

IMPACT OF CASTE AND RELIGION ON THE PERMANENT DENTAL ERUPTION IN INDIA

V. Rami Reddy

Department of Physical Anthropology and Prehistoric Archaeology, Sri Venkateswara University, Tirupati, India

Abstract: A cross-sectional study was carried out in Gulbarga, Karnataka (India) on the permanent dental eruption in 2564 boys (1366) and girls (1198) of different Hindu castes: Brahmins, Lingayats and Others; and religious groups: Hindus, Muslims and Christians. The first tooth was noticed at the age of 4 years in Lingayats of either sex and most teeth erupted earlier in Lingayats and Others of Hindu religion as well as in other religious groups namely Muslims and Christians. The completion of eruption appears to have occurred earlier in Lingayats and Others only than in Brahmins. But in the Muslims and Christians the full set of teeth erupted earlier than in Hindus. Statistically significant difference was found in the mean number of teeth between Brahmins and Others at the age of 10 years, while at the same age and at 8 years there were significant differences between Hindus and Muslims, when Student's 't' test was applied. There are no other studies available on caste/religious groups for comparative evaluation. This is in continuation of the author's earlier study on the eruption age and order of permanent teeth according to sex and economic status among these caste and religious groups.

Key words: Permanent dental eruption, India.

Introduction

Studies on dental eruption patterns help in evaluating the stage of physiological development and age, besides benefiting the orthodontist in planning treatment. The well-known studies on permanent dental eruption covered the Whites (Suk, 1919), American Negroes (Steggarda and Hill, 1942), New Zealanders (Leslie, 1951), British (Clements et al., 1953a and 1953b), Australian aborigines (Barrett, 1957; Barrett et al., 1964), Chinese (Lau, 1971) and Gambians (Billewicz and McGregor, 1975). Such data on Indian populations are awfully missing excepting the pioneering works of Powell (1902), Shourie (1946), and more recently those of Nanda and Chawla (1966), Kaul et al. (1975), Bhasin et al. (1977) and Awasthi and Khare (1978). Thus no systematic populational study has been attempted so far in this country in which exist numerous endogamous castes/tribes and religious groups.

In this context, a project was launched to investigate the dental maturity and morphology among the people of Gulbarga town, a part of which on deciduous and permanent dental eruption by sex and economic status showing earlier eruption in females was dealt with already (Rami Reddy, 1981 and 1982). The present paper based on the same project reports the development of permanent teeth and level of dentition attained at specified ages in some castes (communities) and religious groups.

Material and Methods

Gulbarga town, situated (17° 21' N and 76° 51' E) on the Madras-Bombay broad gauge line, is about 600 and 200 kms north and west of Bangalore and Hyderabad, the capital cities of Karnatak and Andhra Pradesh states, respectively, in South India. Its population according to 1971 census is 1 45 630. Brahmins and Lingayats constitute the predominant castes besides the Muslims and Christians. Other castes with small populations are Reddis, Vysyas, Kshatriyas, Marathas, Kurubas, Jains, Harijans, etc.

2 564 unrelated normal healthy boys (1 366) and girls (1 198) aged 3 to 25 years and above were selected belonging to Brahmins (939) and Lingayats (766), populationally

dominant Hindu castes, and others (559) including subjects from castes with small sample sizes such as Jains, Vysyas, Kurubas, Harijans, etc. The rest were Muslims (233) and Christians (67), both religious groups. The subjects primarily came from schools, colleges and randomly chosen households representing the castes and religious groups. Birth dates were recorded with utmost care by utilising the available sources. The teeth were examined with the help of an experienced dental surgeon from the local Medical College, using alternate pairs of mouth mirrors and a probe. Those teeth that partly emerged above the gum were considered as erupted and noted by encircling the concerned numbers of the teeth on a standard proforma field-tested earlier. All cases with history of teeth extraction were discarded.

Data analyses were made using IBM-370/155 computer. The mean and standard error of the teeth erupted were calculated and tabulated in each age group separately. The median eruption age was estimated for each tooth using graphic method. First and third quartiles were also calculated and presented with medians. The analysis of variance was applied to test the influence of region, side, caste, and religion. The subjects were grouped by age following the completed age mode, i.e. the age on last birth day.

Results

Number of Teeth Erupted at Specified Ages

Table 1 shows the first tooth eruption at four years in Lingayats and a year later in Brahmins. The mean numbers of teeth erupted were higher in Lingayats and Others than Brahmins at 5-13, 16 and 18-24 years of age. The difference in mean number between Brahmins and Lingayats which seemed to be higher at 5-7 years (1.2-1.0) gradually decreased from 8-9 years. No statistically significant difference was observed between these groups even at 10 years age with maximum intercaste difference (2.2). The number of teeth increased rapidly between 5 and 13 years in all the three castes but from 14 years the increase was comparatively less but consistent. The number fluctuates in all groups from 14-25 years and above. Lingayats and Others appear to be nearer to each

Table 1. Mean ± S.E. (Sample size) of permanent teeth erupted in Gulbarga Children by Age and Caste

Age group Completed (Yrs)	Brahmins N = 939	Lingayats N = 766	Others N = 559
3	0.0 ± 0.00 (35)	0.0 ± 0.00 (56)	0.00 ± 0.00 (24)
4	0.0 ± 0.00 (38)	0.3 ± 0.21 (67)	0.00 ± 0.00 (16)
5	0.6 ± 0.25 (30)	1.8 ± 0.36 (81)	1.5 ± 0.54 (26)
6	2.8 ± 0.43 (47)	4.1 ± 0.79 (40)	3.4 ± 0.49 (24)
7	6.1 ± 0.45 (47)	7.1 ± 0.82 (33)	7.0 ± 0.66 (28)
8	9.6 ± 0.32 (60)	9.8 ± 0.63 (20)	11.5 ± 1.13 (26)
9	12.6 ± 0.42 (76)	13.0 ± 0.90 (37)	14.5 ± 0.76 (28)
10*	14.7 ± 0.67 (51)	16.9 ± 1.17 (39)	17.3 ± 0.83* (41)
11	19.7 ± 0.87 (38)	20.7 ± 1.01 (33)	21.1 ± 1.15 (26)
12	23.5 ± 0.67 (43)	24.5 ± 0.87 (37)	25.7 ± 1.00 (24)
13	26.5 ± 0.44 (52)	26.8 ± 0.89 (19)	26.6 ± 0.46 (20)
14	27.5 ± 0.24 (59)	27.3 ± 0.32 (28)	27.1 ± 0.44 (22)
15	27.8 ± 0.10 (76)	28.0 ± 0.00 (23)	27.8 ± 0.18 (14)
16	27.9 ± 0.10 (54)	28.1 ± 0.16 (35)	28.0 ± 0.23 (18)
17	28.4 ± 0.15 (49)	28.4 ± 0.26 (27)	28.6 ± 0.25 (26)
18	28.9 ± 0.22 (44)	29.0 ± 0.31 (28)	29.4 ± 0.28 (25)
19	29.3 ± 0.30 (32)	29.7 ± 0.31 (33)	29.9 ± 0.28 (29)
20-24	29.9 ± 0.12 (92)	30.5 ± 0.17 (112)	30.2 ± 0.14 (129)
25**	30.9 ± 0.44 (16)	30.6 ± 0.42 (18)	31.2 ± 0.30 (13)

* Difference between Brahmins and others is statistically significant ($P < 0.02$).

** Not significant elsewhere.

other than Brahmins in view of lesser mean number of erupted teeth from 5–13 years in the former. The difference between Brahmins and others is statistically significant at 2% probability only at 10 years. Both onset and completion of eruption appeared to occur earlier in Lingayats than Brahmins, while in Others the onset age was same as in Brahmins but with an apparently earlier completion time.

In all religious groups the first tooth emerged at four years with the Hindus showing a steep increase in means from 4–14 years. The Muslims and Christians presented inconsistent decreasing and increasing trends in the number of teeth erupted, the former at 5–6 (2.1–1.4) and 7 years (15.0), respectively, and the latter at 8 years (13.0) with fluctuating numbers from 14 years and above unlike in Hindus. At 8 and 10 years age significant differences were found only between Hindus and Muslims when Student's 't' test was applied. Muslims and Christians appeared to experience completion of eruption earlier than Hindus.

Age at Eruption

As portrayed in Table 2, all mandibular teeth of either side excepting premolars and third molars erupted earlier in Brahmins at all percentiles. The lower PM1 erupted earlier at 25th percentile, and upper PM1 at 50th and 75th percentiles, respectively. Comparatively late eruption has been noticed in upper than lower jaw at 25th and 50th percentiles. The lower M1 seemed to emerge earlier at 25th and 50th percentiles unlike at 75th when the teeth erupt in left maxilla. In Lingayats too, all teeth but both premolars, M1 and M3 erupted earlier in the mandible. In other castes, only the mandibular C and M3 appeared earlier at all percentiles, while in other teeth the eruption pattern, although varied, showed inconsistent trend. However, the eruption variation was found to be statistically insignificant as revealed by the 'F' values calculated between castes, regions (upper/lower) and sides (right/left).

Table 3 shows in all religions earlier eruption of mandibular LI and C than the maxillary ones at all percentiles. The right lower CI also erupted earlier in Hindus and Muslims at all percentiles unlike in Christians. The maxillary PM1 and mandibular M2 in Muslims, and maxillary PM1 and mandibular M3 in Christians have emerged earlier. No statistically significant difference was noticed between regions, religions, and sides as evidenced by the 'F' values.

In median eruption ages by caste, the extent of difference between homologous teeth and sides seems to be inconsistent. It ranges between 0.2 and 1.0 years in the lower PM2 of Lingayats. In Brahmins the left C and PM2 preceded the right in both jaws while the left upper M1 and lower M2 preceded their counterparts. In Lingayats unlike in Brahmins all upper right teeth but I, M2 and M3, and lower CI and M3 preceded the left ones, while it is vice versa in other teeth. In others too, the trend is nearly similar to that in Lingayats. As shown before, the lower teeth normally erupted earlier than upper ones with certain exceptions. The CI and PM1 of either jaw present no difference between Brahmins and Lingayats. In all teeth but upper CI and M1, the dental development of Lingayats was advance of Brahmins.

The most frequent range of difference in either jaw in median eruption ages in all religious groups in 0.2 years which is negligible. In Hindus all left upper teeth but CI and M2, and lower PM1, PM2 and M3 preceded right. In Muslims all lower teeth except M1 erupted earlier. Most upper left teeth showed precedence over the right ones. In Christians all lower teeth but premolars erupted earlier. The lower right anterior teeth preceded left, the remaining being equal save for the molars in which the left preceded the right.

Table 2. Age (Years) at Eruption of Teeth by Caste – 25th, 50th and 75th Percentiles

Type of Teeth	Percentile	Upper jaw Lingayats						Lower jaw Lingayats					
		Brahmins		Others		Brahmins		Others		Brahmins		Others	
		Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left
Central Incisors	25th	5.5	5.8	5.8	5.8	5.8	5.6	5.0	5.0	5.0	5.3	5.4	5.3
	50th	6.8	6.8	6.8	6.8	7.1	7.1	6.0	6.0	6.0	6.5	6.9	7.1
	75th	8.0	7.8	7.8	7.8	8.6	8.6	7.0	7.0	7.0	7.5	8.6	8.6
Lateral Incisors	25th	7.5	7.0	7.3	6.5	6.3	6.2	5.8	6.0	5.8	5.8	5.8	6.4
	50th	8.5	8.5	8.3	8.0	7.5	7.6	7.0	7.3	7.0	6.8	8.5	8.8
	75th	9.0	9.0	9.0	8.8	8.5	8.8	8.3	8.3	8.3	7.8	8.9	8.9
Canines	25th	10.3	10.3	9.3	10.0	9.8	9.4	9.5	9.3	9.0	9.0	8.8	9.1
	50th	11.5	10.8	10.5	10.8	11.1	11.3	10.5	10.3	10.5	10.3	10.6	10.8
	75th	12.0	11.8	11.5	11.8	11.9	12.1	11.3	11.3	11.3	10.8	11.7	11.9
First Premolars	25th	9.8	9.3	8.8	9.0	8.8	9.0	9.5	9.3	10.0	9.5	9.2	8.8
	50th	10.3	10.3	10.0	10.3	10.1	10.1	10.5	10.5	10.5	10.5	10.4	10.1
	75th	11.0	11.3	10.8	10.8	11.9	11.9	11.3	11.3	11.3	11.0	11.6	11.8
Second Premolars	25th	11.0	10.3	10.3	10.0	9.7	9.8	10.5	10.3	11.3	10.3	9.6	9.4
	50th	11.8	11.3	11.0	10.8	11.2	10.9	11.5	11.0	12.3	11.3	10.9	10.9
	75th	12.5	12.5	11.8	11.3	12.9	12.6	12.5	12.3	13.0	12.5	12.3	12.3
First Molars	25th	4.8	4.8	5.0	5.0	4.9	4.8	4.5	4.5	4.8	4.8	4.9	4.8
	50th	6.0	5.8	6.3	6.5	6.3	6.8	5.5	5.5	7.8	7.8	6.9	6.8
	75th	7.0	7.0	7.3	8.0	8.0	8.4	6.8	6.8	11.0	11.0	9.3	8.9
Second Molars	25th	11.3	11.0	10.8	10.5	9.8	10.1	10.5	10.5	10.3	10.0	10.2	10.1
	50th	12.0	12.3	11.5	11.5	11.0	11.1	11.8	11.5	11.3	11.0	11.1	11.2
	75th	12.8	13.0	12.8	12.8	12.6	12.4	12.5	12.5	12.3	12.0	11.8	12.6
Third Molars	25th	18.0	18.5	17.5	17.5	18.1	17.9	17.5	17.8	17.5	18.0	17.8	17.6
	50th	20.0	20.0	19.5	19.3	19.6	19.6	19.5	19.5	19.0	19.5	19.0	18.8
	75th	21.0	20.8	21.3	20.8	21.1	21.3	21.0	21.0	21.3	20.8	20.7	20.3

Differences in the mean number of teeth erupted between caste, region (upper/lower), and side (right/left) are not significant ($P > 0.05$) as shown by the 'F' test

Table 3. Age (Years) at Eruption of Teeth by Religion – 25th, 50th and 75th Percentiles

Type of Teeth	Percentile	Hindus		Upper jaw Muslims		Christians		Hindus		Lower jaw Muslims		Christians	
		Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left
Central Incisors	25th	5.3	5.3	5.8	5.8	5.8	6.0	5.0	5.3	5.5	5.5	5.0	5.0
	50th	6.5	6.5	7.0	7.0	7.0	7.0	6.0	6.3	6.8	6.3	6.0	6.3
	75th	7.5	7.5	8.0	8.0	8.0	8.0	7.0	7.3	8.0	7.0	7.3	7.0
Lateral Incisors	25th	6.3	6.0	7.0	7.3	6.8	6.8	5.5	5.5	6.3	6.0	6.0	5.8
	50th	7.8	7.5	8.3	8.5	8.3	8.3	6.8	6.8	7.0	7.3	6.8	7.0
	75th	9.3	9.0	9.0	9.0	9.0	9.0	7.5	8.0	8.5	8.5	8.3	8.3
Canines	25th	9.5	9.5	9.8	9.8	10.0	10.0	9.3	9.3	9.0	9.0	9.0	9.0
	50th	11.0	10.5	11.5	11.0	11.3	10.8	9.8	10.0	10.3	10.5	10.3	10.5
	75th	11.8	11.5	12.0	11.8	12.0	11.8	11.3	10.8	11.3	11.3	11.3	11.3
First Premolars	25th	8.8	9.5	9.3	9.0	9.3	9.0	9.3	9.3	9.5	9.5	9.5	9.3
	50th	10.3	10.0	10.3	10.0	10.3	10.0	10.0	9.8	10.8	10.3	10.5	10.5
	75th	10.8	10.5	11.0	11.3	11.0	11.0	11.5	11.0	11.5	11.5	11.5	11.5
Second Premolars	25th	9.5	9.8	10.3	10.0	10.0	10.0	10.0	9.8	10.3	10.0	10.0	10.0
	50th	11.3	10.8	11.5	11.3	11.0	10.8	11.3	11.0	11.3	11.3	11.0	11.0
	75th	11.8	12.5	12.8	11.8	12.0	12.5	11.8	11.8	11.8	12.0	12.5	12.5
First Molars	25th	5.3	5.3	5.0	5.0	5.5	5.0	5.3	5.3	5.0	5.0	5.5	5.3
	50th	6.5	5.8	6.0	6.3	5.8	6.0	5.8	6.3	6.0	6.0	5.8	5.8
	75th	8.0	7.0	7.0	7.3	7.3	7.0	7.0	7.5	7.0	7.3	7.0	7.3
Second Molars	25th	10.3	10.3	11.0	11.0	10.5	10.3	10.3	10.3	10.3	10.0	10.0	10.0
	50th	11.5	11.5	11.8	11.8	12.3	12.0	11.3	11.3	11.3	11.3	10.8	10.8
	75th	12.3	12.5	13.0	13.0	12.8	13.0	12.0	12.0	12.5	12.5	12.8	12.3
Third Molars	25th	17.8	18.0	18.0	18.5	18.0	19.0	17.3	17.5	18.0	17.8	17.3	17.5
	50th	20.3	19.0	23.5	21.3	21.5	21.8	20.3	19.8	18.8	19.0	21.3	19.8
	75th	26.3	25.0	26.5	26.0	26.8	27.3	25.0	26.3	25.3	26.5	25.5	24.5

Differences in the mean number of teeth erupted between religion, region (upper/lower), and side (right/left) are not significant ($P > 0.05$) as shown by the 'F' test

Discussion

Tooth eruption studies, a source on physiologic development of individuals in a particular community or region, have not been carried out on large scale in any country. The present cross-sectional study was aimed mainly to evaluate eruption variability if any by population and religion.

The study revealed that the first tooth erupted as early as 4 years in Lingayats unlike in New Zealanders (Leslie, 1951), and Brahmins and Others in whom it was 5 years. However, most teeth erupted in subjects of all series by 13 years. Lingayats and Others come nearer to each other than Brahmins, in view of negligible difference between them in the mean number of teeth erupted from 5–13 years. Statistically significant difference was observed between Brahmins and Others who stand apart in both extremes of caste hierarchy. The completion time appears to be earlier in Others than in Brahmins. In all religious groups the onset of eruption occurred at same age (4 years). The 't' values revealed significant differences between the Hindus and Muslims at 8–10 years. This is probably due to the difference in dietary habits of these populations, the latter consuming purely vegetarian type of food stuffs while the latter are non-vegetarians.

The mandibular I, C, M1 and M2 erupted earlier than those of maxilla at all percentiles in Brahmins as in Lingayats and unlike in Others. There was negligible difference between the eruption ages of teeth of either side irrespective of caste and jaw as in Gambians (Billewicz and McGregor, 1975). All anterior teeth and M1 erupted before the posterior ones unlike in Pima Indians (Dahlberg and Menegaz-Bock, 1958) and New-Zealanders (Leslie, 1951) in whom the latter erupted earlier. This was perhaps due to the shedding of the sufficiently matured anterior deciduous teeth and premature shedding of deciduous M1. The eruption sequences in our populations are in general agreement with other populations in India and abroad excepting Lingayats whose lower CI erupted earlier than the M1, and PM2 before M2. The general pattern in upper jaw is 6 1 2 4 3 5 7 8 and in lower jaw, 6 1 2 3 4 5 7 8. According to the studies of Steggarda and Hill (1942), Hurme (1949), and Kaul et al. (1975) the most common sequence of teeth emergence in maxilla is M1 I1 I2 P1 (C P2) M2, and in mandible, (M1 I1) I2 (C P1) P2 M2, the order varying in teeth within parentheses. Haataja (1965) and Noyes et al (1948) showed that the mandibular premolars emerge before canines unlike in our series. However, in Lingayats and Christians the mandibular M2 erupted earlier than PM2.

On the whole the mandibular teeth tend to erupt earlier than the maxillary ones as in Chandigarh children (Kaul et al., 1975) and the pattern of mandibular-maxillary precedence is in agreement with the two American Indian populations, Quechua and Pima (Israel et al., 1967). As in Australian aborigines (Barrett et al., 1964) and Dehradun Gurkhas (Awasthi and Khare, 1978) there is no marked difference between our populations in their basic tooth emergence.

*

Received 9 July 1986.

References

- Awasthi, S. C. and Khare, B. P. (1978): Sequence and age of eruption of permanent dentition among Gurkhas of Dehradun (U.P.). – Presented at the *IV Ann. Conf.⁴ Ethnographic and Folk-Culture Society*, U.P., held at Ahmedabad (India) from January 8–10.
- Barrett, M. J. (1957): Dental observations on Australian aborigines: tooth eruption sequence. – *Austral. Dent. J.*, 2; 217.
- Barrett, M. J., Brown, T. and Cellier, K. M. (1964): Tooth eruption sequence in a tribe of Central Australian aborigines. – *Am. J. Phys. Anthrop.*, 22; 79.
- Bhasin, M. K., Sharma, A. and Singh, I. P. (1977): Permanent dental emergence in the Kuluis of Himachal Pradesh. – *The Anthropologist*, 21; 9.
- Billewicz, W. Z. and McGregor, I. A. (1975): Eruption of permanent teeth in West African (Gambian) children in relation to age, sex and physique. – *Ann. Hum. Biol.*, 2; 117.

- Clements, E. M. B., Davies-Thomas, E. and Pickett, K. G. (1953a): Time of eruption of permanent teeth in British children in 1974-8. - *Brit. Med. J.*, *1*; 1421.
- Clements, E. M. B., Davies-Thomas, E. and Pickett, K. G. (1953b): Order of eruption of the permanent human dentition. - *Brit. Med. J.*, *1*; 1425.
- Dahlberg, A. A. and Menegaz-Bock, R. M. (1958): Emergence of the permanent teeth in Pima Indian children: A critical analysis of methods and an estimate of population parameters. - *J. Dent. Res.*, *37*; 1123.
- Haataja, J. (1965): On the order of eruption of permanent teeth in Finnish children in the light of cross-sectional material. - *Acta Odont. Scand.*, *23*; 215.
- Hurme, V. O. (1949): Ranges of normalcy in the eruption of permanent teeth. - *J. Dent. Child.*, *16*; 11.
- Israel, H., Dahlberg, A. A., Garn, S. M. and KeRewsky, R. S. (1967): Relative eruption precedence of mandibular and maxillary teeth in two populations. - *J. Dent. Res.*, *46*; 456.
- Kaul, S., Saini, S. and Saxena, B. (1975): Emergence of permanent teeth in school-children in Chandigarh, India. - *Archs. Oral. Biol.*, *20*; 587.
- Lau, W. H. (1971): The eruption time of the permanent teeth in Chinese. - *J. Formosan Med. Assoc.*, *70*; 159.
- Leslie, G. H. (1951): *A biometrical study of the eruption of the permanent dentition of New Zealand children*. - New Zealand Government Printer, Wellington.
- Nanda, R. S. and Chawla, T. N. (1966): Growth and development of dentitions in Indian children. I. Development of permanent teeth. - *Am. J. Orthodont.*, *52*; 837.
- Noyes, F. B., Schour, I. and Noyes, H. J. (1948): *Oral histology and embryology*. - Lea and Febiger, Philadelphia.
- Powell, A. (1902): Medical examination in cases of rape. - *Indian Med. Gaz.*, *37*; 230.
- Rami Reddy, V. (1981): Eruption of deciduous teeth among the children of Gulbarga, South India. - *Indian J. Med. Res.*, *73*; 772.
- Rami Reddy, V. (1982): Eruption of permanent teeth among the people of Gulbarga, Karnataka. - *Anthrop. Közl.*, *26*; 83-97.
- Shourie, K. L. (1946): Eruption age of teeth in India. - *Indian J. Med. Res.*, *34*; 105.
- Steggarda, M. and Hill, T. J. (1942): Eruption time of teeth among Whites, Negroes, and Indians. - *Am. J. Orthodont.*, *28*; 351.
- Suk, V. (1919): Eruption and decay of permanent teeth in Whites and Negroes. - *Am. J. Phys. Anthropol.*, *2*; 351.

Mailing address: Prof. V. Rami Reddy
 Department of Physical Anthropology
 Sri Venkateswara University, Tirupati 517 502, Andhra Pradesh, India

