



ORIGINAL ARTICLE

Rickets among children ≤ 5 years of age presenting with poor growth visiting a tertiary healthcare facility.

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ABSTRACT... Objective: To determine the frequency of rickets among children ≤ 5 years of age presenting with poor growth visiting a tertiary care facility. **Study Design:** Cross-sectional study. **Setting:** Pediatric Unit-2, Bahawal Victoria Hospital, Bahawalpur. **Period:** July 2021 to January 2022. **Material & Methods:** A total of 261 patients with poor growth and ≤ 5 years of either gender were included. A written consent was taken from the parents/guardian of all study participants after explaining them the nature of this study. All demographic data along with outcome variable (frequency of rickets) was noted on a predesigned proforma. **Results:** Mean age was 3.34 ± 1.41 years. Majority of the patients 136 (52.11%) were between 4 to 5 years of age. Out of the 261 patients, 153 (58.62%) were male and 108 (41.38%) were females with male to female ratio of 1.4:1. Mean sunlight exposure time was 25.67 ± 11.72 minutes/day. Mean age of start of weaning was 8.13 ± 4.33 months. Frequency of rickets among children ≤ 5 years of age presenting with poor growth was found in 18 (6.9%) patients. **Conclusion:** The frequency of rickets among children ≤ 5 years of age presenting with poor growth was high (6.9%).

Key words: Poor Growth, Rickets, Sunlight Exposure.

INTRODUCTION

Rickets is known to occur because of unmineralized matrix at growth plates. Rickets develop in children prior to fusion of the epiphysis.¹ In Pakistan, literature highlighted the prevalence of rickets as 2.25% among children.² Regional data showed that around 82% of the pediatric population has vitamin D deficiency.³ Vitamin D deficiency is one of the major causes of rickets.^{4,5} In the developed countries due to improved nutritional status of children, rickets are not very common. Data among children under 16 years of age from UK between 2015 to 2017 revealed that yearly incidence of rickets was 0.48 per 100000 children.⁶ Children with relatively low daily exposure to sunlight or decreased dietary intake of vitamin D are at increased risk for rickets. Children born as premature or having dark skin color also have increased chances of rickets.⁷

while subclinical presentation of rickets are also common.⁸ Most common presentations of rickets are bowed legs, rachitic rosary, frontal bossing of the skull, widened wrist and ankle joints, poor growth, delayed motor development, recurrent lower respiratory infection, chronic diarrhea and fits. In rickets, radiological studies might exhibit metaphyseal flaring, irregular and widened physis.^{9,10}

In Pakistan, not much work is seen about the frequency of rickets in children visiting a tertiary healthcare facility. The findings of this study were thought to provide us useful information about the magnitude of rickets in our population of South Punjab, Pakistan. The present study was planned to find out the frequency of rickets among children ≤ 5 years of age presenting with poor growth visiting a tertiary care facility.

Rickets may present with signs and symptoms

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MATERIAL & METHODS

This cross-sectional study was done at Pediatric Unit-2, Bahawal Victoria Hospital, Bahawalpur from July 2021 to January 2022. The calculated sample size was 261 children with a 1.8% margin of error, taking expected frequency of rickets as 2.25%² at confidence level of 95%. Using non-probability, consecutive sampling, a total of 261 children of either gender up to 5 years of age presenting at outpatient or inpatient department of pediatrics were included. Vitrally unstable children were not included. Approval for this study was acquired from The Institutional Review Board (1207/DME/QAMC). A written consent was sought from parents/guardians of all study participants explaining them the aims of this study. All the study information including information of outcome variable i.e. rickets (yes/no) was collected and recorded on predefined Performa. Rickets with poor growth was labeled as the radiological feature (cupping, fraying and flaring) and low Vitamin D level (<20ng/ml). Bowed leg was labeled as outward curvature of the legs, causing a separation of the knees when the ankles are close or in contact. Rachitic rosary was the prominent knobs of bone at the costochondral joints of rickets patients.

Statistical analysis was performed using SPSS version 16.0. Results were presented as mean and standard deviation for quantitative variables like age, age of weaning, sunlight exposure time and Vitamin D levels. Frequency and percentage were calculated for qualitative variables like gender, feeding, family h/o rickets, prematurity, frontal bossing, rachitary rosary, bowing of the legs and presence of rickets (yes/no). Effects modifiers like age, gender, weight, Sun light exposure, age of start of weaning and family h/o rickets were controlled through stratifications. The Post stratification chi-square was applied to see the effect of these on outcome variable. P value < 0.05 was considered as significant.

RESULTS

In a total of 261 children, mean age was 3.34±1.41 years. Majority of the children, 136 (52.1%) were between 4 to 5 years of age. There were 153 (58.6%) male children and 108 (41.4%)

female with male to female ratio of 1.4:1. Mean body weight of the children was 13.68±5.49 kg. Mean sunlight exposure time was 25.67±11.72 minutes/day. Mean age of start of weaning was 8.13 ± 4.33 months. Distribution of patients with respect to characteristics of the children is shown in Table-I.

Characteristics		No. of Patients %age
Age in years	≤3	125 (47.9%)
	4-5	136 (52.1%)
Gender	Male	153 (58.6%)
	Female	108 (41.4%)
Body Weight	≤12	103 (39.5%)
	>12	158 (60.5%)
Sunlight Exposure in minutes per day	≤30	147 (56.3%)
	>30	114 (43.7%)
Start of Weaning in months	≤12	189 (72.4%)
	>12	72 (27.6%)
Family h/o rickets		74 (28.4%)
History of Premature Birth		96 (36.8%)
Frequency of Clinical Findings	Loss of Appetite	82 (31.4%)
	Frontal bossing	117 (44.8%)
	Rachitary Rosary	137 (52.5%)
	Bowing of the Legs	157 (60.2%)

Table-I. Characteristics of the children (n=261).

Rickets was diagnosed in 18 (6.90%) patients. When Stratification of rickets was done with respect to study variables, age, gender, body weight, sunlight exposure and family history of rickets were not found to have any statistically significant association ($p>0.05$). Star of weaning was noted to have a significant association with the frequency of rickets ($p<0.001$). Table-II is showing stratification of rickets with respect to study variables.

DISCUSSION

Vitamin Disvital for the proper skeletal development while vitamin D deficiency is established to raise chances of rickets, improper growth, motor delay and hypocalcemic seizures.^{11,12} As prevalence of vitamin D deficiency is high among all age groups especially in the developing countries, rickets has emerged as an important health issue.¹³

Study Variables		Rickets		P-Value
		Present	Absent	
Age in years	1-3	07 (5.60%)	118 (94.40%)	0.428
	4-5	11 (8.09%)	125 (91.91%)	
Gender	Male	13 (8.50%)	140 (91.50%)	0.225
	Female	05 (4.63%)	103 (95.37%)	
Body Weight in kg	≤12	11 (10.68%)	92 (89.32%)	0.051
	>12	07 (4.43%)	151 (95.57%)	
Sun light exposure in minutes per day	≤30	13 (8.84%)	134 (91.16%)	0.159
	>30	05 (4.39%)	109 (95.61%)	
Start of Weaning	≤12 months	06 (3.17%)	183 (96.83%)	<0.001
	>12 months	12 (16.67%)	60 (83.33%)	
Family History of Rickets		06 (8.11%)	68 (91.89%)	0.627

Table-II. Stratification of rickets with respect to study variables (n=261)

In this study, frequency of rickets among children ≤ 5 years of age presenting with poor growth was noted in 18 (6.90%) cases. Local data from Peshawar observed 2.25% children to have rickets.² Data from the neighboring country highlighted development of rickets due to low dietary calcium intake along with borderline vitamin D nutrition levels.¹⁴ A study from Australia revealed incidence of rickets as 4.9 per 100,000 children aged below 15 years which is quite low when compared to the present findings.¹⁵ That study from Australia also revealed that duration of exclusive breastfeeding was inversely linked with serum vitamin D levels among children aged below 3 years.¹⁵

Data from New Zealand found incidence of rickets as 2.2 per 100000 children aged below 15 years which is also showing much lesser proportion of rickets among pediatric population when compared to the present findings.¹⁶ Literature from Western populations have showed that rickets were quite common up till mid-20th century and was also called “The English Disease” but worthy work done by the likes of “Harriette Chick” and “Elsie Dalyell” revealed that high prevalence of rickets in the western population was because of vitamin D deficiency. A study from Vienna during World War-I, outdoor sunlight exposure in summer, exposure to mercury vapor lamp, cod liver oil were noted to cure rickets.¹⁷ No public registry is present to show the exact burden of rickets in Pakistan but whatever data is present, it has highlighted that rickets is a concerning public health issue especially among children below 5

years of age with poor growth as was exhibited in this study.

The present study had some limitations as well. As this was single center study, our findings cannot be generalized. Relatively low sample size and small number of children with rickets, factors associated with the frequency of rickets might not have reflected truly in the present data. As this was a cross-sectional study, we were unable to follow up these children for treatment outcomes.

CONCLUSION

The frequency of rickets among children ≤ 5 years of age presenting with poor growth was high (6.9%). So, we recommend that in every children presenting with poor growth, rickets should be taken into consideration and its early recognition and management should be done in order to reduce the morbidities among these children.





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AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Muhammad Akram	Concept and designing, Responsible for Data.	
2	Abid Ali Anjum	Drafting.	
3	Muhammad Usman	Data analysis.	
4	Imran Qaisar	Literature review, Critical analysis.	
5	Ameer Ahmed Malik	Proof reading, Final approval.	