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# ERUPTION AGE OF PERMANENT FIRST MOLAR AND CENTRAL INCISORS IN THE HIMACHALI POPULATION

**Ashish Justa[1], Kanika Gupta[2]**

1.Designation.MDS, Department of Pedodontics and Preventive Dentistry, Himachal Dental College, Sunder Nagar

2.MDS, Department of Pedodontics and Preventive Dentistry, Himachal Dental College, Sunder Nagar

## ABSTRACT:

Teeth eruption is a dynamic, complex physiological process in odontogenesis which serves as an important parameter in Anthropology, Medico-legal cases or mass disasters. Timings of tooth eruption show variations in different populations. The timing of tooth eruption is influenced by various factors such as heredity, geographic factors, sex, race, nutrition, climate and others. Appropriate knowledge about the sequence and pattern of tooth eruption are important for diagnosis and treatment planning in paediatric dentistry.

**Aims:** Studying gender differences in sequence and age of eruption of permanent first molar and permanent incisors in school going children of Himachal Pradesh

**Materials and methods:** The cross-sectional data was collected from 809 Himachali subjects comprising 398 girls and 411 boys, aged 6-9 years using simple random technique. Specially designed Performa's (WHO – Oral Health Assessment form for Children, 2013) was assigned to each child individually. Independent t-test was used to assess the molar and incisors eruption differences between males and females.

**Results:** As per our study, the permanent mandibular first molars erupted earlier than central incisors in both boys and girls. Mean age of eruption of mandibular first molar in males was 6.98 yrs where as in females it was 6.79 yrs which was found to be significant (≤0.0005).

**Conclusion:** All teeth erupted earlier in girls than boys. Molars erupted earlier than incisors in both the sexes.

**Keywords:** Eruption, first molar, central incisor, himachal

## INTRODUCTION:

According to Wise et al, tooth eruption is a complex and strictly regulated process that involves cells of the tooth organ and the surrounding alveolus.[1] In erupting, the crown of the tooth must escape from its bony crypt and pass through the lining mucosa of the oral cavity.[2] Teeth aid in personal identification and age estimation as they are highly durable and resist putrefaction, fire, chemicals etc.[3] Teeth are the most indestructible part of the body and do not need special dissection. Hence teeth provide excellent material in living and non-living populations for anthropological, paleontological, genetic, odontological and forensic investigations.[4] Permanent teeth generally erupt between ages 6-13 years except for the third molars. Several studies have shown that eruption of permanent teeth is an orderly, sequential and age specific event.[5,6] Various factors that are responsible for variations in tooth eruption of different population can be physiological (e.g., related to genetic, constitutional,

*Corresponding Author Address: Dr. Kanika Gupta. E-mail: kanikagpt09@gmail.com

geographic, gender, race, nutrition, climate, hormonal, urbanization), pathological (caries status, endocrine diseases), or local (such as obstacles in the path of eruption and lack of space).[5] Teeth are biological markers of maturity and their eruption into oral cavity is an important milestone in an individual's life.[7]India is a vast multiethnic and multicultural country where the chronology of emergence of permanent teeth is expected to vary from region to region. Evolution of the human race has drifted through many changes seen in the living as well as food habits, and oral hygiene over a span of thousands of years, which may have influenced the eruption of teeth as well.[8] Literature reports very few studies about the dental emergence from northern states of India. The standards for tooth eruption patterns derived for a western population cannot be extrapolated to an Indian scenario. So, in a need to collect local data, the study was done to analyse the difference in emergence timings of permanent first molar and permanent incisors in the school going males and females of Himachal Pradesh, India.

## MATERIALS AND METHODS:

**Study Area:** All the subjects considered for the study were of Himachali origin selected from 5 districts, representing different geographical locations of the state.

**Sampling technique:**

Simple random technique was adopted to obtain cross-sectional data collected on 809 subjects comprising 398 girls and 411 boys, aged 6-9 years.

**Subject selection:**

Inclusion Criteria: The subjects who were apparently healthy both physically and mentally. Exclusion Criteria: Children with a history of chronic infectious disease, nutritional or endocrine disturbances, recognized syndromes and developmental disturbances such as cleft lip and palate. Ethical clearance was obtained from the Institutional Ethical Committee Review Board. Prior permission was obtained from the school authorities and the day of examination was scheduled. On a given day 30-50 students were examined. The study was completed in a period of 6 months time.

**Observation Process**:

Specially designed Performa's (WHO – Oral Health Assessment form for Children, 2013) was assigned to each child individually. Inspection was carried out in a broad day light in outdoor environment with subjects maintaining seated posture. Mirror and probe were used for examination. The examination commenced from the maxillary right quadrant for the presence of permanent teeth, followed by the maxillary left, mandibular left and mandibular right quadrant. The eruption of first molar and incisors in the oral cavity of each child were recorded in his/her performa. A tooth with any of its parts emerged

through the gingiva was considered as erupted.

**Recording of Age:**

The ages of the children were recorded as: child's date of birth (confirmed from school records) to the date of examination. Permanent dentition has been recorded in FDI Notation:

| | | | |
|---|---|---|---|
| Maxillary Teeth. | 16 | 12 | 11 |
| Mandibular Teeth. | 46 | 42 | 41 |

Apart from this, the sex, case number and absence/presence of canines/premolars was recorded and coded for subsequent statistical analysis. The range of age in context to tooth eruption was considered as follows: If in a population of particular age group the tooth was found to have erupted in 1% of subjects, that age was considered as minimum age, where as if tooth eruption was noted in all the subjects (100%) the age was considered as maximum age of eruption.

**Statistical analysis:**

Mean and median was obtained on central tendencies and SD. SEE and 95% CI were considered as measure of dispersion. All statistical analysis was performed using the statistical software program SPSS for Windows, Version 16.0 (SPSS Inc, Chicago, IL, USA). Descriptive statistics of eruption time were computed for each tooth. Independent t-tests were used to assess the differences between males and females and between the maxillary and mandibular arch. P-values of less than or equal to 0.05 were considered statistically significant. No statistically significant differences were found in the eruption times of permanent teeth on the right and left sides of the jaw; therefore, only one side (right) was assessed.

## RESULTS:

**Distribution of subjects:** The total sample of this study was divided according to their gender into 411 (50.80%) male and 398 (49.20 %) female with age 6-9years (Table 1).

The present study shows overall early eruption of permanent teeth in females than in males, in maxilla (Table 2) and mandible (Table 3) as well. In girls maxillary first molar erupted at the age of 6.75±.374 followed by central incisor at the mean age of 7.74±.471 and lateral incisor at the age of 8.84±.723.

In boys, maxillary first molar erupted at the age of 7.27±.651 followed by central incisor at 7.82±.593 years and lateral incisor at the age of 8.94±.832 (Table 4, Graph 1).In mandible the age of eruption of first molar, central incisor and lateral incisor was 6.80±.479, 6.98±.517, 8.38±.748 respectively. For similar sequence in mandible for girls, the age of eruption was 6.71±.362, 6.79±.372,and 7.71±.373 respectively(Table 5, Graph 2).

Table 1: Distribution of study Population.

| Age in Years | | 11(%) | 12(%) | 16(%) |
|---|---|---|---|---|
| 6 | M(100) | 10(10) | 0 | 45(45) |
| | F(101) | 7(6.9) | 0 | 74(73.3) |
| 7 | M(100) | 60(60) | 13(13) | 87(87) |
| | F(101) | 73(72.3) | 25(24.8) | 90(89.1) |
| 8 | M(102) | 99(97.1) | 77(75.5) | 99(97.1) |
| | F(100) | 94(94) | 65(65) | 100(100) |
| 9 | M(109) | 109(100) | 94(86.2) | 109(100) |
| | F(96) | 96(100) | 80(83.3) | 96(100) |

Values are presented as N (%)

Table 2: Descriptive statistics for frequency of erupted maxillary teeth in different age groups of male and female subjects

| Age (in years) | Total-N % | Gender | N | % |
|---|---|---|---|---|
| 6 | 201 (24.84%) | M | 100 | 49.75% |
| | | F | 101 | 50.25% |
| 7 | 201 (24.84%) | M | 100 | 49.75% |
| | | F | 101 | 50.25% |
| 8 | 202 (24.96%) | M | 102 | 50.50% |
| | | F | 100 | 49.50% |
| 9 | 205 (25.33%) | M | 109 | 53.2% |
| | | F | 96 | 46.8% |
| Total | 809 | M | 411 | |
| | | F | 398 | |

Table 3: Descriptive statistics for frequency of erupted mandibular teeth in different age groups of male and female subjects.

| Age in Years | | 41(%) | 42(%) | 46(%) |
|---|---|---|---|---|
| 6 | M(100) | 33(33) | 7(7) | 55(55) |
| | F(101) | 47(46.5) | 4(4) | 78(77.2) |
| 7 | M(100) | 92(92) | 55(55) | 96(96) |
| | F(101) | 94(93.1) | 73(72.3) | 94(93.1) |
| 8 | M(102) | 102(100) | 91(89.2) | 102(100) |
| | F(100) | 97(97) | 94(94) | 100(100) |
| 9 | M(109) | 109(100) | 103(94.5) | 109(100) |
| | F(96) | 96(100) | 96(100) | 96(100) |

Values are presented as N (%)

Table 4: Descriptive statistics for comparison of mean age of maxillary teeth in male/female subjects

| Tooth no | Gender | N | Mean ± SD | t(p) |
|---|---|---|---|---|
| 11 | M | 261 | 7.82±.593 | 1.609(0.1082) |
| | F | 217 | 7.74±.471 | |
| 12 | M | 355 | 8.94±.832 | 1.621(0.1054) |
| | F | 297 | 8.84±.723 | |
| 16 | M | 212 | 7.27±.651 | 8.586(0.0001)* |
| | F | 141 | 6.75±.374 | |

* Significant

Graph:1 UM1- Upper 1st Molar,ULI- Upper Lateral Incisor, UCI- Upper Central Incisor

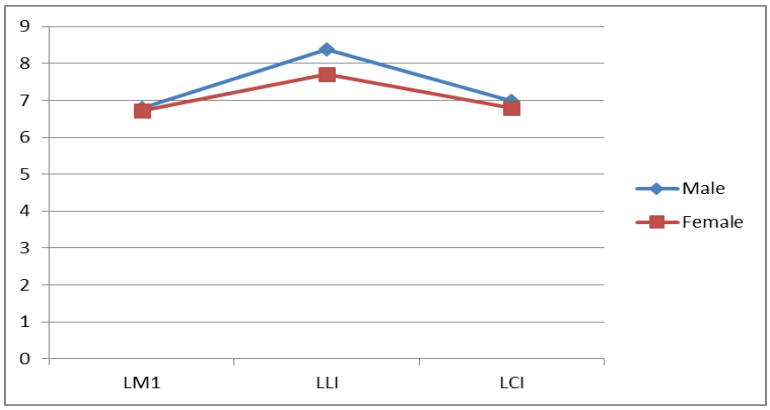


Table 5: Descriptive statistics for comparison of mean age of mandibular teeth in male/female subjects.

| Tooth no | Gender | N | Mean ± SD | t(p) |
|---|---|---|---|---|
| 41 | M | 160 | 6.98±.517 | 3.571(0.0004) * |
| | F | 136 | 6.79±.372 | |
| 42 | M | 359 | 8.38±.748 | 11.3561(0.0001) * |
| | F | 281 | 7.71±.373 | |
| 46 | M | 144 | 6.80±.479 | 1.7760(0.0785) |
| | F | 136 | 6.71±.362 | |

* significant

Graph 2: LM1- Lower 1st Molar, LLI- Lower Lateral Incisor, LCI- Lower Central Incisor.

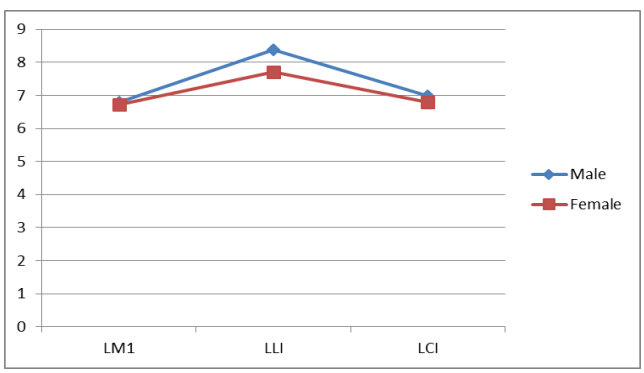

Table 6: Sequence of eruption

| | | | | |
|---|---|---|---|---|
| Male | Maxilla | M1 | CI | LI |
| | Mandible | M1 | CI | LI |
| Female | Maxilla | M1 | CI | LI |
| | Mandible | M1 | CI | LI |

M1- First Molar, CI- Central Incisor, LI- Lateral Incisor

## DISCUSSION:

Understanding the timing and sequence of permanent teeth eruption is important for general dental practitioners as well as specialists involved in managing dental problems in growing children.[9] Gonzales et al.(1954) stated that the teeth may give, reliable information about age in childhood and youth, as beyond adult life these changes are too uncertain to be of value.[10] Eruption timing and sequence can be determined either clinically or radiographically (Demerjian method),[11,12] however, radiographic methods may not be feasible in developing countries in practice and may not be appropriate in community-based studies in either developing or developed countries for ethical reasons.[13]Therefore, in the present study, the eruption time of teeth was determined clinically.

Dahlberg and Menagaz-Bock(1958).[14] stated that the cross-sectional method is preferable to the longitudinal method because it is amenable to include larger samples that would yield results that are more representative of the population and reduces the risk of bias. From birth till the pre-adolescent years, somatic growth and development in females is generally more advanced than in males.[15] The present study shows overall early eruption of permanent teeth in females than in males and this findings is in agreement with other studies done by Lakshamappa A[16] Shantanul al[17]and Hussain *et al.*[18]How ever A Singh and RK Gorea[19] did not find any significance in eruption of permanent teeth when both sexes were compared. Dhaiya BR[20] also found eruption between genders to be non significant.

However, delayed eruption of all teeth was seen in this study when comparison was made with western population.[5,9] With no reference age available for Indian population this cannot be regarded as delayed eruption.

Permanent teeth eruption is a complex process that can be influenced by a number of general factors such as: genetics,[21] nutrition,[12,22] preterm birth,[23] socioeconomic factors,[24,25] body height and weight,[5] hormonal factors[26]and various systemic diseases.[27] As this study was carried out mostly in rural areas and government

schools of Himachal Pradesh, nutrition can be one of the reason for delayed eruption. A study conducted by Inderjeet Kaur[28]on Jatt Sikh children of Public as well as government school, found the median emergence time to be more advanced in Public school children as compared to government school children.

In a study conducted by LO and Moyers [29] the most frequent eruption sequence seen in maxilla was 6,1,2,4,5,3,7 in 48.74 % of population where as sequence of 1,6,2,4,5,3,7 and 1,2,6,4,3,5,7 was found in 0.84% and 0.42% population respectively. In mandible eruption of Incisors before first molar was found in 1.27% of population. In our study the sequence of 6,1,2,4,5,3,7 in maxilla and 6,1,2,3,4,5,7 in mandibular segment was recorded which is in accordance with most of the studies. [6,8,9]

## CONCLUSION:

The teeth erupted in female earlier than male. Teeth in the lower Jaw erupted earlier than in the upper Jaw. In general, we found that there was delay in the time of eruption of all the teeth that were included in this study.

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