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CLINICAL PRESENTATIONS OF NUTRITIONAL RICKETS IN CHILDREN UNDER 2 (TWO) YEAR OF AGE

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ABSTRACT

AIMS & OBJECTS: *To describe various clinical manifestations and laboratory profile of nutritional rickets in children under 2 years of age.*
STUDY DESIGN: *This is a descriptive type of study.*
PALACE & DURATION OF STUDY: *This study was conducted in the Department of pediatrics, Chandka Medical College Larkana, from Jan 2006 to Dec 2008.*
PATIENTS & METHODS: *The data was collected from outdoor as well as indoor patients .50 cases of either sex,clinically suspected as rickets, under the age of two years were included in the study.*
INCLUSION CRITERIA: *All the clinically suspected cases of rickets were included. The cases hospitalized for other problems but proved to be rickets were also included.*
EXCLUSION CRITERIA: *All children having genetically skeletal dysplasia.*
Children above 2 year of age.
Renal rickets
Vitamin D resistance rickets
Metabolic rickets
Drug induced rickets.
RESULTS: *A total of 50 (fifty) patients belonging to different localities, having a variety of clinical presentations of rickets were seen during the study period.*
The age range was one month to 24 months, 33 were males and 17 were females.
The main clinical presentations of rickets (n=22) presented with pneumonia, 11 with diarrhea, 11 with seizures and 6 patients presented with delayed milestones.
CONCLUSION : *Nutritional rickets is common in children younger than 2 years. Majority of patients present with other problems like pneumonia, diarrhea & seizures with Laboratory findings of hypocalcaemia, hypophosphataemia & raised alkaline phosphatase.*
Nutritional Rickets are most common in those children, who were exclusively on breast-feeding for prolonged duration, those in whom weaning was delayed or inadequate and those who were malnourished.

KEY WORDS : Nutritional Rickets, Pneumonia,Diarrohea,Seizures.

INTRODUCTION:

Rickets is a disease, which affects the bone of growing children. Calcium and phosphate are important elements that form the bone. In nutritional rickets, initially the availability of calcium is diminished, later disturbances in phosphate occur.[1]

Nutritional rickets remains a public health problem in many countries, despite dramatic declines in the prevalence of the condition in many developed countries since the discoveries of vitamin D and the role of ultraviolet light in prevention.[2]

However, vitamin D deficiency occurs more frequently in population for whom the vitamin D supply is limited and whose diets are low in calcium or calcium bioavailability than in population whom the vitamin D supply condition similar but dietary calcium is not low[3, 4].

Vitamin D deficiency and/or nutritional rickets remain prevalent in developing regions of the world and ranks among the 5 most common diseases in children.[5]

Although virtually eliminated from Europe and North America by the fortification of food with vitamin D, but it remains prevalent in many developing world, including

Africa[5], the Indian subcontinent**,** Asia, and the Middle East[6], It is unclear why rickets occur so frequently in tropical countries with abundant sunlight, which should prevent vitamin D dificieny[7], some cases seen today are those who have prolonged breast feeding and whose complementary food is not enriched with vitamin D and also who are insufficiently exposed to the sun[8]. However it remains a very prevalent disease in developing countries, living in poorly sunlight housing, as well as environmental pollution from traffic, forming thick smoke and dust screen blocking off the ultraviolet light (essential for vitamin D synthesis in the skin) appeared to be the main factor responsible for vitamin D deficiency[9]. It is found especially in Muslim countries where cold climate, the pregnant and lactating women in purdah (cover with cloth) as well infants leads to inadequate sun exposure[9, 10]

As there is large infant population in developing countries, the number of babies suffering from rickets. Due to reduced vitamin D production, the children with darkly pigmented skin and inadequate sunlight exposure because of air pollution the infant remaining indoors, or infants being excessively covered when outside[10, 5]. Although the mineralization defect is diffuse, the clinical and radiological bone lesions predominate in areas of rapid bone growth, namely the long bone epiphysis and the costochondral junction[11, 12]. Vitamin D has a regulatory role in skeletal muscle, the immune system, and cell differentiation, including induction of protein, such as nerve growth factor in the central nervous system; recently vitamin D deficiency has been implicated as risk factor for diabetes, ischemic heart disease, and tuberculosis in Asians[11]. Nutritional rickets is mostly observed before 18 months of age. Boys are more frequently affected than girls in similar life condition; the reason for this is unclear as growth velocity is identical in both sexes in pre-pubertal age. Dietary deficiency is the main factor, responsible for rickets. Although rickets in preterm infants has decreased with improvement in care and nutrition. Early diagnoses and treatment can prevent fractures and other complications such as decreased linear growth[12, 13].

The incidence of rickets was 32% in pre mature infant with birth weight below 1.5 Kg[14]. Hillman et al and Lyon AJ found osteopenia in 92% and 75% respectively in their studies.

Rickets is common disease in children. An early diagnosis and proper management is required to avoid a lot of morbidity brought

TABLE-I
AGE & SEX DISTRIBUTION

(n = 50)

No. of Cases	Age (in months) (Mean ± SD)	Age (In months)	Age (In month) Range Median
Female (n = 17)	9.59 ± 5.21	1.00 – 18.00	9.00
Male (n = 33)	11.54 ± 6.37	2.0 – 24.00	12.00
Total	10.88 + 6.02	1.00 – 24.00	9.5

Female: Male Ratio = 1: 1.94

TABLE-II
DISTRIBUTION OF AGE GROUP

(n = 50)

D Group	No. of Cases	Percentage
Group I (0 – 6 months)	14	28%
Group II (7 – 12 months)	17	34%
Group III (13 – 18 months)	16	32%
Group IV (19 – 24 months)	3	6%

TABLE-III
PRESENTING COMPLAINTS

n = 50)

Presenting Complaint	No. of Cases	Percentage
Pneumonia	22	44%
Diarrhea	11	22%
Seizures	11	22%
Delayed milestones	6	12%

TABLE-IV
ASSOCIATED DISEASES

(n = 50)

Disease	No. of Cases	Percentage
Worm infestation	23	46%
Anemia	12	24%
Dysentery	9	18%
Meningitis	4	8%
UTI	2	4%

TABLE-V
CLINICAL SIGNS OF RICKERTS

(n = 50)

Signs	No. of Cases	Percentage
Anterior fontanel wide open	38	76%
Front parietal Bossing	31	62%
Widening of Wrist	44	88%
Rachitic rosary	27	54%
Harrison's Sulcus with pigeon chest	6	12%
Bowing of legs with Widening of ankle joints	6	12%
Pathological fractures	2	4%

about by this treatable and preventable disease which is an extra economic burden on parents and health facilities of state[15].

PATIENTS & METHODS

This was a descriptive study conducted in the department of paediatrics, Chandka Medical College Larkana, which is tertiary care unit. The data was collected from out door and indoor patients.50 Children of either sex under 2 years of age were included during the study period.

INCLUSION CRITERIA:

All the clinically suspected cases of rickets were included.
The cases hospitalized for other problems but proved to be rickets were also included.

EXCLUSION CRITERIA:

All children having genetically skeletal dysplasia.
Children above 2 year of age.
Renal rickets
Vitamin D resistance rickets
Metabolic rickets
Drug induced rickets.

All the suspected cases were thoroughly investigated for rickets employing standard laboratory techniques, and clinical presentation.
Statistical analysis was done on package of SPSS; version-13 and the distribution of cases among various criteria was presented by their percentage.Study protocol was approved by local ethical committee of institution.

RESULTS

Out of 50 (fifty) children, 33 (66%) were males and 17 (34%) were females. Table-I
The age range was one month to 24 months. The children of 0-6 months were 14 (28%), 7-12 months were 17 (34%), 13-18 months were 16 (32%) and 19-24 months were 3 (6%). Table-II
Thirty-seven (74%) were from urban areas. 13 (26%) were from rural area. Out of 37 (74%) children living in the urban areas, 26 (52%) were living in very small houses with poor exposure to sunlight and 6 (12%) were from the slums and 5 (10%) were living open house.
The patients who had rickets 22 (44%) presented with pneumonia, 11 (22%) presented with diarrhea, 11 (22%) presented with seizures and 6 (12%) presented with delayed milestones. Table-III
The patients with rickets were found with other associated problems, 23 (46%) worn infestations, 12 (24%) anemia, 9 (18%) dysentery, 4 (8%) meningitis and 2 (4%) had UTI**.** Table-IV
Thirty eight (76%) had wide open anterior fontanel, front parietal bossing were seen in 31 (62%), 44 (88%) were wide wrist, 27 (52%) had rachitic rosary, 6 (12%) had bowing legs (Knock knees) with widening of ankle joint and 2 (4%) had pathological fracture. Table-V
The main radiological findings seen were metaphysical cupping in 39 (78%), fraying, 20 (40%), 2 (4%) had stippling and 27 (54%) had splaying and 16 (32%) had decreased bone density with dense white line. Table-VI
The biochemical abnormalities were seen in 23 (56%), hypocalcaemia, serum alkaline phosphatase raised in 42 (84%) and 9 (18%) had low phosphate level. Table-VII

TABLE-VI
RADIOLOGICAL FINDINGS

(n = 50)

Radiological Findings	No. of Cases	Percentage
Cupping	39	78%
Fraying	20	40%
Stippling	2	4%
Splaying	27	54%
Others	16	32%

TABLE-VII
LABORATORY FINDINGS

(n = 50)

Serum Calcium
Normal Range 8.8 – to 10.8 mg/dl*

Range (mg/dl)	No of Cases	Percentage
5 – 7	9	18%
7.1 – 9	30	60%
9.1 – 10.8	11	22%

Serum Alkaline Phosphatase
Upper limit normal range 145 – 420 iu/dl*

Range (iu/dl)	No of Cases	Percentage
145 – 800	18	36%
801 – 1500	20	40%
1501 – 3000	10	20%
3001 -5000	2	4%

Serum Inorganic Phosphorous
Normal Range 3.3 – 6.5 mg/dl*

Range (mg/dl)	No. of Cases	Percentage
2.5 - 3.0	6	12%
3.5 – 4.0	12	24%
4.5 – 5.5	32	64%

DISCUSSION

Nutritional rickets is the commonest variety of rickets in Pakistani children[16]. Iqbal SJ et al (1994) in their study mentioned that vitamin D deficiency rickets is the more common from of rickets in Asian children. Akber P and Iqbal had a study with similar results[17].
In all the studies done so far, no special emphasis was laid on the nutritional rickets in children up to two years of age. As this is the time when appropriate intervention can prevent permanent deformities.
Total numbers of children in the present study were fifty (50). It was found that male sex is predominant 34 (68%). These results are comparable with study carried out by Banajeh SM et al, 86% were male. The present study succeeded to see clinical

presentation of nutritional rickets under the two years of age and most of the result of this study correlates with the study of *H. Abdul et al*. In our study, majority of children were 31 (62%) under one year. The results are almost similar with study carried out by *EL-Hag Al et al* in which 44% of patients were up to one year.

The second age group affected was between 13 – 24 months 19 (38%), these results are comparable with results of study carried out by *Azra Jameel et al.* In which (37.54%) were between 13-24months, it was noted that most of the children 37 (74%) were exclusive breast-feed, these results are comparable with study carried out by *Hameed A. et al*, in which 87% children were exclusively breast-feed[14].

In majority of patients 22 (44%) presented with pneumonia, the results are similar to study carried out by *Hameed A. et al* in which 48% had lower respiratory tract infection[13.]. *Muhe et al*, in which 43% children with broncho pneumonia.

Second common presentation was diarrhea 11 (22%) and seizures 11 (22%). These results are comparable with the study carried out by *Azra Jameel et al* and *Hameed et al*[16, 17] in which 22% of patients had diarrhea and 15% had seizures.

The majority of patients 44 (88%) had broad wrist frontoparietal bossing was seen in 31 (62%) and rachitic rosary in 27 (54%). These finding are comparable to study carried out by *EE Ekanem et al* in which 62% broad wrist and 25% had rachitic rossary[18, 19].

All the patients included in our study had some degree of radiological changes suggestion of rickets such as metaphysical Splaying, cupping, fraying, widening of epiphyseal growth plate and poor mineralization of trabecular bone[20].

The X-Rays is a very useful for early diagnosis as radiological abnormalities can be found before physics signs [21].

Twenty Three 23 (46%) of patients had low serum calcium, 9 (18%) had low serum phosphorus and alkaline phosphatase was raised in 42 (84%). These results are comparable to study carried out by *Azra Jameel et al* in which 55% patients had raised in alkaline phosphatase[22.]

CONCLUSION

Nutritional rickets is a common problem in children younger than 2 years of age. These children can present with other problems like pneumonia, diarrhea & seizures. Laboratory findings (hypocalcaemia, hypophosphataemia & raised alkaline phosphatase.) are helpful in diagnosis.

It was seen in children who were from urban settlements livings in small houses with poor sun exposure, who were exclusively on breast-feeding for prolonged duration.

RECOMMENDATIONS

1. Education of families for timely weaning.
2. Clinicians should consider this preventable problem on priority basis.

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