

# Eruption Chronology of Primary Teeth in Nepalese Children

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## ABSTRACT

**Background:** The timing of emergence of teeth has been seen to vary in different races in the world. However, no study has been conducted to represent the Nepalese population. Therefore, the aim of the present study was to assess the timings of emergence of primary teeth and establish the eruption chronology for Nepalese children.

**Study Design:** 500 healthy Nepalese children (245 males and 255 females) from various dental health camps organized in all different parts of Nepal were enrolled to see the emergence of incisal tip of incisors and canines or cusp tip of molars visible through gingiva along with their age and sex.

**Results:** Delayed eruption of primary teeth was found in Nepalese children when compared with the children of western countries. Nepalese female children showed early emergence by one month compared to their male counterparts.

**Conclusion:** A baseline data for emergence timings of primary teeth in Nepalese children has been established, which now can be used as reference standard for clinical, academic and research purposes in Nepal. There is a racial variation in the emergence of teeth. Nepalese children showed delayed eruption of primary teeth when compared to the western children.

**Key words:** chronology, emergence, Nepalese children, primary teeth

## INTRODUCTION

The sequential timing of formation and eruption of teeth has long history of usage in anthropometry and its allied fields. Emergence of the tooth in simpler term means the appearance of tooth in oral cavity through the gingiva. The emergence of primary teeth has been studied among different population and among different ethnic groups as evident from various literatures. Though it has been suggested in the literature that standards for tooth emergence should be derived from the population in which they are to be applied because factors related to tooth emergence of both deciduous and permanent dentitions may vary among various races.<sup>1</sup> Unfortunately, due to the lack of data in our population, information on the age of primary teeth emergence to be used as reference standard for clinical, academic and research purposes in Nepal is based solely on the American and European standards. Therefore, adequate knowledge of the timing of emergence of primary teeth among Nepalese children along with its pattern and other details are required for diagnosis of developmental disturbances and other related anomalies.

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Application of information available regarding tooth emergence related to other races when applied to the Nepalese population may mislead clinical decision making. Evidence based, result oriented information regarding timing, sequence and pattern of emergence of primary teeth are needed to be established for correct diagnosis and treatment planning, caries prevention programmes aimed at protection of first molars during the caries susceptible period, cosmetic purpose and also for anthropological use. Besides, this knowledge will also play a significant role in legal as well as forensic applications.<sup>2</sup> Therefore, the aims of the present study were to:

1. Assess the timing of emergence of primary teeth and establish the eruption chronology for Nepalese children.
2. Study the gender variation in emergence of primary teeth in Nepalese children.
3. Compare the emergence timings of Nepalese and western countries children.

### **MATERIALS AND METHODS**

The study was approved by the Ethical Committee of BP Koirala Institute of Health Sciences, Dharan, Nepal for the use of human subjects. All those subjects who fulfilled the inclusion criteria and who willingly agreed to participate in the study were recruited. Details of the nature and benefits of the study were informed to the patient/patient guardian, and were asked to sign a consent form. Total five hundred healthy children out of which two hundred forty five male and two hundred fifty five female children were studied in various dental health camps organized in various parts of Eastern, Middle, Western, Mid-Western and Far-Western region of Nepal. Children from all major 15 castes like Sherpa, Bhote, Thakali, Magar, Tamang, Gurung, Rai, Limbu, Brahmin, Chhetri, Newar, Tharu, Chepang, Baishnav and Sudra residing in mountaneous, hilly and terai region of country were included in the study. There was random selection of 33 to 34 children from each cast and out of which 16 to 17 were males and similar in number were females from each cast. Birth dates of children were recorded by asking their parents, as there is no customary to have birth certificate in villages of Nepal.

Healthy children were defined as those without any growth related disorders, any genetic abnormalities, having no prolonged disease like diabetes mellitus, endocrine disorders, cardiac, renal and intestinal disorders. Patients' age, sex and emergence of incisal tip to incisal margin of incisors and canine or cusp tip to occlusal margin of molars visible through gingiva were noted.

### **STATISTICAL ANALYSIS**

This was a cross sectional study. Sample number and sampling design were first discussed with statistician and accordingly multistage random sampling technique was adopted. The collected data was entered into computer using Microsoft windows' access software and after purification of data, analysis was done into SPSS (Statistical Package for Social Sciences) version 10:00 software. Frequency, proportion and percentage were calculated to summarize the collected information. Student's 't' and 'Z' tests were used to test the significance of the variables. Date of emergence of individual teeth was calculated by probit analysis. Evidence based conclusions were drawn from the study based on the results.

### **RESULTS**

The study of emergence of primary teeth involves 500 subjects out of which 245 were males and 255 were females. The mean age of emergence of primary teeth was calculated by taking average of timings of emergence of primary teeth (Table 1).

Mean age and range of emergence of primary teeth in male and female children were also calculated and tabulated. Female children showed early emergence by one month compared to male children but the difference was statistically insignificant (Table 2).

Nepalese children showed delayed eruption compared to the children of western countries. We can compare the mean age and range for the emergence of primary teeth in Nepalese children with the children of western countries (Table 3).

**Table 1. Mean age and range of emergence of primary teeth in Nepalese children (n=500).**

Types of primary teeth	Mean age and range of emergence in Nepalese children
Lower central incisor	11 months (8-16 months)
Lower lateral incisor	16 months (11-20 months)
Lower canine	23 months (17-26 months)
Lower first molar	19 months (16-22 months)
Lower second molar	30 months (25-36 months)
Upper central incisor	13 months (9-18 months)
Upper lateral incisor	14 months (10-19 months)
Upper canine	21 months (16-24 months)
Upper first molar	19 months (16-23 months)
Upper second molar	31 months (25-36 months)

**Table 2. Mean age and range of emergence of primary teeth in Nepalese children (gender wise).**

Types of Primary Teeth	Mean age and range of emergence in male Nepalese children (n=245)	Mean age and range of emergence in female Nepalese children (n=255)
Lower central incisor	11 months (9-17 months)	10 months (8-16 months)
Lower lateral incisor	16 months (11-20 months)	15 months (11-20 months)
Lower canine	23 months (17-26 months)	23 months (17-26 months)
Lower first molar	19 months (16-22 months)	18 months (16-22 months)
Lower second molar	30 months (25-36 months)	30 months (25-36 months)
Upper central incisor	13 months (9-18 months)	12 months (9-18 months)
Upper lateral incisor	14 months (10-19 months)	14 months (10-19 months)
Upper canine	21 months (16-24 months)	20 months (16-24 months)
Upper first molar	19 months (16-23 months)	19 months (16-23 months)
Upper second molar	31 months (25-36 months)	30 months (24-35 months)

**Table 3. Mean age and range of emergence in Nepalese children and children of western countries.**

Types of primary teeth	Mean age and range of emergence in Nepalese children	Mean age and range of emergence in children of western countries. <sup>3</sup>
Lower central incisor	11 months (8-16 months)	8 months (6-10 months)
Lower lateral incisor	16 months (11-20 months)	13 months (10-16 months)
Lower canine	23 months (17-26 months)	20 months (17-23 months)
Lower first molar	19 months (16-22 months)	16 months (14-18 months)
Lower second molar	30 months (25-36 months)	27 months (23-31 months)
Upper central incisor	13 months (9-18 months)	10 months (8-12 months)
Upper lateral incisor	14 months (10-19 months)	11 months (9-13 months)
Upper canine	21 months (16-24 months)	19 months (16-22 months)
Upper first molar	19 months (16-23 months)	16 months (13-19 months)
Upper second molar	31 months (25-36 months)	29 months (25-33 months)

## DISCUSSION

The present study result shows mean age and range of emergence of primary teeth in Nepalese children as 11 months (8-16 months) for lower central incisor, 16 months (11-20 months) for lower lateral incisor, 23 months (17-26 months) for lower canine, 19 months (16-22 months) for lower first molar, 30 months (25-36 months) for lower second molar, 13 months (9-18 months) for upper central incisor, 14 months (10-19 months) for upper lateral incisor, 21 months (16-24 months) for upper canine, 19 months (16-23 months) for upper first molar and 31 months (25-36 months) for upper second molar.

The result shown in our study provides a baseline data for eruption chronology of primary teeth in Nepalese children which is delayed in comparison to the western children.<sup>3</sup>

A study conducted by Anita Gupta et.al in Sunsari district of Nepal showed the mean age of emergence of primary maxillary central incisor as 11 months, lateral incisor 13 months, canine 19 months, first molar 15 months, second molar 25 months, and for lower primary teeth, central incisor 10 months, lateral incisor 13 months, canine 21 months, first molar 16 months, and second molar 26 months.<sup>4</sup> This study showed the early emergence of primary teeth compared to the present study. The difference could be due to the reason that their study was limited to the population of one particular district of Nepal whereas the present study represented the entire Nepalese population.

The present study also compared mean age and range of emergence of primary teeth in Nepalese male and female children and found the female children showed early emergence of primary teeth by one month but the variation was not significant. The reason behind this might be genetic. In contrast to our finding, Choi NK and Yang KH in their study on eruption timing of primary teeth in Korean children found eruption of primary teeth in boys earlier than those of girls.<sup>5</sup> NL Soliman et.al also found early emergence of primary teeth in boys than girls, except for lower canines and first molars.<sup>6</sup> However, a study by Kitamura showed early teeth eruption in girls as compared to boys.<sup>7</sup> Whereas, some other study has shown no difference in gender variation for tooth emergence.<sup>8</sup>

Nepalese children show delayed eruption compared to the children of western countries. The present study compared mean age and range of emergence of primary teeth in Nepalese and western children; like for lower central incisor, the mean age and range of emergence of primary teeth in Nepalese children is 11 months (8-16 months), whereas it is 8 months (6-10 months) in western children. Similarly, lower lateral incisor is 16 months (11-20 months) in Nepalese, whereas it is 13 months (10-16 months) in western, lower canine 23 months (17-26 months) in Nepalese, whereas 20 months (17-23 months) in western, lower first molar 19 months (16-22 months) in Nepalese, whereas 16 months (14-18 months) in western, lower second molar 30 months (25-36 months) in Nepalese, whereas 27 months (23-31 months) in western, upper central incisor 13 months (9-18 months) in Nepalese whereas 10 months (8-12 months) in western, upper lateral incisor 14 months (10-19 months) in Nepalese, whereas 11 months (9-13 months) in western, upper canine 21 months (16-24 months) in Nepalese, whereas 19 months (16-22 months) in western, upper first molar 19 months (16-23 months) in Nepalese whereas 16 months (13-19 months) in western, and upper second molar 31 months (25-36 months) in Nepalese, whereas 29 months (25-33 months) in western children.

The reason behind the children of western countries showing early emergence compared to Nepalese children might be related to nutritional factor, where western children are far well nourished than the contemporary Nepalese children. Not to forget the genetic role which should be taken into consideration as well.<sup>9</sup> However, study results of Folyan M et.al showed no effect of sex, breast-feeding or socio-economic status on the timing and pattern of teeth eruption in Nigerian children.<sup>10</sup>

Despite all primary teeth initiating development at the same time and odontogenic differentiation first beginning in the maxillary incisors followed by mandibular incisors, the mandibular primary incisors erupt earlier than the maxillary incisors as documented in the precise chronology by Hu X et al.<sup>11</sup> Having this general coincidence, the sequence of primary teeth emergence in majority of Nepalese children as found out by the present study is lower central incisor, upper central incisor, upper lateral incisor, lower lateral incisor, upper canine, lower canine, lower first molar, upper first molar, lower second molar and upper second

molar. There are some variations in the sequence of emergence of primary teeth in small percentage population such as: 12% of children exhibited earlier emergence of upper central incisor than lower central incisor; 48% of children showed earlier emergence of lower lateral incisor compared to upper lateral incisor; 41% of children had lower canines emerged earlier than upper canines, first primary molars emerged first in either jaw in equal percentage, and only 3% children showed earlier emergence of upper second molar compared to the lower second molar.

In 1.8% children, there was no eruption of lower lateral incisors, canines and first molars by the time upper first molars emerged in their oral cavity. The right and left side of either jaw showed no significant variations in timing and sequence of emergence of primary teeth at all. On the same jaw, either primary tooth was seen emerging early in particular side in equal percentage to other side or exactly at the same time in every child. This is in contrast to the study done in Nigerian children where a tendency towards earlier eruption on the left side was observed in boys especially for the mandibular canine.<sup>12</sup>

The researchers of the present study postulate a fact that “generally smaller the tooth size, earlier is the emergence of the tooth”. The reason behind this is the early completion of developmental process and two third root formation for small size teeth. The larger size teeth usually take longer time to complete the developmental process and two-third root formation, thereby delaying in emergence. It is the gene that controls, regulates, and governs all the developmental processes. Thus, genes for teeth directly influence the emergence of teeth. In this way genetic factor is taken into consideration with high importance while dealing with emergence of teeth.

### CONCLUSION

The eruption chronology of primary teeth in Nepalese children becomes an important study to pediatric dentists as it plays a vital role in establishing a baseline data where otherwise, the clinicians of Nepal have been utilizing western data for any clinical, academic and research purposes. There is a racial variation in the emergence timings of primary teeth, with Nepalese children showing delayed eruption compared to the children of western countries and though insignificant,

Nepalese female children showed early emergence by one month compared to their male counterparts. Apart from serving as a real comparison for eruption timings in the Nepalese population, this paper also aids in establishing the data bank for future references.

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