

A CROSS-SECTIONAL STUDY OF ERUPTION PATTERN OF TEETH IN 10-12 YEAR OLD CHILDRENKrishnan B¹, Liza John²**HOW TO CITE THIS ARTICLE:**

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ABSTRACT: The study was conducted in children of age group 10-12 years in North Kerala population to assess the timings of eruption of canine and premolars and compare the eruption pattern within jaws and amongst different sexes.

KEYWORDS: Canine, Premolar, eruption pattern, comparison between jaws.

INTRODUCTION: Establishment of identity of the decedent is one of the important objectives of medicolegal autopsy. Age estimation is an important step in the creation of an anthropological profile. The principal means which enable one to form a fairly accurate opinion about age of an individual especially in earlier ages are teeth, ossification of bones and sexual characteristics.⁽¹⁾ In the childhood phase the most useful age indicators are teeth development and eruption sequence which are fairly similar to all. Assessment of dental development and dental age by means of tooth counts is a convenient and simple method in ages where emergence is expected.⁽²⁾ The canines and premolars which erupt between age 10-12 are the ones depended upon for a rough assessment of age in this period. The study helps check whether conventional standards regarding eruption timing are true for the local population.

MATERIALS AND METHODS: The study material consisted of 314 boys and 334 girls belonging to age group of 10-12 years who were students from seven randomly selected schools in Calicut city. The children were divided into groups as follows: Group I B (Boys 10-11 years), Group I G (Girls 10-11 years), Group II B (Boys 11-12 years), Group II G (Girls 11-12 years). Children with documented dates of Birth, no previous major dental intervention and no documented or apparent major nutritional deficiencies or illnesses were selected.

Each subject was examined by one doctor from forensic medicine and one from the Dental College. A general examination for ruling out asymmetries of sides, developmental defects, hormonal or major nutritional deficits was carried out. History of oral surgical interventions or trauma was asked for. Recording of height and weight were carried out. Dental examination and data recording followed this. Oral cavity was examined with a dental mirror aided by torch light and the data was recorded. In cases of doubt of a tooth as to permanent or deciduous the tooth was photographed and examined in detail later using computerized photographic evaluation methods.

A tooth was considered to be erupted when the tip of crown of tooth had penetrated the gum margin (stage-1 of tooth eruption).

The data obtained was tabulated, eruption timings in the jaws and in the sexes were correlated. Cross tabulation tests were done with respect to each tooth in each jaw and in each sex and their statistical significance studied using Chi-square test and McNemar test.

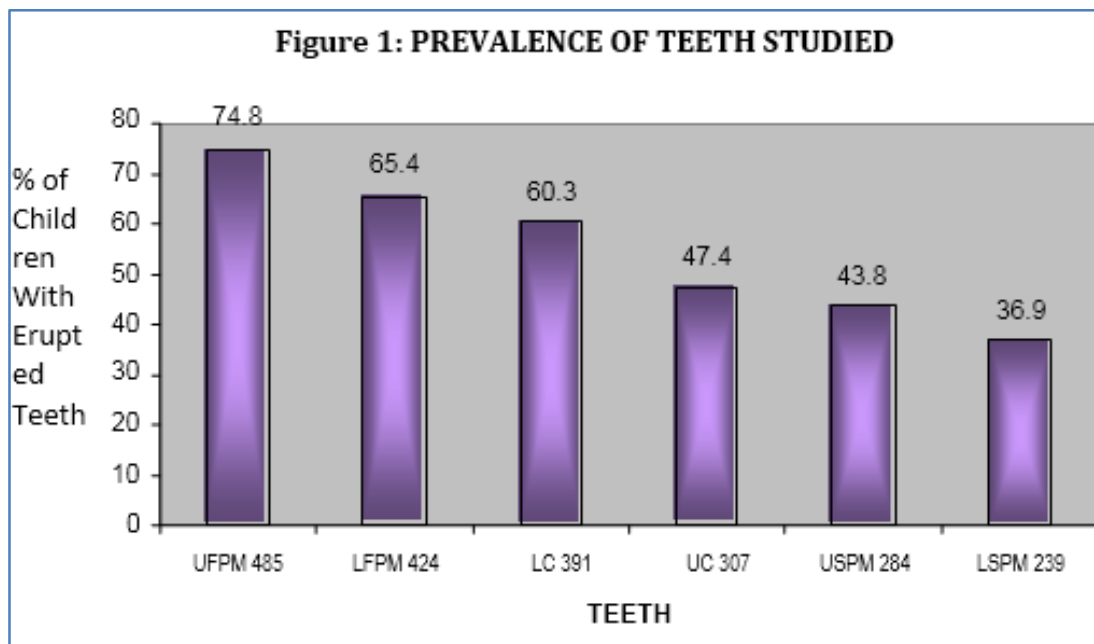
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OBSERVATION: The pattern of eruption of the first and second premolar and the canines in both maxillary and mandibular jaws have been tabulated below (Table1).

Group		Maxillary first premolar		Mandibular first premolar		Maxillary second premolar		Mandibular second premolar		Maxillary canine		Mandibular canine	
		Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
IB	Present	97	64.2	74	49	43	28.5	34	22.5	48	31.8	63	41.7
	Absent	54	35.8	77	51	108	71.5	117	77.5	103	68.2	88	58.3
	Total	151	100	151	100	151	100	151	100	151	100	151	100
IIB	Present	133	81.6	118	72.4	85	52.1	80	49.1	77	47.2	104	63.8
	Absent	30	18.4	45	27.6	78	47.9	83	50.9	86	52.8	59	36.2
	Total	163	100	163	100	163	100	163	100	163	100	163	100
IG	Present	97	63	85	55.2	50	32.5	36	23.4	51	33.1	77	50
	Absent	57	37	69	44.8	104	67.5	118	76.6	103	66.9	77	50
	Total	154	100	154	100	154	100	154	100	154	100	154	100
IIG	Present	158	87.8	147	81.7	106	58.9	89	49.4	131	72.8	147	81.7
	Absent	22	12.2	33	18.3	74	41.1	91	50.6	49	27.2	33	18.3
	Total	180	100	180	100	180	100	180	100	180	100	180	100

Table 1: Pattern of eruption of premolar and canine teeth in upper and lower jaw

In the study group 74.8% of all subjects studied had erupted maxillary first premolar, 65.4% had erupted mandibular first premolar, 60.3% had erupted mandibular canine, 47.4% had erupted maxillary canine, 43.8% had erupted maxillary second premolar and 36.9% had erupted mandibular second premolar.



COMPARISON OF ERUPTION OF CANINES AND SECOND PREMOLAR: In 288 subjects, the canines and second premolars were present. In 193 subjects both were absent. In 131 subjects the canines had erupted with second premolars unerupted. In 36 subjects the second premolars had erupted with canines unerupted. This data clearly shows that more subjects had erupted canines to erupted

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second premolars. Cross tabulation was done, binomial distribution used, and McNemar test carried out. This precedence of canine eruption over second premolar was statistically significant.

Table 2: CANINE / PREMOLAR Cross tabulation

			SECONDPREMOLAR		Total
			Present	Absent	
CANINE	Present	Count	288	131	419
		% within CANINE	68.7%	31.3%	100.0%
		% within PREMOLAR	88.9%	40.4%	64.7%
	Absent	Count	36	193	229
		% within CANINE	15.7%	84.3%	100.0%
		% within PREMOLAR	11.1%	59.6%	35.3%
Total	Count	324	324	648	
	% within CANINE	50.0%	50.0%	100.0%	
	% within PREMOLAR	100.0%	100.0%	100.0%	

COMPARISON OF ERUPTION OF CANINES BETWEEN THE JAWS: In 279 subjects upper and lower canines were present. In 229 cases both were absent. In 28 cases where the upper canine had erupted, the lower canines were not. In 112 cases where the lower canines had erupted the upper canines were absent. This clearly shows that there were more people with erupted lower canines and unerupted upper canines than vice versa. The findings were cross tabulated and McNemar test applied. The canines erupted earlier in the lower jaw in statistically significant numbers. ($p < 0.0001$)

Table 3: LC-UC --Cross tabulation

			LC		Total
			Present	Absent	
UC	Present	Count	279	28	307
		% within UC	90.9%	9.1%	100.0%
		% within LC	71.4%	10.9%	47.4%
	Absent	Count	112	229	341
		% within UC	32.8%	67.2%	100.0%
		% within LC	28.6%	89.1%	52.6%
Total	Count	391	257	648	
	% within UC	60.3%	39.7%	100.0%	
	% within LC	100.0%	100.0%	100.0%	

DISCUSSION: There are commonly accepted eruption patterns of teeth, both in time and sequence. It is commonly believed that the canine erupts later than the premolars.

However, in a longitudinal study conducted in Europe in 2004 observed a noteworthy change in the eruption sequence of teeth and determined that the eruption of canine precedes the eruption of the second premolar.⁽³⁾ In a study on Delhi boys conducted in the same year confirms this change of pattern of tooth emergence.⁽⁴⁾

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With this difference in observation kept in mind, the present study was taken up to observe the eruption pattern of canine and second premolars in children of both sexes of the 10-12 year age group.

In the present study (A cross-sectional study) 648 subjects were examined and the teeth eruptions were observed. In the total population (10-12 years) studied 74.8% had their maxillary first premolar (UFPM) erupted, 65.4% had mandibular first premolar (LFPM), 60.3% had mandibular canine (LC), 47.4% had maxillary canine (UC), 43.8% had maxillary second premolar (USPM) and 36.9% had mandibular second premolar (LSPM) erupted. This gradient would seem to be the sequence of eruption of teeth in the study group.

Precedence of Eruption (Between Teeth and Jaws): The maxillary first premolar had erupted in 63.6% of all subjects in the 10-11 year age group (Group I) and 84.8% in the 11-12 year age group (Group II). It was the first tooth to erupt in most subjects among the six teeth studied. The mandibular first premolar had erupted in 52.1% in group I and 77.3% in group II (Combined 65.5%). This was the second prevalent tooth among the six studied.^(4,5,6,7)

The mandibular canine had erupted in 45.9% in group I and 73.2% in group II (Combined 60.3%). This was the third prevalent tooth. The maxillary canine had erupted in 32.5% of all subjects in group I and 60.6% in group II (Combined 47.4%). This was the fourth prevalent tooth.

The maxillary second premolar had erupted in 30.5% of all subjects in group I and 55.7% in group II (Combined 43.8%). This was the fifth prevalent tooth. The mandibular second premolar had erupted in 23% in group I and 49.3% in group II (Combined 36.9%). This was the least prevalent tooth among the six.⁽⁶⁾ The sequence of eruption differed in the (mandibular) canine preceding even the (mandibular) first premolar.^(4,7) Observations of the present study were in agreement with the fact that canines preceded second premolars in both jaws.⁽³⁾

The mean age of eruption is 10.6 and 10.85 years for maxillary and mandibular second premolar respectively.⁽⁴⁾ The second premolars show a delay in eruption in the present study since only lesser percentage (55.7% maxillary and 49.3% mandibular) showed eruption even in group II (11-12 year) studied. The mean eruption timing for the tooth as 11-12 years,⁽⁷⁾ and 11.5 years,⁽⁶⁾ which is earlier than that found in the present study. The timing of eruption of the second premolar in the present study would broadly be in consonance with 10-13 years.⁽⁵⁾

These findings demonstrate that the eruption timings in this population are later when compared to the earlier observed timings noted by.^(4,6,7)

The canine erupts by 9.9 years ⁽⁴⁾ and 10.87 years.⁽⁶⁾ The timing of eruption of canine is as 9-10 years for the lower jaw and 11-12 years for the upper jaw.⁽⁷⁾ The timings of eruption of canines as 10-12 years (male) and 9-11 years (female) for the tooth in lower jaw and 10-13 years (male) and 10-12 years (female) for upper jaw,⁽⁵⁾ and is broadly in consonance with the present study. In the present study the lower canine had erupted in 45.9% in Group I and 73.2% in Group II. The upper canine had erupted in 32.5% in group I and 60.6% in group II and is later than previous studies.^(4,6,7)

Sequence of Eruption (Canine and Second Premolar): In the present study 131 subjects, had erupted canines with unerupted second premolars; 36 subjects had erupted second premolars with unerupted canines. This precedence of eruption of canine over second premolar was there in both jaws and was statistically significant and is consistent with previous observations.^(6,8,3) The sequence differed in the (Mandibular) canine preceding even the (Mandibular) first premolar.⁽⁴⁾

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Eruption Timing between the Jaws: From the present study it can be seen that the first and second premolars showed earlier eruption in the maxilla but was not statistically significant, while canines erupted earlier in the mandible and was significant.

The earlier eruption of the premolars in the maxilla than in the mandible is consistent with previous observations.^(5,7,4) The early eruption of the canines in the mandible is consistent with the data given by all these workers. There is mandibular precedence over maxilla.^(4,3)

SUMMARY: Teeth are called “lasting remains” as they resist decomposition and animal action. The observance of eruption pattern by dental examination, radiological examination of the jaws and study of the degenerative changes are the commonly used techniques to estimate age from teeth. Students of the age 10-12 years from various schools in Calicut were examined by a team of doctors and the data collected was analyzed with the help of a biostatistician and the results observed.

The eruption of the first premolar in both jaws was found to be in consonance with earlier studies. The canine was observed to precede the second premolar with statistical significance. The first and second premolars erupted earlier in the maxilla than in the mandible, but this was statistically insignificant. The canines erupted earlier in the mandible and this precedence in the lower jaw was statistically significant. The second premolar eruption was delayed than noted in the earlier studies.

The present study being a cross sectional one only gives the prevalence of erupted teeth. The study was able to document changes in the dental eruption sequence and to compare the pattern of eruption between the jaws. The present study was not assisted with radiography thus the possibility of impacted teeth being recorded as unerupted is real. The median age of eruption of tooth can be arrived at by a similar but longitudinal study.

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AUTHORS:

1. Krishnan B.
2. Liza John

PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of Forensic Medicine, Government T. D. Medical College, Alappuzha.
2. Assistant Professor, Department of Forensic Medicine, Government T. D. Medical College, Alappuzha.

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Dr. Krishnan B,
Assistant Professor,
Department of Forensic Medicine,
Government T. D. Medical College,
Alappuzha.
E-mail: drkrishnanb@yahoo.com

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