Original Article

Frequency of Nutritional Rickets Under Two Year Aged Children Admitted with Severe Pneumonia in The Department of Pediatrics, BBH, Rawalpindi

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Objective: To determine the frequency of nutritional rickets in children hospitalized with severe pneumonia.

Methods: It was a cross-sectional study conducted at Department of Pediatrics, Benazir Bhutto Hospital, Rawalpindi Pakistan from 1st May 2012 to 31st October 2012. A total of 75 patients of severe pneumonia between 6 to 24months were selected according to inclusion criteria. Data was collected including admission number, age, sex, weight, consistent signs of rickets, history of breast feeding and duration of sun exposure in 24 hours. A single blood sample 5ml was collected at the same time for biochemical changes of rickets and sent to the hospital lab for analysis of serum calcium, phosphate and alkaline phosphates levels. Reports were verified by the hospital pathologist. All the data was subjected to proforma and analysed by SPSS-15.

Results: Out of 75 patients of severe pneumonia, 48(64%) were male, and 27(36%) were female. The mean age was 11.9±4.9 months and mean weight was 8.0±1.4kg. The frequency of breast feeding was 53(70.7%). The duration of sun exposure was inadequate in mostly patients 51(68%).Rickets was found in 57(76%) of patients of severe pneumonia.

Conclusions: Rickets was found in 57(76%) of patients of severe pneumonia. It is concluded that nutritional rickets is very common in children under two year of age, hospitalized with severe pneumonia.

Keywords: pneumonia, nutritional rickets, Vitamin-D.

Introduction

Childhood pneumonia is a leading cause of death, accounting for 15% of deaths worldwide in children under 5years of age.[1] In Pakistan pneumonia contributes 19% of total deaths in under 5years children.[2] According to IMNCI severe pneumonia is defined as any child with cough/fast breathing with the lower chest in drawings.[1] Bacterial pneumonia presents with high fever, chills and rapid breathing[3] while onset in viral pneumonia is slow however it worsens over time[3]. The most common typical pathogen include Streptococcus pneumonia, Haemophilus influenza and Staphylococcus aureus.[4] Clinical symptoms are crucial to diagnosis in inadequate resources settings; however, chest x-ray and laboratory investigations are confirmatory for pneumonia.[3] Diagnostic advances include the use of new radiological methods, better specimen collection, and improved microbiological tests.[5] Nutritional rickets is a public health concern in developing countries.[6] Rickets is the commonest presentation of vitamin-D deficiency.[7] Rickets is a metabolic disease of growing bones in children due to deficiency or impaired metabolism of vitamin D or calcium and may lead to fractures or deformity.[8] The prevalence of nutritional rickets in under five-years children is 15-18% in South East Asia.[9] The frequency of nutritional rickets is 2.25%in Pakistan.[10] Evaluation of nutritional rickets includes detail history, physical, laboratory, and radiological evidence.[11] The majority of cases respond to one to two doses of injectable vitamin-D (600,000 IU)i.e.stoss therapy.[10] A minimum of 400iu of vitamin-D is recommended daily to prevent vitamin D deficiency and rickets.[12]

In addition to skeletal homeostasis, vitamin-D has a physiological role.[13] In addition to Skeletal deformities, chest infection is also a complication of vitamin-D deficiency which needs focus. The rationale of this study is to highlight the importance of vitamin-D in preventing pneumonia through simple measures.

Methods

This was a cross-sectional study, conducted at Department of Pediatrics, Benazir Bhutto Hospital Rawalpindi for six months from 1st May 2012 to 31 October 2012.After approval from the ethical committee of hospital and consent from a guardian, a total of 75 children of ages between 6 to 24 months

admitted with severe pneumonia were included. Children having a history of liver or renal disease, taking isoniazid, rifampicin phenytoin, phenobarbitone, during the previous three months or on vitamin-D supplements were excluded from the study. Data was collected including admission number, age, sex, weight. Severe pneumonia was diagnosed by IMNCI classification chart for sick child age 2months to 5 years by catergeroizing any danger sign (Ask: Is he able to drink or breast feeding? Does the child vomit everything? Has the child had convulsions (fits)? Ask if more than 1 convulsion or if prolonged more than 15 minutes if yes to other. See if the child is lethargic or unconscious. Is the child convulsion now?). Any general danger sign or stridor in calm child was diagnosed as severe pneumonia. Further patients were evaluated for rickets by taking a history of breast feeding and duration of sun exposure in 24 hours along with clinical features for rickets. A single blood sample 5ml were collected at the same time for biochemical changes sent to the hospital lab. Serum calcium, phosphate and alkaline phosphatase levels were done and verified by hospital pathologists. All the findings were subjected to proforma and analysed on SPSS 15.

Results

Out of 75 children hospitalized with severe pneumonia 48(64%) were male, and 27(36%) were female. Gender distribution is represented by a bar graph in Figure 1. Mean age and weight were 11.93 months with SD of 4.979 and 8.029 kg with SD of 1.4397 respectively shown in (**Table-1).**

Table-1: Distribution of age (months) and weight (kg) in the study population.

	Age	Weight
Mean	11.93	8.029
Std. Deviation	4.979	1.4397
n:	75	75

Table-2: Frequency of breastfeeding and adequate sun exposure in the study population.

Characteristic	Options	Frequency	Percentage
Beastfeeding	Yes	53	70.7
	No	22	29.3
	Total	75	100.0
Sun Exposure	Less than 3.4 hours	51	68.0
	More than 3.4 hours	24	32.0
	Total	75	100

About two-thirds of children 53(70.7%) received breast feeding and duration of sun exposure was inadequate in most patients 51(68%) and was adequate in only 24 (32%) patients. Findings are depicted in **(Table-2)**. Rickets had a high burden and diagnosed in 57(76%) patients of severe pneumonia and absent in only18 (24%) of patients, depicted in (**Fig-2).**

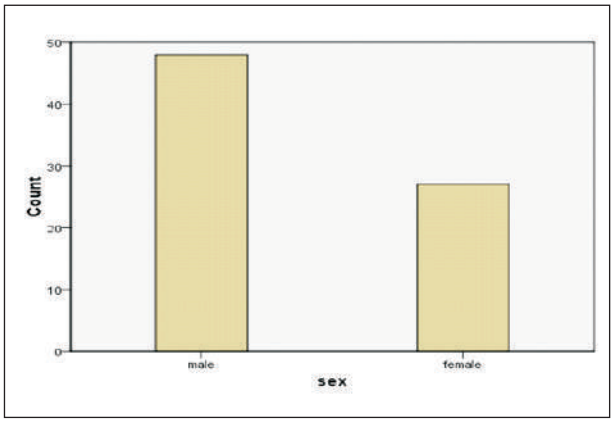

Fig-1: Gender distribution in the study population.

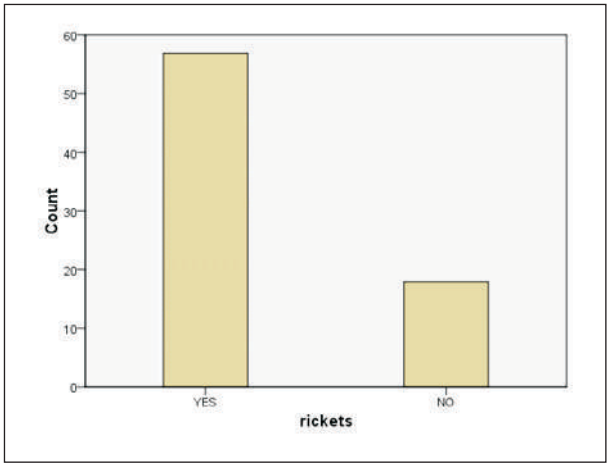

Fig-2: Frequency of nutritional rickets in the study population.

Discussion

Nutritional Rickets is among the five most common diseases of children. Rickets is not only a predictor of bone health, but it also causes other problems.[14] Over the last few years, several studies have been conducted to find out the prevalence and relationship of nutritional rickets with respiratory infections. In a study done in Karachi out of 137 patients, with severe pneumonia, 83 were male and 54 females. The frequency of nutritional rickets in children with severe pneumonia was observed in 101(74%) cases which is similar to our study. Rickets was more common in 2 to 12 months of age, i.e., 79.8% (67/84) and in those children who were breastfed (85.3% vs 40%). The

frequency was higher in those children who were not exposed to sunlight.[15] In a study, 283 infants diagnosed with nutritional rickets due to Vitamin D deficiency (67% males) that were between 6 and 14 months of age. Among the total, 70% were exclusively breastfed, and 23% were breast-fed until the age of 1 year. The most frequent clinical presentation was hypo-calcemic convulsions (34%) followed by chest infections (33%) and gastroenteritis (25%).[16] In Denmark, from 1995 to2005, the average incidence of nutritional rickets in children aged0-14.9and 0-2.9 was 2.9 and 5.8 per 100,000 per year respectively.[17] An Australian study 398 children identified with vitamin D deficiency (55% male; median age, 6.3 years). The overall incidence in children ≤15 years of age in Australia was 4.9/100 000/year. Duration of exclusive breastfeeding was inversely related to serum vitamin D levels in children less than three years of age.[18]The study was done in Qatar, and a very sun-rich area revealed that 23.9% of the studied children had nutritional rickets. The mean SD age of those with rickets (3.76 years 1.51) was slightly higher than those without rickets 3.57 years. The children with rickets spent a significantly shorter average duration (26.86 minutes 19.94) under the sun than those without rickets (30.59 minutes 15.72).[19]

In a study done in Turkey, among the causes of admission of rachitic children to the hospital, fever (66%) and coughing (62.2%) were the most frequent. Pneumonia was accompanied by rickets in 47.1% of the cases.[20] During one year in a study conducted in Turkey, 305 hospitalized children (ages between 0 to 3 years) were evaluated for clinical and biochemical markers of vitamin D deficient rickets and related factors. 21 (6.8%) were diagnosed as nutritional vitamin D deficiency and rickets. Most of the children diagnosed were under one year old (16/21, 76.2%). 14 vitamin D deficient rachitic children were admitted with infectious conditions, and most of them were respiratory tract infection.[21] In a prospective cohort study in 272 hospitalized patients with pneumonia. Hundred forty-three patients One vitamin D deficient ((53%) were<50 nmol/L), 79 patients (29%) were vitamin D insufficient (5075 nmol/L), and 50 patients (18%) were vitamin D sufficient (>75 nmol/L). Vitamin D deficiency was associated with an increased risk of ICU admission and 30-day mortality. Vitamin D status was an independent predictor of 30-day[22].

In Jordan, nutritional rickets seems to be a common problem among infants. Forty-seven infants (10.6%) out of the 443 included in the study were found to have nutritional rickets. 40 (85.1%) of the rachitic infants were admitted due to lower respiratory tract diseases compared with 30% of the control group. Rachitic infants were breastfed in 82.9%.[23] The most recent vitamin D intake guidelines by the American Academy of Pediatrics recommends that all infants, including those who are exclusively breastfed, have a minimum intake of 400IU vitamin D per day beginning as early as the first two months of life.[24] Our study focuses on the relationship between vitamin D deficiency and severe pneumonia. It highlights increasing burden of nutritional rickets in children hospitalized with pneumonia, and it should be prevented to reduce morbidity and mortality associated with pneumonia.

Conclusion

Rickets was found in 57(76%) of patients of severe pneumonia. It is concluded that nutritional rickets is very common in children under two year age hospitalized with severe pneumonia.

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