in both the sexes. When compared between the males and females, males show slightly higher prevalence of OHI (S) in all the income groups than the females.

31. The percentage of gingivitis decreases as the income level increases. There is no significant difference observed between males and females in respect of the prevalence of gingivitis.
Dental Morphology

32. No supernumerary teeth are observed in the deciduous teeth as well as in the permanent dentition up to 10 years of age in both the sexes.

33. The highest frequency of supernumerary teeth is observed at 16-20 years and 21-25 years age groups in males (3.69%) and females (3.65%) respectively.

34. The incidence of carabelli’s anomaly is found highest among 4 years age group in boys (14.06%) and girls (12.28%). However, this trait does not follow any specific pattern regarding its distribution.

35. The occurrence of carabelli’s anomaly is slightly higher in males (8.59%) compared to their female counterpart (7.48%).

36. The incidence of shovelling in both the jaws is found to be slightly higher in females than in males.

37. The occurrence of diastema is higher in the lower age group in both the boys and girls.

38. In respect of the deciduous dentition, the incidence of diastema is recorded higher in both the jaws of the boys than that of the girls.

39. The incidence of crowding in the deciduous teeth is comparatively low in both the sexes.
40. The frequency of crowding in the permanent teeth is found to be higher in the anterior teeth compared to the posterior teeth in both the jaws and sexes.

41. No incidence of cingulum is found below 1 year of age and 12-14 years of age in boys and girls. The highest frequency of cingulum is recorded at 5 years and 6 years of age in the girls and boys respectively.

42. In all the quadrants of both the jaws, the incidence of cingulum in the permanent teeth is found to be higher in the central incisor than that of the lateral incisor in both the sexes.

43. The incidence of occlusion is recorded as 52.39% over-bite, 47.24% normal-bite and 0.37% under-bite among the males; whereas in females, the incidence of occlusion is 54.01% over-bite, 45.77% normal bite and 0.22% under-bite.

CONCLUDING REMARKS

The present study was conducted to examine the dental eruption, dental and oral pathology and dental morphology among the Mizo of Aizawl town, Mizoram. Medial incisor is the earliest deciduous tooth to erupt in the lower jaw of both the sexes. Deciduous tooth have completed their eruption at 37-42 months of age in both the sexes. The first permanent tooth to emerge is the mandibular first molar and the last to erupt is the maxillary second molar (excepting, M3) in both the boys and girls. By 15 years of age, all the teeth except the third molar have completed their eruption. Except the mandibular canine and first premolar and maxillary medial incisor and second molar, all
the teeth in female erupt earlier than their male counterpart. A comparative study of emergence of permanent teeth (excluding \(M3\)) among some Indian populations by jaw and sex shows that in all the populations, the mandibular first premolar erupts earlier than their maxillary counterpart; however, the eruption takes place at the same time among females also.

The occurrence of dental caries was observed earliest at of 13-18 months age in both the sexes, where, only mild and moderate forms of caries were recorded. The frequency of caries affected teeth is higher in the posterior teeth than the anterior teeth in both males and females. In both the sexes of the Mizo of Aizawl town, the prevalence of caries appears in low frequency among the *kuhva* (betel nut and leaf with lime) chewers, compared to that of the non-chewers.

The present study reveals that the chewing of *Kuhva* to certain extent protects the teeth from the dental caries and periodontal diseases in the present population. However, smoking and tobacco chewing show negative effect in the dental health. The prevalence of the OHI (CI-S),OHI (DI-S) is also affected by certain socio-economic factors like the family size, literacy, income etc. High income, small family size and high education are negatively associated with the dental and the oral diseases.
REFERENCES


