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# NUTRITIONAL RICKETS AMONG HOSPITALIZED CHILDREN IN ALBAIDA HOSPITAL -LIBYA

**Mohamed Thabet Ali*[1] and Najwa H. Abduljawad[2]**

[1,2]Department of Pediatrics, Omar Almukhtar University, Albaida – Libya.

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***Corresponding Author**
**Dr. Mohamed Thabet Ali**
Department of Pediatrics,
Omar Almukhtar University,
Albaida - Libya.

## ABSTRACT

Nutritional rickets is a significant health problem among children. We determined the frequency of nutritional rickets and vitamin D deficiency among hospitalized children in Althawra hospital in albaida city /Libya and their risk factors. During 18 months period, 180 hospitalized children (ages between 0 to 2 years) were evaluated for clinical and biochemical markers of vitamin D deficient rickets and related factors. 43 of them (23.8%) were diagnosed as nutritional vitamin D deficiency and rickets. Most of the children diagnosed were under one year old (32/43, 74.4%). 27 vitamin D deficient rachitic children were admitted to the hospital with respiratory tract infection. The rachitic group was compared for statistical significance with the non-rachitic control patients for the data collected. Rachitic children had a lower rate of vitamin D intake. The frequency of malnutrition and anemia and the percentage of covered mothers were higher in the rachitic group than in the control group. Vitamin D deficiency related rickets is still a common and serious health problem especially in the infancy period. a specific attention should be given to women of reproductive age and in the early infancy period. Initiation of vitamin D supplementation could be offered very early in children with risk factors.

**KEYWORDS:** Nutritional rickets, children, vitamin D deficiency, respiratory tract infection, pneumonia.

## INTRODUCTION

Nutritional rickets maintains its importance in many developing countries around the world. Vitamin D deficiency is re-emerging as a significant health problem even in many developed countries, especially among pregnant women and their infants.[1] Vitamin D deficiency not only causes rickets, but it is also one of the predisposing factors for osteoporosis,

cardiovascular disease, bone deformities and rheumatoid arthritis among adults.[2] The frequency of this disease varies by age, climate, and socioeconomic status of the population.[3] We aimed in this study to determine the frequency of rickets among hospitalized children who were presented to the Department of Pediatrics in Althawra hospital in Albaida city over 18 months period.

## PATIENTS AND METHODS

The cohort includes one hundred and eighty children, belongs to ≤2 years age group, who were hospitalized in Department of Pediatrics -Althawra Hospital in Albaida city /East of Libya, because of varying medical problems. The study period covers 18 months (January 2018 - August 2019). The patients who were diagnosed with rickets due to nutritional vitamin D deficiency were included in the study. Age, gender, etiology of admission, infant feeding practice, and vitamin D intake history were recorded. The diagnosis of rickets was based on the clinical, radiological and biochemical findings. According to the Centers for Disease Control (CDC), vitamin D deficient rickets has been defined as having a low serum 25 hydroxyvitamin-D level combined with one or more of the following radiographic changes: osteopenia, widening of growth plates, fraying and cupping of the metaphysis, and craniomalacia.[4] Low serum phosphorus (P) level, normal or low calcium (Ca) level, and significantly high alkaline phosphatase (ALP) levels are also considered as required biochemical criteria for the diagnosis. The presence of clinical signs including, caput quadratum, wide anterior fontanel, bowing of the legs, rosary beads, and Harrison's groove of the chest was recorded. Radiologically, the widening of the wrist, cupping as well as fraying of the ends of the radius and ulna were accepted as pathological findings. The patients with other causes of rickets such as resistance to vitamin D or vitamin D dependent rickets, anticonvulsant drug usage, or hepatic and renal tubular failure were excluded from the study. The control group consisted of the 137 non-rachitic children. Biochemical and hematological parameters were analyzed on admission to hospital. Serum Ca, P and ALP levels were measured by using Bayer Corporation Device® analyzer. Serum 25(OH) vitamin D3 levels were determined in the cases diagnosed as rickets. Prior to enrolment in the study, an informed consent was obtained from the patient and his/her parents. Cases diagnosed as nutritional rickets were treated with oral vitamin D3 with total dosage of 200,000 U vitamin D3. The rachitic group was compared with the age-matched non-rachitic children as the control group. All cases were evaluated for the parameters such as severity of illness, clinical status, nutritional status, vitamin D intake, breast feeding duration.

## RESULTS

One hundred and eighty patients, aged between 0-2 years, were hospitalized during the study period. Twenty five boys (58.1%) and eighteen girls (41.9%), totally 43 children, were diagnosed as nutritional vitamin D deficient rickets within this group. 32 of the 43 patients (74.4%) diagnosed as vitamin D deficient rickets were under one year old (Fig. 1).

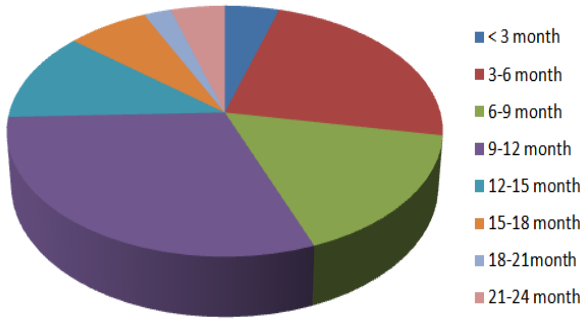


**Fig. 1: Distribution of patients according to ages.**

The mean age was 9.47±6.46 month Vitamin D deficient rickets in our patients were found to be nutritional in origin. 27 rachitic children were admitted to hospital with respiratory infection. On physical examination, Widening of wrist was the most frequent clinical finding (34,9%, 15/43 of the patients). Rachitic rosary (29%), asymmetry of the head (17%), and persistence of craniotabes after 4 months of age (11.2%) were other common findings of rickets. The serum Ca levels were low (<8 mg/dl) in 14 children and 4 of them presented with convulsion due to hypocalcaemia. The mean Ca level of the study group was 7.23±1.34 mg/dl, mean P level was 4.97±2.4 mg/dl, and mean ALP level was 442±325 U/L. 25(OH)D3 levels were low in all rachitic patients (8.2±3.1 µg/L, N: 20-60 µg/L). While only 11 patients in the vitamin D deficient rickets group had been reported to have regular vitamin intake and 27 of them (62.8%) had respiratory tract infection (Table I). On physical examination, Widening of wrist was the most frequent clinical finding (37%, 16/43 of the patients). Asymmetry of the head (27%), rachitic rosary (21%), and persistence of craniotabes after 4 months of age (11%) were other common findings of rickets. The serum Ca levels were low (<8 mg/dl) in 18 children and 9 of them presented with convulsion due to hypocalcemia. When the duration of breast feeding was evaluated, 6 cases (13.9%) had never received breast milk and 12 cases (27.9%) were breast-fed for less than 6 months. 24 of 43 rachitic children (58.1%) were in the weaning period. Within the control group, 51 children (37.2%) were

breast-fed for less than 6 months, and 11 children (8%) had never been breast-fed. The differences between the two groups were statistically insignificant.

**Table I: Causes of Admission to Hospital of Rachitic Cases.**

| Causes | Number of cases | (%) |
|---|---|---|
| Respiratory infections | 27 | 62.8 |
| Gastroenteritis | 5 | 11.6 |
| Seizure | 4 | 9.3 |
| Fever | 5 | 11.6 |
| Rash | 1 | 2.3 |

**Table II: Comparison of Rachitic Cases with Non-Rachitic Cases.**

| Richitic | Non-Richitic | | |
|---|---|---|---|
| | (n: 43) | (n: 137) | |
| No vitamin D supplementation | 32 (74.4%) | 48 (35%) | p<0.05 |
| Breast feeding | 20 (46.5%) | 61(44.5%) | p<0.05 |
| Malnutrition | 14 (32.5%) | 7 (5%) | p<0.01 |
| Anemia | 30 (69.7%) | 57(41.6%) | p<0.01 |
| Low income | 41 (95.3%) | 90 (66.6%) | p<0.01 |
| Infection findings | 28 (65.1%) | 57 (41.6%) | p<0.01 |

## DISCUSSION

Rickets is frequently seen in countries in which malnutrition, under-education, and low socioeconomic status are significant problems or in populations lacking adequate sunlight exposure. Rachitic children had a lower rate of vitamin D intake. The frequency of malnutrition and anemia and the percentage of covered mothers were higher in the rachitic group than in the control group, however anaemia could be associated with other pathology.[5] In our study, the frequency of vitamin D deficient rickets among hospitalized children aged from 0 to 2 years was 23.8% in albaida city, which means that rickets is still an important health problem in our country. Rickets could be a predisposing factor for respiratory tract infections.[6] Pneumonia frequency is found to be five times higher in rachitic cases.[4] In our cases, respiratory tract problems were the most common reason for hospitalization. In a study from Jordan, a very high rate (85.1%) of respiratory tract infection in the rachitic children was reported.[7] Deformities of the thorax, compression of the lung tissue, hypocalcemic myopathy of intercostal muscles, and changes in humoral and cellular immunity are the suspected mechanisms for pneumonia in rachitic cases. Vitamin D is also an important regulatory factor of the immune system.[8] Most of our vitamin D deficient children were under one year old. Early occurrence of rickets could depend on various factors. It is known that concentrations of metabolites related to bone health in breast milk

and cow's milk are far from meeting the requirements in the infancy period.[9] These data indicate that the solution to rickets requires specific attention during pregnancy and the early infancy period. Routine vitamin D supplementation or periodic determination of vitamin status during pregnancy would be the first step to decrease rickets occurrence during the infancy period.[10] Education about the importance of weaning children to a diet adequate in both vitamin D and calcium should be emphasized. Insufficient maternal vitamin D supplementation during pregnancy, covered mothers, low educational and socioeconomic status, and pregnancies without regular medical visits indicated a severe risk of vitamin D deficiency, and urgent initiation of vitamin D supplementation in children could prevent the development of rickets.

## CONCLUSION

Nutritional rickets is still a common and serious health problem in our country. Monitoring of serum 25(OH)D3 concentration during pregnancy, sufficient maternal supplementation, education of the population, and early vitamin D supplementation during the infancy period would decrease disorders due to the vitamin D deficiency.

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