

Study of Rickets in Exclusively Breast Fed Children below 6 Months

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Abstract: Aims: To study factors affecting rickets, clinical presentation of rickets and role of supplementation in prevention of rickets. Study and design: prospective study done from June 2008 to October 2010. Methods: 60 infants who were on exclusively breast feeding and 0-6 months age, enrolled in study. Detailed history, clinical examination, Serum alkaline phosphatase and X-ray wrist done in all patients. Rickets defined by biochemical and/or radiological abnormalities. Patients with rickets with abnormal X-ray wrist were treated with high dose of vitamin D, calcium and phosphorus. Others were given supplemental vitamin D, calcium and phosphorus. Infants with normal X-ray and serum alkaline phosphatase also supplemented with vitamin D, calcium and phosphorus. All the infants were followed up after 12 weeks and repeat X-ray wrist and serum alkaline phosphatase done. Statistical analysis: Chi square test and Fisher's exact test applied. Results: Out of 60 patients 35 had rickets (58.33%). Maximum cases seen in 5-6 months children (11/12-91.6%). As age advances chances of rickets increases in 0-6 months children (P value- 0.0033, significant). Incidence of rickets slightly higher in LBW (14/21-66.66%) than NW (21/39- 53.84%) but p value is not significant (0.4925). Lack of maternal supplementation with Vitamin D and calcium is most common risk factor (24/35-71.42%). Multiparity is second most common maternal risk factor (15/35-42.85%). Most common illness associated with rickets is respiratory tract infection (15/35- 42.85%). Craniotabes seen in (12/35 - 34.28%) infants. Clinically normal infants with laboratory evidence in form of raised s.alk. phosphatase seen in (15/37) 40.54% infants. All patients with rickets responded to therapy and showed resolution in form of radiological improvement and normalisation of serum alkaline phosphatase. Out of 25 normal infants without rickets, no one developed rickets after supplementation. Conclusion: Rickets seen throughout 0-6 months and maximum cases seen in 5-6 months age. Lack of supplementation with calcium and vitamin D to mother is most important risk factor. Craniotabes is the most common clinical feature. Significant number of infants have raised s.alk. phosphatase without clinical manifestation. There is favourable response to prophylactic supplementation with Vitamin D, calcium and phosphorus.

Keywords: Rickets, Exclusively breast fed children

Key Message: Mother should be supplemented with vitamin D and calcium antenatally. Exclusively breast fed infants below 6 months should be supplemented with Vitamin D and calcium. Serum alkaline phosphatase is useful marker to detect early Rickets.

1. Introduction

Nutritional rickets is disease of growing children. Vitamin D deficiency rickets is preventable and has been almost eliminated among children in the developed countries by prophylactic means. Although breast feeding is a highly appraised practice, human milk supplies adequate amount of all necessary nutrients except a few, for example Vitamin D. Being a tropical country, in India, we get enough sun exposure. But practice of keeping young infants inside home most of the time, keeping them covered with clothes and avoiding sun exposure during 10 AM to 2 PM when vitamin D absorption occurs, will make young infants susceptible for developing rickets. Malnutrition and dark skin increases the risk of this disease. The resurgence of nutritional rickets associated with non supplemented breast feeding has been reported and apparently this feeding practice (exclusively breast feeding) is no guarantee for rickets prevention.

2. Subjects and Methods

I conducted prospective study from June 2008 to October 2010. The study was approved by the institutional ethical committee and informed consent was obtained from parents. Infants born at full term, age 0-6 months, on exclusively breast feeding were enrolled in the study. Infants with liver disorders and bony dysplasia were excluded. Total 60 young infants attending Pediatric department were enrolled.

Detailed history taken. Maternal history like age, height, multiparity, vitamin D and calcium supplements during an-

tenatal period, diet, sun exposure, any drug that interfere with Vitamin D and Calcium and vitamin D deficiency disorder, asked in detail. Birth history of infants like maturity, birth weight, route of delivery and any complications asked. Feeding history and history of supplementation taken. History about present illness for visiting Pediatric department and also past history of major illness taken. Anthropometry, vitals and thorough clinical examination done. Special evaluation of signs of rickets done.

Serum alkaline phosphatase and X-ray wrist done in all infants. S.alk.phosphatase done by colorimetric assay. 140-420 IU/l taken as normal range. >420 IU/l considered raised. X-ray wrist done in all infants and reporting done by radiologist. Additional investigations like s.calcium, s.phosphorus and Vitamin D level done in few infants. Rickets defined as biochemical and/or radiological abnormalities. Radiologically confirmed rickets Infants were treated with therapeutic dose of vitamin D (cholecalciferol sachets, total 6 lakh IU over 10 day). Supplemental vitamin D (400IU/day) along with calcium (150 mg/kg/day) and phosphorus (75 mg/kg/day) given for 12 weeks. Calcium (150 mg/kg/day), phosphorus (75mg/kg/day) and vitamin D (400IU/day) supplemented in Infants with only biochemical abnormality (raised S alkaline phosphatase). Normal Infants without any evidence of rickets, supplemental vitamin D, calcium and phosphorus given to study prophylactic role. Follow up clinical examination and evaluation with repeat S alkaline phosphatase and X-ray wrist done in all infants. Infants with biochemical and/or radiological abnormalities even after 12 weeks of treatment, continued with supplements for another

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12 weeks and re-evaluated in same manner. Data analysed by SPSS software. Chi square test and Fisher's exact test applied whenever applicable and results obtained. The criteria for significance in all analysis was $P < 0.05$.

parameter. There is a favorable response of prophylactic vitamin D and calcium.s

3. Results

Total 60 infants included in study. Out of 60,35 infants had rickets and 25 normal infants. Baseline characteristics of all infants shown in table. In 0-6 months age, maximum cases of rickets seen in 5-6 months (11/12= 91.6%). As children are growing vitamin D and calcium requirement is maximum. Male to Female ratio is 1.1: 1 suggestive of equal sex distribution. Rickets in LBW infants is (14/21= 66.66%) which is slightly higher than NBW (21/39= 53.84%) but p value is not significant (P value- 0.49). while applying chi-square test for present weight, P value is 0.90, which is not significant. That suggests, patients irrespective of weight (percentile) presented with rickets. So all patients would require supplementation.

Relations of maternal factors shown in table 2. Out of 35 infants with rickets 24 infants' mother had not taken vitamin d and calcium supplements antenataly. We can easily prevent this by improving antenatal supplementation in health care. Multiparity, vegetarian diet, use of burkha, short stature are common maternal factors associated with rickets in Infants.

Illness associated with rickets shown in table 3. Most common illness is respiratory tract infection.

Clinical features seen in our patients are shown in table 4. Craniotabes is the most common feature seen in young infants, followed by wide open AF. Abnormalities of extremities, ribs and spine were not seen in young infants.

Correlation of clinical and laboratory parameter shown in Table 5. Fisher's exact test applied and P value is 0.0004 which is very significant. It is suggestive of good correlation. Total 37 infants did not have any clinical feature, then also rickets seen in 15 Infants (15/37=40.54%) which suggests that early rickets can be picked up only by investigations.

Raised serum alkaline phosphatase seen in 31 infants (31/35=88.57%) , which indicate that it is a good parameter for screening. At the end of 12 weeks of treatment with Vitamin D, calcium and phosphorus, 27 patients serum alkaline phosphatase became normal, rest 4 patients require another 12 weeks treatment.

4. Conclusion

Rickets seen throughout 0-6 months but maximum cases seen in 5-6 months age group. Multiparity, vegetarian diet, burkha use, short stature and lack of supplements are common maternal risk factors lead to development of rickets in infants. Most common clinical feature is craniotabes. Significant numbers of infants have raised serum alkaline phosphatase without clinical features, highlights the importance of serum alkaline phosphatase as an important screening