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A STUDY ON ERUPTION OF TEMPORARY TEETH AMONG CHILDREN OF TIRUPATI.

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Abstract: There are two sets of teeth in human dentition, twenty deciduous teeth with three tooth groups – two incisors, one canine, two molars in each quadrant of maxilla and mandible; and 32 permanent teeth with 4 tooth groups (2) two incisors, one canine, two pre molars and three molars in each quadrant of maxilla and mandible. Knowledge of development of the teeth and their emergence in the oral cavity is applicable to clinical practice, as well as archaeology, demography, forensics (forensic science and forensic medicine) and paleontology. The aim of this study was to study the eruption of deciduous teeth in the children and to study the patterns of eruption of temporary teeth (deciduous teeth) in either sex and in each of the four quadrants separately.

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INTRODUCTION

The primary aim of the contemporary physical anthropological and human population genetic researches has been to expound the nature of biological variations in different human populations and the meaning of these differences in the understanding of the ongoing evolutionary process. But the systems used have been varying from time to time based on technological development as well as nature of the subject. Among the other systems regularly studied human dentition is of special interest and occupies important place long since. There are two sets of teeth in human dentition, twenty deciduous teeth with three tooth groups – two incisors, one canine, two molars in each quadrant of maxilla and mandible; and 32 permanent teeth with 4 tooth groups (2) two incisors, one canine, two pre molars and three molars in each quadrant of maxilla and mandible. The former set of teeth is replaced by the latter during the course of development.¹

Knowledge of development of the teeth and their emergence in the oral cavity is applicable to clinical practice, as well as archaeology, demography, forensics (forensic science and forensic medicine) and paleontology. Historically, the term 'ERUPTION' has been used to denote emergence of tooth through gingival. The teeth are hardest and most durable of all parts in the body, and hence account for a large proportion of the human and pre human fossil remains available for study. As a matter of fact, virtually all fossil forms of primates, now known are represented by teeth which as one of the anatomical systems help in understanding the relationship between the different groups of primates. Dental age has been assessed on the basis of the number of teeth at each chronological age (Demirjian 1986) on stages of formation of crowns and roots of the teeth (Smith 1991).² Dental age during the mixed dentition period may be assessed on the basis of which have erupted, the amount of resorption of roots of primary teeth and the amount of development of permanent teeth. Since growth is characteristic of early childhood, growth failure and bodily disproportion are characteristic of "Protein energy malnutrition" (Visweswara Rao 1978, 1980).³ Deciduous dental eruption is often used for the estimation of age in infants and young toddlers (Jellife & Jellife 1968, 1973).⁴ It may be of interest to assess the inter relationship between nutritional status, deciduous dental eruption and the age of the children. The formula – "Number of teeth erupted plus six is equivalent to age in months" was found appropriate for broader age grouping of young children in New Gunia (Bailey 1964).⁵ Dentition may be considered to be the best physiological indicator of chronological age in juveniles (Smith 1991).²

The present work is a humble attempt on these lines and which provided new information on deciduous teeth eruption represented by dominant Hindu Caste population and those other religious namely Islam and Christianity. The aim of this study was to study the eruption of deciduous teeth in the children and to study the patterns of eruption of temporary teeth (deciduous teeth) in either sex and in each of the four quadrants separately.

MATERIALS AND METHODS:

The data for the present study was obtained from the observations on deciduous teeth eruption, made on 999 subjects (Neonates, toddlers and children) in the age group of 0 – 36 months, and the work carried out during August 2011 to April 2012 in Tirupati, Chittoor District geographically located in the Andhra Pradesh State of Southern India.

The study of 999 children was accomplished through survey of Newborns and pre-school children from the houses in town. To achieve the main objective of finding out the deciduous teeth eruption between 0 – 36 months, the following data was collected.

- a. Bio-social information concerning the subject and his/her family members such as person identity, age (date of birth), sex, residential history and occupation, social status nutrition of parents with monthly income (in rupees) from different sources.
- b. Eruption pattern: (a) deciduous dentition in 999 subjects. To comprehend the anatomical pattern of study of eruption of deciduous teeth in 0 – 36 months. The method of study comprised of dental inspection under day light sometimes but mostly focused light was used.

Prior to commencement of dental examinations the concerned parents in the sampled houses were approached and explained the purpose of the project and their approval for the programme was obtained. The selection of subjects was done by the sampling at random method. They were drawn from the selected house to house searching of different areas of the town. Subjects of both sexes were almost equally represented.

During dental examinations, an experienced dental surgeon was consulted sometimes necessary precautions were taken while making the dental inspections and while recording the relevant details of deciduous teeth eruption. All the dental inspections were carried out under day light and most of the time the focus of torch light was used. For assessing the eruption of deciduous teeth the oral cavities of the subjects were examined and any teeth that had at least partly pierced the muco periosteum were considered as erupted and were marked present. But, for convenient sake eruption stages were classified as follows:

'0' stage: Bud, only swelling of gum at the tooth place observed.

I stage: Just cut gum and appear in the oral cavity.

II stage: Midway between just erupting and eruption up to occlusal surface.

III stage: erupted up to occlusal surface.

The age of birth has been expressed as 0 months to 1 year according to the international convention. The sample has been divided into age groups with monthly age groups up to 36 months in order to evaluate the trend in the eruption pattern in the first year of the child as

compared to that in subsequent years. The data collected were analyzed using the standard statistical tools like mean and standard deviation.

RESULTS:

The data obtained by dental examination of children were recorded in pre-tested schedules. The mean age, standard deviation and standard error of mean are calculated for the group corresponding to the relevant eruption age (E subscript). For the purpose of the present study, E₅₀ is chosen as the most appropriate criterion. E₅₀ is defined as the age at which 50% of individuals show eruption of particular type of tooth.

Test of significance to study the differences in age of eruption between two (male and female) categories

When the age of eruption for given tooth in 2 different groups (the male and female) are compared in relation to number of teeth erupted, no significant difference has been observed except when number of teeth is 20 (in which significant difference observed). Statistical test is based on the standard error of difference between two means (student’s ‘t’ test). The results together with the ‘P’ values are tabulated.

Table 1: Mean age at eruption in months at E-50 level among males compared to females

Tooth	Right Upper			Right Lower			Left Upper			Left Lower		
	Male	Female	P Value	Male	Female	P Value	Male	Female	P Value	Male	Female	P Value
I ₁	9.85	9.42	>0.05, ns	7.18	8.74	<0.001,s	9.85	9.19	>0.05, ns	7.23	8.59	<0.001,s
I ₂	10.83	10.74	>0.05, ns	13.73	11.45	<0.001	10.34	10.85	>0.05, ns	13.70	11.75	<0.001,s
C	14.92	15.49	>0.05, ns	15.00	17.20	<0.001	14.28	15.51	<0.001,s	15.00	17.26	<0.001,s
M ₁	13.97	13.26	>0.05, ns	14.15	14.33	>0.05, ns	13.92	13.33	>0.05, ns	14.17	14.37	>0.05, ns
M ₂	23.37	20.18	<0.001,s	23.29	21.70	<0.001, s	23.29	20.60	<0.001,s	23.13	20.90	>0.05, ns

Table 2: Mean age at eruption in months at E-95 level among males compared to females

Tooth	Right Upper			Right Lower			Left Upper			Left Lower		
	Male	Female	P Value	Male	Female	P Value	Male	Female	P Value	Male	Female	P Value
I ₁	11.54	11.85	>0.05, ns	10.84	11.31	>0.05, ns	11.54	11.72	>0.05, ns	10.90	11.23	>0.05, ns
I ₂	12.98	14.06	<0.001,s	14.54	16.43	<0.001,s	12.85	14.18	<0.001,s	14.50	16.10	<0.001,s
C	17.03	19.26	<0.001,s	20.53	20.83	>0.05, ns	16.96	19.29	<0.001,s	19.92	21.00	<0.001,s
M ₁	14.80	15.85	<0.001,s	16.64	16.16	>0.05, ns	14.80	15.86	<0.001,s	16.73	16.78	>0.05, ns
M ₂	26.87	25.51	<0.001,s	26.72	26.14	>0.05, ns	27.03	25.70	>0.05, ns	26.71	25.81	>0.05, ns

DISCUSSION:

The general pattern of eruption of temporary/deciduous tooth is in the following order: I₁ – Central incisor (Lower), I₁ (upper), I₂ (upper), I₂ (lower), First Molar (M₁), Canine (C), Second

Molar (M_2). In the present study, this pattern is present in all (i.e., in Males, females and combined of E_{50} and E_{95} level). The teeth of lower jaw are erupt earlier than that of upper jaw generally as reported.

In the present study, this pattern is maintained in Central Incisor (I_1) only, that too in males at E_{50} and E_{95} levels and combined at E_{50} level only. That means this pattern is not maintained in all other groups (in Female E_{50} and E_{95} levels and combined at E_{95} level).

To put in simple terms, I_2 , C, M_1 of upper jaw erupted earlier than that of lower jaw teeth. I_1 of lower jaw erupted earlier than that of upper jaw in male children at E_{50} and E_{95} levels and in combined at E_{50} level, but not in female at E_{50} and E_{95} levels and combined E_{95} levels in which I_1 eruption showed no difference of eruption time in both upper and lower jaws teeth.

In general, the pattern of eruption of teeth appears to be symmetrical. In present study, symmetrical eruption of teeth is maintained in most of the children. The stage when 20 temporary teeth have erupted up to 2nd Molar in all quadrants are 26.92 months to 27.78 months for males, 23.79 months to 24.95 months for females. The difference of age of eruption is at the stage between males and females from 2.83 months to 3.13 months.

A careful examination of the published literature shows that the majority of the investigations so far carried out on the eruption of deciduous teeth were dealt with American (Doering and Allen 1942, Sandler 1944)⁶ and European children (Falkren 1957)⁷ and some with those from other parts of the world such as Japan (Kitamura 1942), New Guinea (Voors, 1957 Friedlaender and Bailit 1969),⁸ Korea (Yun 1957),⁹ Uganda (Welbourn 1956), Dakar (Falker, 1957)¹⁰ and Gambia (Mc Gregor, et. al 1968 Billewicz, 1973),¹¹ in Africa and Hong Kong, In China (Billewicz et al. 1973).¹² The study of Barrett and Brown (1966) on the Australian aboriginal children is the other important addition to these works. Updated researches on dental eruption in the Indian subcontinent are reviewed from point of age, sex, nutrition, economic status, caste, religion, and region.

Among the research studies a few pioneering studies of Powell (1902) in Mumbai were mainly to find out the range of variation of teeth eruption showrie (1946) on the South Indian Boys and Girls and on Lahore boys.¹³ Benerjee and Mukherjee (1967) among the Bengalee children Neuman et. al. (1969) in young rural Punjabi children,¹⁴ Derasari (1970) among the rural and Urban children of Baroda area, Mukherjee (1973) in the low income group Bengalee Hindu children.¹⁵ Visweswar Rao et. al (1973) among the rural Indian children around the city of Hyderabad in Andhra Pradesh and Prakash (1974) on a small number of Punjabi Hindu children.¹⁶ Added to these are the most recent works of Rami Reddy (1981, 83) among Brahmins¹⁷, Llingayaths and other caste groups of Gulbarga, Karnataka and Rami Reddy and Vijayalskhmi (1984) among the Velama caste children on South Eastern Andhra Pradesh.¹⁸

Sequence of eruption of temporary teeth based on average age at eruption

Present survey results show that the order of eruption of teeth to erupt in each quadrant is same almost throughout. The order is I₁ I₂ M₁ C M₂ 12435. Except in Female – E₉₅ level of mandible, in which sequence is differs from others. I₁ M₁ I₂ C M₂ 1 4 2 3 5.

Longman in medical embryology (7th edition) described the sequence of eruption as follows:

I ₁	C	I ₂	M ₁	M ₂
1	3	2	4	5

Which is deviated from our present study

V.Rami Reddy, in his studies in Gulberga children noticed following sequence of eruption:

I ₁	I ₂	M ₁	C	M ₂
1	2	4	3	5

Which is as that of our present study

Meinhard Robinow, studied the following sequence of eruption:

I ₁	I ₂	M ₁	C	M ₂
1	2	4	3	5

Which is as that of our present study.

The findings of a dental survey of children in the age group of 0 – 36 months in Tirupati town are reported. The study population comprises of 999 children-541 males and 458 females children identified randomly. Average ages at eruption for various temporary teeth are computed, based on the concept of eruption age at specified stage, -E subscript, which is defined as the age at which specified percentage of individuals show eruption of a given temporary tooth. The results are compared with those of other studies, particularly with reference to the average ages at eruption as well as the chronological order in which various temporary teeth erupt. The tables are formed to estimate the age of individual based on the total number of teeth that have erupted. The present study is a cross-sectional and community based study.

1. Based on the average age at eruption, the chronological order of eruption of temporary teeth is 12435 except in female –E95 level of mandible, in which sequence is differs i.e., 14235.

Order of eruption:

I_1	I_2	M_1	C	M_2
1	2	4	3	5

2. The average ages at eruption in months of temporary teeth in males and females are as follows:

	I_1	I_2	M_1	C	M_2
Females	8.56	10.68	13.30	15.50	19.92
Males	7.17	10.34	13.90	14.28	23.10

3. Temporary teeth erupting earlier in males in I_1 I_2 and C. But, in molars (M_1 and M_2) earlier eruption is observed in females. The magnitude of difference of age of eruption is 0.5 to 3.5 months for various teeth.
4. In all (I_1 C M_1 M_2) types of teeth except I_2 have no significant difference with some minor exceptional variations. But, in I_2 as a whole most of the teeth erupt earlier on left side with some exceptional variations.
5. In I_2 C M_1 – teeth erupt earlier in maxilla. But, in I_1 earlier eruption of teeth is seen in mandible in males; no difference of eruptional age is observed in females. In M_2 most of the teeth show no difference of eruptional age. As a whole difference of eruptional age in between maxillary and mandibular teeth is 0-4 months.

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