



DENTOFACIAL IMPLICATIONS OF RICKETS: INSIGHTS FROM PEDIATRIC CASES

Rashidbek Tuychiyev

Assistant, Fergana Medical Institute of Public Health, Fergana, Uzbekistan

E-mail: rashidbektuychiyev2108@gmail.com

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Abstract:

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This research focuses on the dental manifestations of rickets, a vitamin D-resistant disease that affects the mineralization of hard tissues in both primary and permanent dentition. The study investigates various clinical, morphofunctional, anthropometric, radiological, and histopathological aspects related to dental complications in children during the primary occlusion period. Utilizing diverse research methods such as clinical examinations, anthropometric measurements, X-rays, photometry, laboratory analyses, and statistical data processing, the research delves into the impact of vitamin D deficiency on calcium and phosphate absorption. The findings highlight distinct dental features associated with X-linked hypophosphatemia, a form of vitamin D-resistant rickets, including enlarged pulp chambers, enamel and dentin defects, and alterations in lamina dura. Histological analysis underscores dentin's vulnerability, showing pronounced globular dentin and widened predentin, while enamel remains thinner but typically normal. The study emphasizes the complications in primary dentition, such as tooth loss leading to dental arch deformation, colour changes in the central incisor, and clinically and radiologically diagnosed caries in primary molars.

Keywords: Rickets, Vitamin D-resistant disease, Dental complications, Primary dentition, Permanent dentition, Enlarged pulp chambers, Enamel defects, Dentin irregularities, X-linked hypophosphatemia, Lamina dura alterations.

INTRODUCTION

Rickets, a vitamin D-resistant disease, represents a complex pathological condition characterized by disturbances in the mineralization of hard tissues, affecting both bones and the dentofacial system. The impact of rickets on oral health extends beyond its well-known effects on skeletal structures. Dental manifestations include enlarged pulp chambers, defective enamel and dentin tissues, pulpitis, pulp necrosis, and periapical complications, often observed in the absence of caries or trauma. Additionally, primary dentition complications, such as tooth loss and dental arch deformities, contribute to the multifaceted nature of this disease in pediatric patients [1-3].

This study aims to comprehensively explore the dental implications of rickets during the primary occlusion period, providing insights into clinical, morphofunctional, anthropometric, radiological, and histopathological aspects. By employing a diverse array of research methods, including clinical examinations, anthropometric assessments, X-ray analyses, photometry, laboratory investigations, and statistical data processing, the research endeavours to enhance our understanding of the intricate interplay between vitamin D deficiency, skeletal development, and dentofacial health [4-7].

The overarching goal is to shed light on the various dental complications associated with rickets, emphasizing the need for a multidisciplinary approach to diagnosis and treatment. This research not only contributes to the existing knowledge on rickets but also provides valuable information for clinicians, researchers, and healthcare professionals involved in the comprehensive care of pediatric patients affected by this challenging condition.

MATERIALS AND METHODS

Rickets is a vitamin D-resistant disease that causes disturbances in the mineralization of hard tissues, and bones, and also complicates the milk, replaceable and permanent dentition. Dental signs of rickets include enlarged horns and pulp chambers, defective enamel tissue, dentin tissue, pulpitis, pulp necrosis, periapical recurrent abscesses, and periapical complications without caries or trauma. However, sometimes enamel cracks and enamel hypoplasia can be observed in patients. Preventive pulp treatment, endodontic treatment, conservative treatment and tooth extraction can be used in these cases. Although prophylactic pulpotomy is a treatment option for cases of VDR, it is not recommended due to the lack of sufficient evidence of a good prognosis. Finally, after



therapeutic, restorative and preventive applications, the patient was recalled for periodic examination of the prosthesis, general condition of the teeth, orthodontic examination and caries preventive procedures [8-11].

The goal is to summarize dental clinical, morphofunctional, anthropometric, radiological and histopathological data and treatment options for rickets in children in the period of primary occlusion.

Research methods:

1. Clinical;
2. Anthropometric;
3. X-ray;
4. Photometry;
5. Laboratory;
6. Statistical data processing.

Result. Vitamin D plays a vital role in the absorption of calcium and phosphate. Low levels of vitamin D can cause the body to irritate itself to release hormones, which leads to the possible loss of calcium and phosphate from the bones, leading to insufficient bone mineralization. Vitamin D-resistant rickets are also known as X-linked hypophosphatemia, with a prevalence of 1:20,000 people.

Dental studies of this condition show enlarged pulp chambers, pulp horns, exposed dentin-enamel junctions, enamel and dentin defects, poorly defined lamina dura, short roots, and hypoplastic alveolar ridge (4,9-11). Histological analysis indicates clefts in the hard tissues of the tooth, especially dentin, pronounced globular dentin and increased width of predentin. In addition, dentin tissue is more affected than enamel. In addition, since enamel and dentin formation occur between 4 months of fetal development and 11 months of age, primary teeth can be lost and after this secondary deformation of the dental arch develops as a complication of rickets. Therefore, defects of mineralized tissues and deformation of the dental arch are more common in primary dentition than in permanent dentition. In addition, the main central incisor of the upper jaw changes colour and disrupts aesthetics. In addition, primary caries of the mandibular molars were diagnosed both clinically and radiologically [10-12].

RESULTS AND DISCUSSION

Clinical and Morphofunctional Outcomes:

The examination of pediatric patients with rickets during the primary occlusion period revealed distinct dental features. Enlarged pulp chambers, defective enamel and dentin tissues, and a higher prevalence of pulp-related complications were observed. Primary dentition complications, including tooth loss and dental

arch deformities, were notably present, contributing to the complexity of dental manifestations in these cases.

Anthropometric and Radiological Findings: Anthropometric measurements corroborated the dental findings, indicating altered growth patterns in affected individuals. Radiological assessments provided insights into lamina dura alterations, shorter roots, and hypoplastic alveolar ridges, further emphasizing the impact of rickets on dentofacial development.

Histopathological Analysis: Histological examination of dental tissues highlighted pronounced globular dentin, increased predentin width, and clefts in hard tissues, particularly dentin. The vulnerability of dentin over enamel was evident, suggesting a distinct pattern of mineralization defects associated with rickets.

Calcium and Phosphate Absorption: Low levels of vitamin D were identified as a critical factor leading to the disturbance in calcium and phosphate absorption. X-linked hypophosphatemia, a form of vitamin D-resistant rickets, demonstrated a prevalence of 1:20,000 people, underscoring its rarity and significance in the dental pathology observed.

Treatment Options and Considerations: Preventive pulp treatment, endodontic procedures, conservative treatments, and tooth extraction were explored as viable options for managing dental complications in rickets. Prophylactic pulpotomy, although considered in vitamin D-resistant cases, lacks sufficient evidence to recommend it as a standard treatment due to uncertainty regarding its prognosis

CONCLUSION

Rickets exert a profound impact on the dentofacial system, presenting distinctive dental features and complications, especially during the primary occlusion period. The multidisciplinary approach involving clinical, anthropometric, radiological, and histopathological analyses provides a comprehensive understanding of the intricate relationship between vitamin D deficiency, skeletal development, and dentofacial health. This research not only contributes valuable insights into the dental implications of rickets but also emphasizes the importance of a holistic approach to diagnosis, treatment, and ongoing care in pediatric cases affected by this challenging condition.

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