Prevalence of Rickets regarding to maturity in children less than 3 years old attending Tikrit Teaching Hospital

ABSTRACT:
Background Rickets is a condition associated with bone-deformity due to inadequate mineralization in growing bones. rickets of prematurity is a well-known condition that predisposes to pathological fractures in . This study aims at identifying the prevalence of rickets in preterm and term babies, study the risk factor of the disease as age, sex type of feeding and biochemical and radiological changes.

Patients & Methods: A case control study done on 200 case with different ages from 1 moth to 3 years were taken 50 cases of them were preterm babies and 150 were term babies. Patients were studied by history (sex, age, type of feeding, residence and clinical feature) and investigation (serum Ca, ph and alkaline phosphatase) and diagnosis depend on radiological feature.

The Results: About 19 cases (38%) of preterm babies were diagnosed as rickets of prematurity, 15 cases (10%) were ricketic in term babies. Residence were not risk factor in preterm but risk factor in term babies. Breast feeding was risk factor in both term and preterm babies. Most common age was between 2 and 12 months in preterm babies. Serum level of calcium was normal in the majority of the cases in both term and preterm babies, serum phosphorus level was low in most of the cases specially in preterm babies. Alkaline phosphatase elevated in 90% of cases diagnosed as rickets.

Conclusions: The rickets is an important disease to be studied in this country account about nearly half of cases of preterm babies and about 10% of term babies. Breast feeding is a risk factor of the disease. Alkaline phosphatase activity and radiological feature are important for screening.

Keywords: Rickets, Children, Tikrit, Ca, ph, Alkaline phosphatase

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Introduction

Rickets is a disease of growing bone, occurs in children only before fusion of the epiphyses, and is due to unmineralized matrix at the growth plates. Rickets may be seen in young children 6 to 24 months old. Rickets may be caused by vitamin_D disorder, calcium deficiency, phosphorus deficiency, renal loss or distal renal tubular acidosis (1).

Wrist X-ray show thickening of growth plate, fraying, cupping and widening of distal end of metaphysis. Laboratory tests show normal to low serum calcium, low serum phosphorus, alkaline phosphatase; increased in all type of rickets, elevated parathyroid hormone in nutritional vit-D deficiency, low serum 25_OH vitamin D (2).

Prematurity is a liveborn infants delivered before 37 completed weeks from first day of the last menstrual period. Causes of preterm birth may be due to fetal causes (fetal distress, multiple gestation), Placental causes (placental dysfunction, placenta previa), uterine causes (bicorunate uterus, incompetent cervix), maternal causes (preeclampsia, chronic medical illness, infection) (3).

Rickets of prematurity occurs as early as 1-4 mo after birth. Most infants have no clinical manifestations, and the diagnosis is based on radiographic & laboratory findings, although some can have non-traumatic fractures, but most are not suspected clinically (4).

AIM

To decrease morbidity among premature infant by early detection of rickets.

Patients AND Methods

This study was carried in pediatric department (ward and outpatient clinic) in Tikrit teaching hospital (Tikrit city) which located 200 Km north of Baghdad city, Iraq.

Hospital based cross sectional case control was done on 200 children less than 3 years, those whom attending Tikrit teaching hospital during the period from the 1st of June 2013 till the 31th of January 2014 over a period of 8 months selected randomly.

A specialy designed interview sheet was used to collect the informations from fathers, mothers, grandmothers, or any other care giver. The sheet includes sociodemographic informations of the study sample as name, age, sex, address, and socioeconomic state.

Physical examination were performed including all signs of rickets.

All cases investigated with serum calcium, serum phosphorus, and serum alkaline phosphatase. (70).

Wrist X-ray was don using X-ray device.
Patient were divided according to maturity into full term (>37 completed weeks of gestation) and preterm (<37 completed weeks of gestation), 200 cases were studied, of them 150 case full term and 50 case preterm, 19 cases were diagnosed as rickets in preterm and 15 cases in term children.

**Results**
The total number of sample was 200 cases.
The total number of children with rickets was 34 cases.
Total number of preterm 50 case, 19 case has rickets.
Total number of term 150 cases, 15 cases has rickets.

**Prevalence of rickets**
The prevalence of rickets among term children less than 3 years old, 15 cases (10%) .

![Figure 1 prevalence of rickets in term children](image1)

The prevalence of rickets among preterm children less than 3 years old, 10 cases (38%) .

![Figure 2 prevalence of rickets in preterm children](image2)

**Gender and rickets prevalence rate:**

84
Most of the cases of rickets in preterm were male, 10 cases (52.6%). In term most cases were also male (60%).

**Age and rickets.**
Most of the cases in preterm were between 2 months and 1 years old, 16 cases (84.2%), while in term almost equal.

**Feeding and rickets**
Most of the cases were breast fed, 15 cases (78.9%), also in term most cases were breast fed, 10 cases (67.7%).

**Residence and rickets**
Most cases of rickets in preterm were urban, 11 cases (57.8%). In preterm also most cases urban 11 cases (73.3%).

**Clinical feature:**
The most clinical feature in the sample are delayed dentation found in 30 cases.

**Table 5: Clinical feature in rickets**

<table>
<thead>
<tr>
<th>Clinical feature</th>
<th>Preterm denominator =19</th>
<th>Term denominator=15</th>
<th>Total denominator=34</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>Percent</td>
<td>No</td>
</tr>
<tr>
<td>Delayed dentation</td>
<td>19</td>
<td>100.0</td>
<td>10</td>
</tr>
<tr>
<td>Weak muscle</td>
<td>19</td>
<td>100.0</td>
<td>9</td>
</tr>
<tr>
<td>Wide wrist</td>
<td>15</td>
<td>78.9</td>
<td>13</td>
</tr>
<tr>
<td>Leg bowing</td>
<td>1</td>
<td>5.3</td>
<td>3</td>
</tr>
<tr>
<td>Wide fontanell</td>
<td>3</td>
<td>15.8</td>
<td>1</td>
</tr>
<tr>
<td>Frontal bossing</td>
<td>2</td>
<td>10.5</td>
<td>2</td>
</tr>
</tbody>
</table>

**Biochemical changes**
In preterm the serum level of calcium was low in 2 cases, serum phosphate was low in 16 cases, serum alkaline phosphatase was high in 18 cases. In term the serum level of calcium was low in 1 cases, serum phosphate was in 10 cases, serum alkaline phosphatase was high in 14 case.

**Discussion**

Prevalence of rickets
In this study, the prevalence of rickets was 19 case (38%) of preterm babies, 15 (10%) of full term babies. Other study in Iran (28) showed 23% of premature babies develop rickets and in a study in Nairobi (29) 58.8% of premature babies develop rickets and in Korea (31) was 44%. In studies on term babies, similar results were obtained in Bangladesh (55).

**Age and rickets:**
In this study, the most age onset of presentation of rickets in prematurity was between 2 to 12 months, in term babies the result was nearly equal in ages below one year and from one to three years.

**Gender and rickets:**
Regarding gender variation, in this study male slightly more than female.

**Residence and rickets:**
In this study, there was no significant difference between rural and urban areas as a risk factor for rickets of prematurity.

**Clinical feature of rickets:**
In this study, the most common presentation was delayed dentations followed by muscle weakness and widening of the wrists. Similar results were obtained in a study in USA (34), however; other studies showed that enlarged fontanelles are the main presenting feature (35, 36).

**Types of feeding and rickets:**
Regarding type of feeding, in this study breast feeding babies are more frequently to develop rickets of both preterm and term babies than of that with bottle feeding. Another studies in UK (41) and India (42) for preterms showed the same results, studies in term babies in USA (60) and Canada (60) showed that rickets was more common in breast fed infants.

**Biochemical results:**
Regarding biochemical results, serum level of calcium was normal in the majority of the cases in both term and preterm's babies, serum phosphorus level was low in most of the cases specially in preterm babies and serum alkaline phosphatase level was significantly high and can be regarded as a good marker of the disease. Nearly similar results were obtained in Hong Kong (47) and Italy (53). Infants with rickets will demonstrate a normal serum calcium and a low or low normal serum phosphorus level (60).

**Radiological changes:**
All the patients included in this study had some degree of radiological changes suggestion of rickets. Another studies in Karachi (50) and U.K (35) demonstrate the same result.

**CONCLUSION**
1. Prevalence of rickets of prematurity in this study was high 39% and for term babies was 10%.
2. The most age of prevalence was between 2 and 12 months for both preterm and term babies.
3. Gender variation was not significant in this study.
4. Urban areas were a risk factor for rickets in term babies and not in preterm babies.
5. Breast feeding was a risk factor for the disease.
6. Delay dentations, muscle weakness and widening of wrist were the most clinical manifestation in this study.
7. Increased serum alkaline phosphatase activity is an important test in diagnosis of rickets and found in 90% of this study.

RECOMMENDATIONS
To ministry of health:
→ Screening test for preterm babies by radiological and biochemical tests for early diagnosis and management of rickets of prematurity.
→ Educational sessions in health centers for benefit of sunlight exposure.

To the physician:
In breast milk Babies supplanted vitamin D in term babies, and vitamin D, calicium and phosphate for preterm babies is mandatory.

References


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