FREQUENCY OF NUTRITIONAL RICKETS IN CHILDREN WITH LOWER RESPIRATORY TRACT INFECTIONS UNDER FIVE YEARS OF AGE

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Background: Lower respiratory tract infections like pneumonia and bronchiolitis are the major cause of morbidity and mortality inchildren. Several studies have associated vitamin D deficiency nutritional rickets with an increased risk oflower respiratory tract infection and vitamin D supplementation has been proposed as possible preventive measure against lower respiratory tract infection in children. The objective of the study was to find out frequency of nutritional rickets in children with lower respiratory infection under five years of age.

Methods: This study was conducted at Pediatric Department Ayub Teaching Hospital Abbottabad, Duration of study was six months from January 2013 to June 2013 and study design was cross sectional study in which a total of 151 patients were observed. Data was collected using Proforma. Patients with pneumonia were diagnosed on clinical basis and supportive radiological finding. Rickets was diagnosed on the basis of clinical and laboratory finding.

Results: In this study mean age was 2 years with SD ± 2.16. Fifty eight percent children were male and 42% children were females. More over 65% children had low serum calcium level < 2.12 mmol, 58% children had low serum phosphorus level < 0.87 mmol and 60% children had serum alkaline phosphatase > 280 units per liter on the bases of which the frequency of nutritional rickets among 151 children was 60% in our study

Conclusion: Our study concludes that the incidence of nutritional rickets was found to be 60% in children with lower respiratory tract infections under five years of age

Key Words: nutritional rickets, children, lower respiratory tract infections.

INTRODUCTION

Rickets is a disease of growing bones which is secondary to the defect in mineralization at growth plate matrix. Vitamin D deficiency remains the most common cause of rickets globally.[1] Vitamin D is usually obtained from exposure to sunlight and from diet like fish liver oil and egg yolk.[1,2] Solar ultra violet B radiations penetrate the skin and initiate the process of vitamin D formation.[2] Vitamin D helps in absorption of calcium from intestine. In the presence of vitamin D intestinal calcium absorption can be as high as 80% of the intake. Rickets usually presents with features like delayed fontanels closure, craniotabes, frontal bossing, and enlargement of wrists, rachitic rosary, delayed teething, carious teeth, and legs deformity like bowing of legs, kyphosis and narrowed pelvis.[3]

Nutritional rickets caused by deficiency of vitamin D has been strongly associated with lower respiratory tract infections.[4] Deformities in the chest like Harrison grove occurs from pulling of the softened ribs by diaphragm during inspiration. Softening of the ribs impairs air movement and predisposes patient to atelectasis and pneumonia.[1] In addition, vitamin D deficiency which is the primary cause of nutritional rickets is also associated with an increased incidence of lower respiratory tract infections. Vitamin D has a role in innate immune system.[5]

Lower respiratory tract infections (like pneumonia and bronchiolitis) are the leading causes of morbidity and mortality in children under five years of age. Recent estimates suggest that pneumonia is responsible for 20% of the deaths in above age group leading to 3 million deaths per year. Hospital based studies reported that 20-30% of admissions in children under five years of age are due to pneumonia. Factors associated with increased mortality include young age of the child, associated chest in drawing, acute malnutrition, lack of breast feeding and rickets.[6] Frequency of nutritional rickets in children with severe pneumonia was observed in 74% of cases.[7] Sub clinical vitamin D deficiencies were associated with severe lower respiratory tract infection, and clinical vitamin D deficiency was associated with a 13-fold-increased risk of pneumonia.[8]

The aim of this study was to find out the frequency of rickets in patients presenting with pneumonia in our population. Pneumonia being one of the major killers among children is important to be studied in synergy with rickets as the combination is understandably fraught with more sinisterus outcomes. The results will add to the existing body of knowledge and would be useful for practitioners as well as planners and policy

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makers of health to devise meaningful interventions both at clinical and community levels specially on vitamin D deficiency and also the results of this study will guide us in suggesting future recommendations on vitamin D levels for children.

MATERIALS AND METHODS

This study was conducted at Pediatric Department Ayub Teaching hospital Abbottabad. Study design was cross sectional study and the duration of the study was six months from January 2013 to June 2013. In this study a total of 151 patients were observed by using the WHO software of sample size determination with the following assumption: Expected frequency of nutritional rickets among children with acute lower respiratory tract infections is 74%7. At 95% confidence level and 7% absolute precision. More over consecutive non-probability sampling technique was used for sample collection. All children of both genders, age of 1-5 years with lower respiratory tract infection were included while all children with lower respiratory tract infections who are developmentally delayed and cerebral palsy, all patients with muscular dystrophies were excluded. Permission from hospital ethical committee was taken before start of the study. All new cases with lower respiratory tract infections enrolled in study. Informed written consent was taken from parents. Children were assessed by researcher by detailed history followed by detailed clinical examination. All those children in whom clinical suspicion of nutritional rickets is found were subjected to laboratory investigations for serum calcium, phosphorus and alkaline phosphatase level to confirm the nutritional rickets. All the above mentioned information including name, age, gender and address was recorded in a pre designedproforma. Strictly exclusion criteria had followed to control confounders and bias in the study results.Data was analyzed using SPSS version 10. Quantitative variable like agewasdescribed in terms of means and standard deviation. Categorical data like gender and nutritional rickets was described in the terms of frequency and percentages. Nutritional rickets was stratified among age and gender to see the effect modifications. Post stratification chi square test was applied in which P value ≤0.05 was considered as significant value.

RESULTS

In This study mean age was 2 years with SD ± 2.16. Fifty eight percent children were male while 42% children were females. Fifty three (35%) children had normal serum calcium > 2.12 mmol while 98(65%) children had low serum calcium level < 2.12 mmol. Sixty three (42%) children had normal serum Phosphorus > 0.87 mmol while 88(58%) children had low serum phosphorus level <0.87mmol, Sixty (40%) children had normal serum alkaline phosphatase < 280 units per liter while 91(60%) children had serum alkaline phosphatase > 280 units per liter. (table no 3)Frequency of nutritional rickets among 151 children was analyzed as 91(60%) children had rickets while 60(40%) children didn't had rickets.(table no 4). Stratification of nutritional rickets with age and gender is give in table no 5,6

DISCUSSON

Far from being eradicated nutritional rickets continue to occur throughout the world with reports from at least sixty countries in the past twenty years. Subtle symptoms that should raise clinical suspicious of rickets in children include bone pain in the legs, delayed age of standing or walking, frequent, falling and delayed growth[9]. Nutritional rickets is a disease whose etiology is related to a lack of Vitamin D, Calcium and Sun light exposure. Globally it is one of the most common non communicable disease afflicting children particularly in certain populations in developing countries. Left untreated rickets can have chronic, sequelae including developmental delay, skeletal abnormalities and painful pathologic facture[10].

Our study shows that 62% children were in age ranged 1-3 years and 38% children were in age range 4-5 years. Mean age was 2 years with SD ± 2.16. Fifty eight percent children were male and 42% children were females. More over 65% children had low serum calcium level < 2.12 mmol, 58% children had low serum phosphorus level <0.87 mmol and 60% children had serum alkaline phosphatase > 280 units per liter on the bases of which the frequency of nutritional rickets among 151 children was 60% in our study. Similar findings were observed in other studies as:

Malnutrition is the underlying cause of approximately half of the fatal acute lower respiratory tract infection. Four key nutritional risk factor for acute lower respiratory infection have been identified. These are macronutrient under nutrition, low birth weight, zinc deficiency and sub optimal breast feeding[11]. In another study 24 (40%) children were underweight as indicated by Gomez arrangement of lack of healthy sustenance. In one study 14 (23.33%) children were under six month

Table No 1: Age Distribution (n=151)

Age	Frequency	Percentage
1-3 years	94	62%
4-5 years	57	38%
Total	151	100%

Mean age was 2 years with SD ± 2.16

Table No 2: Gender Distribution (n=151)

Gender	Frequency	Percentage
Male	88	58%
Female	63	42%
Total	151	100%

Table no 3: Observation (n=151)

Observation		Frequency	Percentage
Serum Calcium	Normal	53	35%
	< 2.12 mmol	98	65%
Total		151	100%
Serum Phosphorus	Normal	63	42%
	< 0.87 mmol	88	58%
Total		151	100%
Serum Alkaline Phosphatase	280 Units per liter	60	40%
	>280 Units per liter	91	60%
Total		151	100%

Table No 4: Frequency of Nutritional Rickets (n=151)

Nutritional rickets	Frequency	Percentage
Yes	91	60%
No	60	40%
Total	151	100%

Table No 5: Stratification of Nutritional Rickets with Age Distribution (n=151)

Nutritional Rickets	1-3 Years	4-5 Year	Total
Yes	56	35	91
No	38	22	60
Total	94	57	151

Table No 6: Stratification of Nutritional Rickets with Gender (n=151)

Nutritional Rickets	Male	Female	Total
Yes	53	38	91
No	35	25	60
Total	88	63	151

Chi square test was applied in which P value was 0.9910

of age while 38 (68.33%) children were beneath thirteen months. Poor maternal vitamin D the status amid pregnancy not with standing different elements might be essential danger component in these babies[12]. Thick dark viels and bad housing contribute to this marginal state of Vitamin D nutrition[13].

The clinical indicator of rickets were recurrent chest infection, floppiness, delayed motor mile stones, diarrhea and abdominal distention were found in 20 to 60% of cases[14]. whilejan et al as found clinical findings in up to 90% of children and radiological findings in 80%[15]. In a study in Peshawar by Khattak et al 64% were male and 36% were female, with male female ratio of 1.77:1[16]. Same results were obtained from study done at Abbottabad by siddiquiet al[13].

In this study rickets was more common in bosom encouragedbabies that is 85.3%. In study from United States 96% of children's who have rickets were bosom encouraged[17]. While in Canadian study 94% rachitic children were bosom fed[18]. There fore national academy of sciences recommends supplement of 200 IU per day for the following ! All breast fed infants unless they are weaned to atleast five hundred ML per day of Vitamin D fortified formula ormilk and all non-breast fed infants who are ingesting less then five hundred ML per day of Vitamin D fortified formula or milk[19].

CONCLUSION

Our study concludes that the incidence of nutritional rickets was found to be 60% in children with lower respiratory tract infections under five years of age. Non-infectious rickets remains an important preventable illness, which predisposes to infectious diseases like bacterial pneumonias, recurrent diarrheas and bone deformities in cases of late presentation. Nutritional rickets in sunny clime of Hazara Division presenting with multiple clinical presentation is predisposing factor for different childhood illnesses.

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