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## RESEARCH ARTICLE

# PREVALENCE OF DENTAL MANIFESTATIONS OF VITAMIN D DEFICIENCY IN YOUNG CHILDREN IN NORTH INDIA

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**ABSTRACT**

**Background:** The aim of this article is to report the prevalence of various dental manifestations of rickets in young children.
**Methods:** Pediatric patients of both the genders of age-group 6-18 years of age with history of rickets in infancy as reported by pediatrician were examined clinically. The exclusion criteria for the study were patients with history of fluorosis, any syndromes or any congenital skeletal deformities. After scanning the medical records, a total of 120 patients (72 males and 48 females) were selected and enrolled for study after taking informed consent from the parents. Data collection was done on an exclusively made self-structured format. Any anomalies of tooth size, shape, and number were noted and co-related with radiographs. The collected data was compiled and statistically compiled.
**Results:** Out of 120 patients, enamel hypoplasia was detected in 90 (75%) cases, missing teeth were detected in 45 (37.5%) cases, bilaterally missing mandibular second premolars were detected in 30 (25%) cases, seven cases were found with bilaterally missing maxillary first premolars, maxillary canines(6.25%) and seven cases were detected with bilaterally missing deciduous lateral incisor (6.25%). Other dental findings revealed spontaneous gingival and dental abscesses occurring without history of trauma and caries. Radiographic examinations revealed large pulp chambers, short roots, poorly defined lamina dura, and hypoplastic alveolar ridge in majority of patients.
**Conclusion:** Based on the high prevalence of oral manifestations of vitamin D deficiency as observed in this study, the authors conclude that the knowledge an practice of prevention treatment strategies is must to preserve the oral and systemic health of children.



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## INTRODUCTION

Vitamin D deficiency is considered to be the most common nutritional deficiency and also one of the most common undiagnosed medical conditions in the world. (Holick, 2012) Vitamin D has evolved into a hormone that is active throughout the body not only to regulate calcium and bone metabolism but also to reduce the risk of chronic diseases including auto immune diseases, malignancies, cardiovascular and infectious diseases. It has been estimated that 1 billion people worldwide have vitamin D deficiency or insufficiency. (Holick, 2012) Though majority of population in India lives in areas receiving ample sunlight throughout the year, vitamin D deficiency is very common in all the age groups and both the sexes across the country. (Harinarayanan and Joshi, 2009; Marwaha and Sripathy, 2008; Harinarayan, 2005) Rickets is a softening of bones in children due to deficiency or impaired metabolism of Vitamin D, phosphorus or calcium, potentially leading to fractures and deformity. (Choudhury *et al*., 2013) Clinical symptoms such as born deformity, spinal curvature, craniotabes, enlargement of the anterior fontanel, rachitic

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rosary, and joint swelling are important findings in rickets. The specific X-ray findings including a cupping, flaring, and fraying of metaphysis; and the elevation of the level of serum alkaline phosphatase are essential for the diagnosis of rickets. (Ohata and Ozono, 2013) The Greek-derived word "rachitis" meaning inflammation of the spine was adopted as the scientific term for rickets, due chiefly to the words similarity in sound. (Winzenberg and Jones, 2013) Patients with Vitamin D-resistant rickets have abnormal tooth morphology such as thin globular dentin and enlarged pulp horns that extend into the dentino-enamel junction. Invasion of the pulp by microorganisms and toxins is inevitable. The increased fibrotic content of the pulp, together with a reduced number of odontoblasts, decreases the response to pulp infection. The most important oral findings are characterized by spontaneous gingival and dental abscesses occuring without history of trauma or caries. (Ohata and Ozono, 2013; Winzenberg and Jones, 2013) Radiographic examinations revealed large pulp chambers, short roots, poorly defined lamina dura and hypoplastic alveolar ridge. These dental abscesses are common and therefore the extraction and pulpectomy are the treatment of choice. Figure 1 shows the spectrum of clinical, radiographic and histologic features of oral manifestations of rickets. The purpose of this article is to report the prevalence of dental manifestations of rickets in young children.

## MATERIALS AND METHODS

Pediatric patients of both the genders of age-group 6-18 years of age with history of rickets in infancy as reported by pediatrician were examined clinically and diagnostic procedures carried out after parental consent. The exclusion criteria for the study were patients with history of fluorosis, any syndromes or any congenital skeletal deformities. After scanning the medical records, a total of 120 patients (72 males and 48 females) were selected and enrolled for study after taking informed consent from the parents. Data collection was done on an exclusively made self-structured format. The developmental defect of enamel index was used for recording enamel lesions. The examination of teeth with enamel hypoplasia was conducted using Federation Dentaire Internationale. Buccal and lingual surfaces of each tooth were examined and defects were recorded. Any anomalies of tooth size, shape, and number were noted and co-related with radiographs. The collected data was compiled and statistically compiled.

## RESULTS

A total of 120 patients with positive history of rickets in infancy were examined. Enamel hypoplasia was detected in 90 (75%) cases, missing teeth were detected in 45 (37.5%) cases, bilaterally missing mandibular second premolars were detected

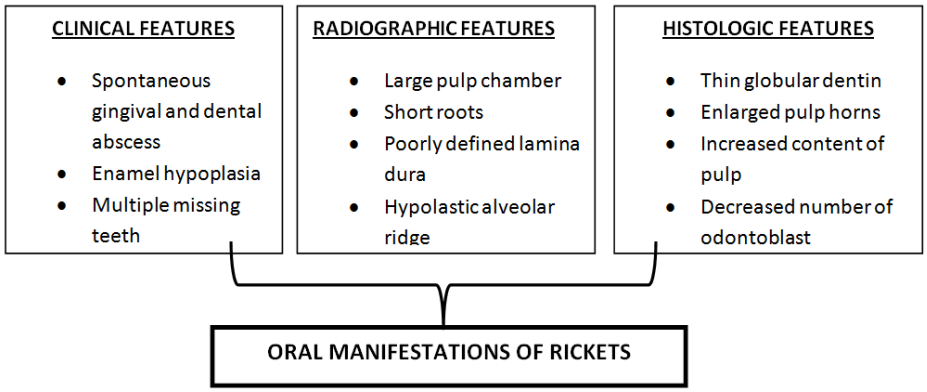
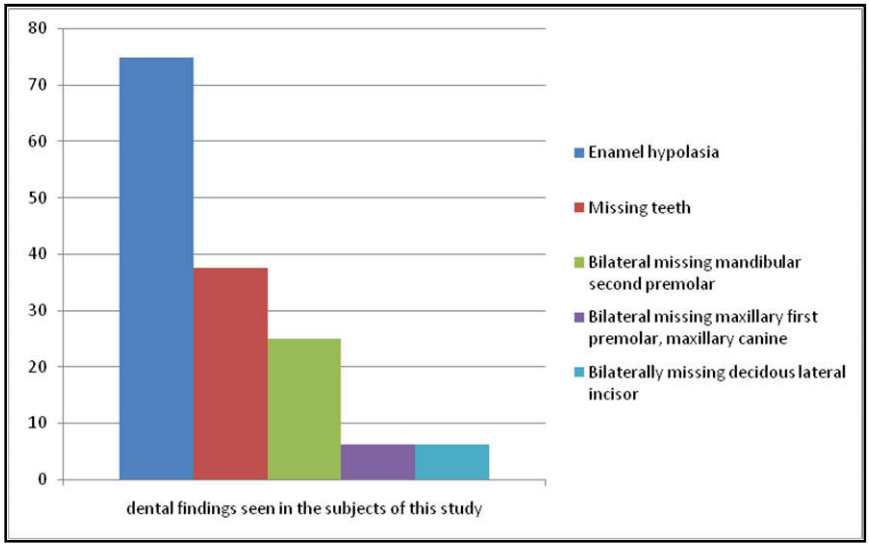



**Figure 1. The spectrum of clinical, radiographic and histologic features of oral manifestations of rickets**




**Graph 1. Summary of findings of the study**

in 30 (25%) cases, seven cases were found with bilaterally missing maxillary first premolars and maxillary canines (6.25%) and seven cases were detected with bilaterally missing deciduous lateral incisor (6.25%). Other dental findings revealed spontaneous gingival and dental abscesses occurring without history of trauma and caries. Radiographic examinations revealed large pulp chambers, short roots, poorly defined lamina dura and hypoplastic alveolar ridge in majority of patients.

## DISCUSSION

Rickets is a disease of infancy affecting calcium metabolism. It could be acquired or inherited in the form of X-linked disorder. Calcium or Vitamin D deficiency is an acquired cause while inherited form rarely occurs as X-linked Of the 120 patients selected for the study, enamel hypoplasia was noticed in 90 patients while missing teeth were present in 45 cases. Enamel hypoplasia has been reported in the previous studies on dental manifestations of rickets as well. (Davit-Béal *et al*., 2014; Zambrano *et al*., 2003; Aggarwal *et al*., 2013) Although these defects are more common in the hereditary form of rickets, the cases with enamel hypoplasia showed a predisposition to those teeth, which were developing at the time of disease. (Tiwari and Puliyel, 2004) Such teeth are more prone to caries because of decreased mineralization. Hence, preventive regimen comprising of periodical examinations, topical fluoride application, application of pit and fissure sealants, and maintenance of good oral hygiene should be performed.

### Conclusion

The dental manifestations seen in patients with vitamin D deficiency appear in a spectrum of severity, ranging from the very severe, with involvement of nearly the entire dentition, to the very mild with normal appearance of the teeth. Effective strategies for the prevention of dental abscesses are available and should be employed to suit each individual patient's needs.

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