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Original Research Article

Assessment of the clinical profile & risks factors of children with rickets in North Bihar.

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Abstract

Aim:*To determine the clinical profile & risks factors of children with rickets.*

Material and methods:*The study was conducted in Department of Pediatrics, Darbhanga Medical College and Hospital, Darbhanga, Bihar, India forone year. Child aged 1-5 years attending in the mentioned with complaints bowing of leg and/or clinical symptoms consistent with rickets were approached. The participant of the study was 120. Biochemical and radiological investigations were done to establish rickets among clinically suspected Childs. Then, serum 25-hydroxy vitamin D [25(OH) D] level was done to identify the stratification of rickets. Clinical presentation, biochemical and radiological reports were collected and kept recorded in separate case record form.*

Results:*Out of 38 participants 42.1% were male and the rest 57.9% were female. So female were dominating in number. We found most of the cases were from Bihar which were 76.3% and 23.7% was from outside Bihar, Besides these 23.7% parents were illiterate, 44.7% parents (At least one: father/mother) were primary level educated, 18.4% were secondary to higher secondary level educated and 13.2 were graduate. On the other hand, 55.3% participants were found from lower class family according to their family income. Then 34.2% were from middle class and only 10.5% were from upper class families. In analyzing the diagnostic findings of the participants we found the highest 94 (76.3%) participants were with nutritional rickets, 13.2% were with non-nutritional rickets and the rest 10.5% were rickets-like diseases. Infant of maternal vitamin D deficiency were 7.8% of infant came with convulsion. Which are investigated and diagnosed? The investigation show that low ca+ level, low 25(OH) D level, high PTH level. Those mothers we are investigated, ca+ level, 25(OH) D level, PTH level which shows ca+ level normal, low 25(OH)D level, high PTH level. In analyzing the spectrum of presentation of children with both the nutritional and non-nutritional rickets we found, 26.3% participants were with bow leg whereas, 2.6% were with knock knee, 10.5% were with sabre tibia.*

Conclusion: *Nutritional rickets is the commonest subtype of rickets in India. In ours study nutritional rickets' are found 78.33% among the patients with rickets. Sometimes physician may be misguided or be confused by the etiology of rickets like diseases.*

Keywords: *nutritional rickets, rickets, bowing of leg, child leg deformity*

I. Introduction

Mineralisation of osteoid tissue of bone is dependent on a suitable supply of minerals, both calcium and phosphate. Failure to provide sufficient mineral results in osteomalacia[1], which, in growing bone with its attendant growth plates and unfused epiphyses, is manifested as rickets. Although, vitamin D deficiency is not the only cause of rickets (nutritional calcium deficiency has also recently been proposed as an important factor. It has historically been a major cause of morbidity.[2] Vitamin D is mainly derived from the action of sunlight on 7-dehydrocholesterol in the skin, and vitamin D deficiency is more likely to occur in individuals with darker skins or in those whose skin is extensively covered. Vitamin D deficiency in pregnant mothers also limits fetal growth.[3,4] In addition, vitamin D may have an importantpart to play in preventing other diseases such as hypertension, various cancers, and type 1 diabetes.[5] Rickets is a relatively rare condition in Western societies and, when it presents, is often associated with some form of metabolic disturbance of vitamin D metabolism,

which may be primary (for ex- ample, vitamin D dependent rickets type I, an in born error of metabolism of vitamin D; or vitamin D dependent rickets type 2, end organ resistance to the action of vitamin D) or secondary (for example, associated with liver or kidney disease), or a defect in renal tubular function (for example, hypophosphataemic vitamin D resistance rickets). However, rickets is also prevalent in sunnier climates,[6] although here it seems that malnutrition may be a contributing factor.[7,8] Darker skinned individuals are just as capable as those with lighter skins of synthesizing vitamin D, but require greater exposure to ultraviolet light to do so. Other factors,suchasnutritionaldeficiencyassociatedwith macrobiotic, vegetarian[9], strict vegan[10] or "healthy food" milk alternative[11] diets, and low exposure to sunlight, either by staying indoors or covering the skin are also important.[12] Breast milk contains little vitamin D and breast fed infants should receive vitamin D supplements. Vitamin D deficiency classically presents with symptoms of bony deformity such as bowed legs, swelling of the wrists, a "rickety rosary", and muscle weakness. If the rickets is severe enough, fractures may ensue[13] and may simulate child abuse.[14.]However, a significant proportion of these patients have symptoms of hypocalcaemia, which may cause convulsions, stridor, and neuromuscular irritability.[15,16] Nutritional rickets has been seen in developing countries. Following the recognition of principal cause, rickets was largely eradicated in Western world. The aim of this study was to determine the clinical profile & risks factors of children with rickets in Darbhanga Medical College and Hospital, Darbhanga, Bihar.

II. Material and methods

The study was conducted inDepartment of Pediatrics, Darbhanga Medical College and Hospital, Darbhanga, Bihar, India for one year.

Methodology

Children aged 1-5 years attending in the mentioned with complaints bowing of leg and/or clinical symptoms consistent with rickets were approached. The participant of the study was 120. Biochemical and radiological investigations were done to establish rickets among clinically suspected Childs. Then, serum 25-hydroxy vitamin D [25(OH) D] level was done to identify the stratification of rickets. The diagnosis was validated upon predefined diagnostic criteria; cases fulfilling both biochemical inclusion criteria and clinical signs/symptoms or radiological Signs of rickets were included. The diagnosis of rickets was made based on raised plasma alkaline phosphatase (ALP), raised serum parathyroid hormone (PTH), or low/normal serum calcium (Ca) in clinically and radiologically consistent cases[17] Whereas, the diagnosis of nutritional rickets is made on the basis of history, physical examination, radiographs and biochemical testing particularly serum 25(OH) D.[17] The cut off value of Vitamin D deficiency was set as <30nmon/l. To evaluate the other causes of rickets were done according to the standard guideline.[17] Borderline result was considered criteria of exclusion and it was replaced by another consecutive purposive sampling. The child was divided into three subtypes: nutritional rickets (rickets with vitamin D deficiency), non-nutritional rickets (rickets not due to the deficiency of vitamin D or rickets due to other cause) and rickets like disease (clinically not like rickets but proof by investigation). Clinical presentation, biochemical and radiological reports were collected and kept recorded in separate case record form.

III. Results

In this study among 38 participants 42.1% were male and the rest 57.9% were female. So female were dominating in number. In analyzing age of the participants we found, the highest 43.4% participants were from (9-18) months age group. In analyzing the socio-economic status of the participants we found most of the cases were from Bihar which were 76.3% and 23.7% was from outside Bihar,Besides these 23.7% parents were illiterate, 44.7% parents (At least one: father/mother) were primary level educated, 18.4% were secondary to higher secondary level educated and 13.2 were graduate. On the other hand, 55.3% participants were found from lower class family according to their family income. Then 34.2% were from middle class and only 10.5% were from upper class families. In analyzing the diagnostic findingsof the participants we found the highest 94 (76.3%) participants were with nutritional rickets, 13.2% were with non-nutritional rickets and the rest 10.5% were rickets-like diseases. Infant of maternal vitamin D deficiency were 7.8% of infant came with convulsion. Which are investigated and diagnosed? The investigation show that low ca+ level, low 25(OH) D level, high PTH level. Those mothers we are investigated, ca+ level, 25(OH) D level, PTH level which shows ca+ level normal, low 25(OH)D level, high PTH level. In analyzing the spectrum of presentation of children with both the nutritional and non-nutritional rickets we found, 26.3% participants were with bow leg whereas, 2.6% were with knock knee, 10.5% were with sabre tibia. On the other hand, as upper limb deformities we found 31.6% with swelling and/or widening wrists. We also found head findings 2.6% with craniotabes and 5.2% with wide anterior fontanelle. Besides these, as other deformities we found 7.9% with rib beading, 2.6% % with pectus carinatum, 5.2% with delayed growth and 5.2% with delayed dentition. In last analyzing the ricks factor of rickets Low sunlight intake (sun light explorer) were 76.3%, Infant of maternal vitamin D deficiency were 7.8%,

Industrial area were 2.6%, Rural area were 2.6%, Urban area were 5.2% and low socio- economic condition were 5.2%.

Table 1 Age and Gender distribution

Gender	No. of patients=38	%
Male	16	42.1
Female	22	57.9
Age in months		
Below 9 months	4	10.5
9-18	18	43.4
18-24	10	26.3
24-48	5	13.1
48-60	1	2.6

Table 2: Demographic profile of children with rickets

Parameter	N=38	%
Residence		
Bihar	29	76.3
Outside Bihar	9	23.7
Education of Parents		
Illiterate	9	23.7
Primary	17	44.7
SSC-HSC	7	18.4
Graduate	5	13.2
Economic Status(family)		
Lower	21	55.3
Middle	13	34.2
Upper	4	10.5

Table 3: Diagnosis of participants with rickets (N=38)

Types of Rickets	N	%
Nutritional rickets	29	76.3
Non-nutritional rickets	5	13.2
Rickets like disease	4	10.5

Table 4: Spectrum of presentation of children with rickets (N=38)

Presentation		N	%
Lower limb deformity	Bow Leg	10	26.3
	Knock knee	1	2.6
	Sabre Tibia	4	10.5
Upper limb deformity	Swelling-widening wrist	12	31.6
Head findings	Craniotabes	1	2.6
	Wide Anterior Fontanelle	2	5.2
Other deformity	Rib beading	3	7.9
	Pectus Carinatum	1	2.6
	Delayed Growth	2	5.2
	Delayed Dentition	2	5.2

Table 5: Risks factors of rickets among participants (N=38)

Ricks factors of Rickets	N	%
Low sunlight intake	29	76.3

Infant of maternal vitamin D deficiency	3	7.8
Industrial area	1	2.6
Rural area	1	2.6
Urban area	2	5.2
Low Socio-economic condition	2	5.2

IV. Discussion

The aim of this study was to determine the clinical profile & ricks factors of children with rickets in Darbhanga Medical College and Hospital, Darbhanga, Bihar, India. Nutritional rickets is acknowledged as a major public health concern globally.[18]In our study; we included 38 cases of rickets and found 76.3% cases of nutritional deficiency rickets. In all of them, 25-hydroxy vitamin D [25 (OH) D levels level was deficient. Reason for the difference between this study and the aforementioned study could be attributed to sample size and study design. Deficiency of Vitamin D in nutritional rickets needs to be addressed as several studies reported vitamin D deficiency of 28% to 40% in infants and younger children of other country dependingon the age and weight of the children.[19] Also, vitamin D deficiency rickets has re-emerged in many affluent industrialized countries of the world. About 13.2% children had rickets due to other causes rather than vitamin D deficiency (non-nutritional rickets) in our study.[20] 25-hydroxy vitamin D [25(OH)D level] level was within normal range in this group of children and was significantly higher than nutritional deficiency rickets group (p value <0.001). Non- nutritional rickets group possibly consists of hypo-calcemic rickets, hypo-phosphatemic rickets and vitamin D resistance rickets in whom Vitamin D level tends to be high.[21] In contrast, an Australian vitamin D deficiency rickets surveillance study found 12% cases of calcium deficiency, 7% cases of phosphate deficiency and 49% cases of parathyroid hormone excess among 398 children of vitaminD deficiency rickets.[20] This probably was due to concomitant calcium deficiency in our subjects which led to high parathyroid hormone and low phosphate level in the blood. Consistent with findings of other studies.[22] Nutritional rickets were found more in younger age groups and in female children in this study.

In analyzing the spectrum of presentation of children with both the nutritional and non-nutritional rickets we found, 26.3% participants were with bow leg whereas, 2.6% were with knock knee, 10.5% were with sabre tibia. On the other hand, as upper limb deformities we found 31.6% with swelling and/or widening wrists.We also found head findings 2.6% with craniotabes and 5.2% with wide anterior fontanelle. Besides these, as other deformities we found 7.9% with rib beading, 2.6% % with pectus carinatum, 5.2% with delayed growth and 5.2% with delayed dentition in our study. However, Karim[23]found knock knee (38%) followed by bow leg (26%) to be the leading presentation of lower limb rickets in their study. On the other hand, a Nigerian study reported swollen wrist to be the leading sign (65%), followed by bow leg (60%).[24]

Our study found these 23.7% parents were illiterate, 44.7% parents (At least one: father/mother) were primary level educated, 18.4% were secondary to higher secondary level educated and 13.2 were graduate. Although the Cox's bazaar study found a similar picture, lesser number of parent's education year may not be associated with increased incidence of rickets[23]because,a Nigerian study found significantly higher education years in fathers of rachitic children.[24] Majority of the families were running on a monthly deficit budget. A similar finding was reported by Karim and his colleagues.[23]further carefully designed studies are needed to establish low socio-economic status as a factor of nutritional deficiency rickets. Nutritional rickets is the commonest sub type of rickets. In ours study 'nutritional rickets' are found 76.3% among the patients with rickets. Sometimes in treating the patients, physician may be misguided or be confused by the etiology of rickets likediseases.

V. Conclusion

Nutritional rickets is the commonest subtype of rickets in Bangladesh. In ours study nutritional rickets' are found 70% to 80% (78.33%) among the patients with rickets. Sometimes physician may be misguided or be confused by the aetiology of rickets like diseases. For getting more specific findings we would like to recommend for conducting more studies regarding the same issue with larger sizedsample.

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