

# Rickets – A case report

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## Abstract

Rickets is a disorder caused by a lack of vitamin D, calcium or phosphate. It leads to softening and weakening of the bones. Dental manifestation of rickets includes enamel hypoplasia and delayed tooth eruption. The most important oral findings are characterised by spontaneous gingival and dental abscesses occurring without a history of trauma or caries. Radiographic examination revealed large pulp chambers, short roots, poorly defined lamina dura and hypoplastic alveolar ridge. These dental abscesses are common, and therefore, extraction and pulpectomy are the treatment of choice. Oral manifestations of rickets should be diagnosed early by both physicians and dentists to prevent severe dental complications. This article aims to report a case of rickets in a 3-year-old girl, describing the dental findings and the treatment to be performed in these cases.

**Keywords:** Hypophosphatemia, oral manifestations, rickets, vitamin D

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## INTRODUCTION

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.<sup>[1-3]</sup>

Rickets is ranked among the top five childhood diseases in developing countries.<sup>[4]</sup> In the Indian subcontinent, both calcium and vitamin D deficiencies are responsible for rickets. A number of factors have been indicated as being responsible for a high prevalence of vitamin D deficiency and rickets including religious customs, atmospheric pollution, increased skin pigmentation, vegetarian diets and maternal vitamin D deficiency.<sup>[5-8]</sup>

Clinical symptoms such as born deformity, spinal curvature, craniotabes, enlargement of the anterior fontanel, rachitic

rosary and joint swelling are important findings in rickets.<sup>[2]</sup> 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.<sup>[2]</sup>

Dental manifestations include enamel hypoplasia, delayed formation of teeth, and increased incidence of cavities in teeth (dental caries).<sup>[9]</sup> Deficiency during early childhood can affect permanent teeth, and ensuing caries can sometimes lead to tooth loss at a young age, in addition to malocclusion and chronic periodontal disease.<sup>[10]</sup> Other dental findings revealed spontaneous gingival and dental abscesses occurring without a history of trauma and caries. Radiographic examinations revealed large pulp chambers, short roots, poorly defined lamina dura and hypoplastic alveolar ridge in the majority of patients.

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## CASE REPORT

A Three and half year of old female patient reported to the Department of Oral Medicine and Radiology with a chief complaint of swelling on the lower left cheek region of jaw for 3 days. On clinical examination (extra-oral examination), showed swelling on the left cheek region of jaw, extending mesiodistally from the corner of mouth to angle of the mandible and supero-inferiorly from the alaragus line till 1 cm below the lower border of the mandible. Figure 1, on palpation, swelling was soft, tempered and tender. Intra-oral examination showed multiple carious teeth. Deep-occlusal caries with 54,64,74,75,84,85. a gingival abscess associated with 85. (?) Root stumps with 51, 52, 61, 62 [Figure 2]. Intra-oral radiograph showed enlarged pulp chambers with periradicular abscesses. (?)

General body examination shows bowed legs or knocked knees with thickened wrists and ankles and complaints of pain while walking Figure 3. The hand radiograph shows a frayed metaphyseal margin and only two carpal bones with no development of the epiphysial end of ulna, Figure 4a. A chest radiograph shows enlargement and cupping of the anterior ends of ribs, Figure 4b. Frayed margins, the classical metaphyseal changes noted in proximal humeri giving rise to rickety rosary, Figure 4c. Incidental finding of cardiomegaly with loss of normal silhouette sign of heart is suggestive of pericardial effusion. The oral hygiene of the patient was poor.

Serum calcium level of patient was 7.2 mg/dl. Serum phosphate was 2.8 mg/dl and vitamin D was 8.6 ng/mL.

## 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 dominant trait.<sup>[11,12]</sup> The most common cause of rickets in India is calcium and vitamin D deficiency. Other causes of rickets include renal diseases, medications and malabsorption syndrome.<sup>[13]</sup> Rickets develop when the growing bones fail to mineralise. Various types of rickets are nutritional rickets, vitamin D-dependent rickets, hypophosphatemic vitamin D-resistant rickets, and X-linked hypophosphataemia.

Albright and colleagues made one of the first descriptions of the hypophosphataemic rickets in 1937. Hypophosphataemic rickets is a hereditary metabolic disease characterised by osseous and dental structural



Figure 1: Swelling on lower left back cheek region

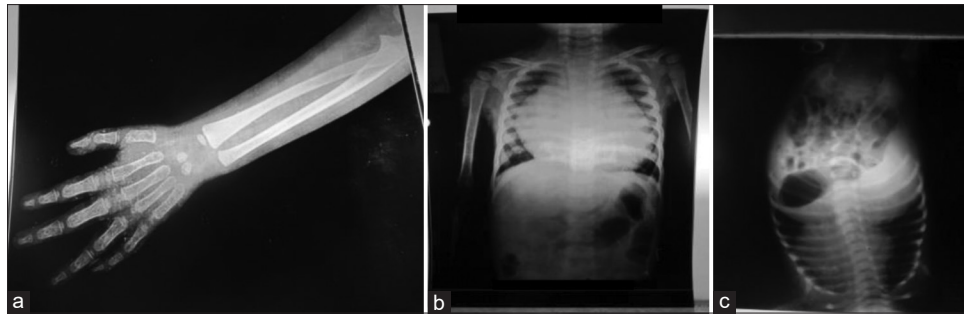


Figure 2: Multiple Carious Teeth



Figure 3: Bowed legs or knock knees, thickened wrists and ankles

defects. The oral manifestations include highly frequent pulp infections as a result of enamel and dentinal defects.<sup>[14]</sup> The pulp infections are multiple spontaneous and can occur from an early age, becoming, in some cases, the first signs of the disease.



**Figure 4:** (a) Frayed metaphyseal margin and only two carpal bones with no development of epiphysial end of ulna. (b) Enlargement and cupping of anterior ends of ribs, frayed margins. (c) The classical metaphyseal changes noted in proximal humeri giving rise to rickety rosary

Inorganic phosphate plays a major role in many biological systems, including cell membrane functions, energy metabolism, cell signalling and oxygen transport.<sup>[15]</sup> In hypophosphatemic rickets, renal proximal tubular resorption is compromised, and the patient presents with hypophosphatemia along with a relative 1, 25-(OH) 2 vitamin D deficiency. Vitamin D is an essential prohormone.<sup>[16]</sup> Once activated by successive hydroxylations in the liver and in the kidney, it binds to the nuclear vitamin D receptor (VDR) and triggers pathways regulating calcium homeostasis, cell proliferation and cell differentiation.<sup>[1-4]</sup>

Low, moderate, and extreme deficiencies are defined as 25-hydroxyvitamin D levels 50, 25, and 12.5 nmol/L, respectively. Moderate and extreme deficiencies result in impaired bone mineralisation and ossification, leading to bone-softening diseases such as rickets,<sup>[17,18]</sup> osteomalacia, and osteoporosis.<sup>[1,3,5]</sup> In our case, vitamin D level was 8.6 ng/dl, which progressed to rickets.

General signs of vitamin D deficiency are well-known and are easy to detect on physical examination. Hypotonia, hypocalcaemia, bone deformations and lethargy are the most common symptoms.<sup>[5]</sup>

Malocclusion associated with hypophosphatemic rickets has not been frequently reported. However, impressive results were obtained herein (12/14 cases). An open bite was the most frequently detected abnormality and can be explained by the delay in maxillary growth in relation to the growth of the mandible (Angle class II).<sup>[19]</sup> Although taurodontism has been reported in the literature, no cases presented with an abnormality in dental morphology in the present study.<sup>[20,21]</sup>

The importance of hypophosphatemic rickets in dentistry is based on two parameters: (1) the dental manifestations commonly represent the first clinical sign of the disease, and (2) the common presence of abscesses in teeth without

a history of caries or trauma implies special measures of oral health prevention.<sup>[14]</sup>

## CONCLUSION

The dentist as well as paediatrician should be made aware of the features of this disorder so that early intervention can prevent subsequent serious and more invasive dental procedures.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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## Conflicts of interest

There are no conflicts of interest.

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