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Frequency of common factors leading to nutritional rickets among children under 2 years of age

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Abstract---Introduction: Ricket is a disorder of developing bones. It is secondary to the mineralization defect at growth plate matrix. In industrialization countries, the elimination of nutritional rickets or vitamin D deficiency has been done by prophylactic means. In under developed countries of Asia, it remains major health problem. There are a lot of factors which take part in synthesis of vitamin D. These factors include sun exposure, pigmentation of skin and pollution etc. Objective: To determine the frequency of common factors leading to nutritional rickets among the children under 2 years of age. Results: Total 147 children under age of 2 years suffering with rickets were included in the study. 1.5:1 was male to female ratio. 13.74 months + 6.4SD was the average age of the patients with range 3-24 months. 120(81.6%) sufferers have been observed with the lack of vitamin D supplementation followed by low maternal education 111 (75.5%).

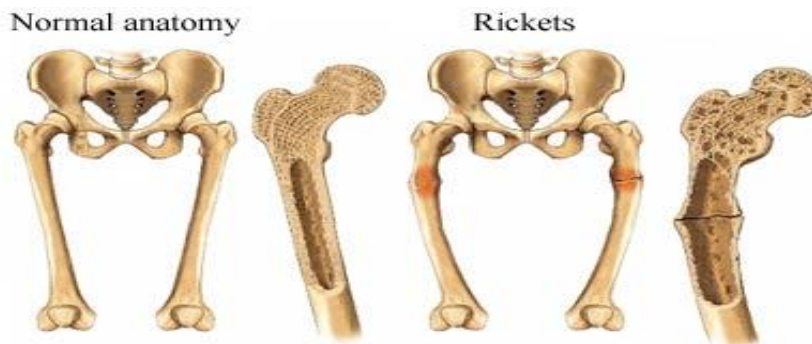
Conclusion: Vitamin D supplementation deficiency is main factor for children suffering from nutritional rickets. It is considered in the management of such patients.

Keywords---malnutrition, nutritional rickets, vitamin D supplements.

Introduction

Ricket is disorder of growing and developing bones. It is secondary to the mineralization fault at growth plate matrix. The deficiency of vitamin D is the utmost frequent cause of rickets all over the world ¹. Craniotables, delayed fontanels closure, frontal bossing, enlargement of wrists, delayed teething, legs deformity, rachitic rosary are the aspects associated with rickets². There are many other factors which are related with deficiency of vitamin D. These factors include atmospheric pollution, decreased sun exposure, increased skin pigmentation. Number of children and have ownership are some socioeconomic causes associated with serum vitamin D levels^{3,4}. Children suffering from vitamin D deficiency in urban minority areas appear to be the most susceptible to attack ^{5,6}. Different reports of rickets from industrialized and developing countries have been published during the last decades^{7,8}. Vitamin D and calcium intake are not sufficient in infants who are on vegan diet⁹.

Internationally, frequency of rickets has been rising. Children are offered to wear sunscreen when they go outside and suggested to spend more time indoors. They are suggested to play electronic games or watching TV inspite of playing outdoors ¹⁰. In infants and young children nutritional rickets is predominantly determined ¹¹. Intestinal calcium and phosphate absorption are stimulated by vitamin D in its active form of 1,25-dihydroxyvitamin D. Dietary Ca absorption is lowered to 10-15% and phosphate to 50-60% in the state of vitamin D deficiency ^{12,13}. Oral Vitamin D supplementation is the treatment of vitamin D deficiency. Treatment for Ca deficiency rickets is done with oral Ca supplementation ¹⁴. Breast milk is not sufficient source of vitamin D. 95% sufferers having age of 4 years or less were breastfed within 6 months before diagnosed and received no vitamin D supplement. It was accepted that kids who were breastfed by vitamin D deficient mothers are at greater chance developing rickets ¹⁵. The difference between osteomalacia and rickets is that osteomalacia occurs in person of any age while rickets is found only in children ¹⁶.



Objective

To determine common factors frequency which leads to nutritional rickets among kids below 2 years of age.

Material and Methods

Researchers assessed children by complete history and clinical examination. The children who were suspected to nutritional rickets were brought to laboratory examination for serum phosphorus, calcium and alkaline phosphatase level to validate nutritional rickets. An expert pediatrician fellow of CPSP supervised all such observation. The researchers interviewed the parents in the presence of consultant pediatrician to find general causes like low maternal education, inadequate weaning practices, poor exposure to sunlight, vitamin D supplements deficiency, feeding on animal milk. Clinical examination was performed to detect malnutrition status of the child. Name, age, gender and address were recorded in a pre designed proforma. SPSS version was used to analyze data. Means and standard were helpful to describe quantitative variables. Frequency and percentage aided to describe categorical data. Stratification among age and gender was done to see effect modifications. Tables and diagram were used to present all results.

Results

147 children having age under 2 years suffering from nutritional rickets were considered in study. Male children were 89(60.54%) and female children were 58(39.46%).1.5:1 was male to female ratio (Figure 1). 13.74months + 6.4SD was average age of the patients .68(46.35%) children have the age less than 10 months.8(5.4%) children were in the age of 11-15 months.48(32.7%) kids were in the age of 16-20 months.23(15.6%)kids have the age more than 20 months (Table 1). Lack of vitamin D supplementation was observed in 120 (81.6%) children having low maternal education 111(75.55).52 (35.4%) kids were exposed to poor sunlight. 73(49.7%) kids have inadequate weaning practices, 71(48.3%) children were on animal milk feeding and 69(46.95%) children have been under malnutrition status. Common factors were same for all ages. Age and gender have also role over it shows in tables and graphs (Table 2). Age wise distribution of common factors represents that general or common factors have been remained in same proportion in all ages.(Table 3). Gender wise factors also represent that gender also plays no specific role over them (Table 4).

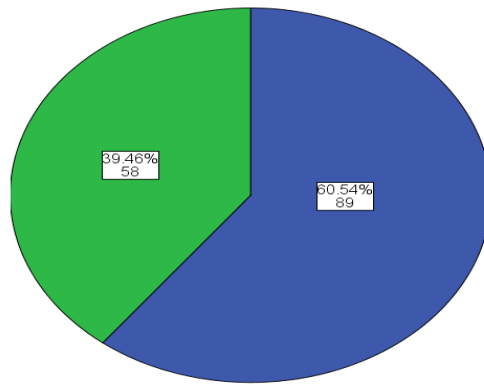


Figure 1: distribution of child gender wise

	Frequency	Percent	Cumulative Percent
<= 10.00	68	46.3	46.3
11.00 - 15.00	8	5.4	51.7
16.00 - 20.00	48	32.7	84.4
21.00+	23	15.6	100.0
Total	147	100.0	

Table 1: Distribution of child age wise

	Count	Table N %
Very limited Sunlight exposure	52	35.4%
Yes	52	35.4%
No	95	64.6%
Less Maternal Education	111	75.5%
Yes	111	75.5%
No	36	24.5%
Not sufficient Weaning Practices	73	49.7%
Yes	73	49.7%
No	74	50.3%
Vitamin D deficient Supplementation	120	81.6%
Yes	120	81.6%
No	27	18.4%
Animals Milk feeding	71	48.3%
Yes	71	48.3%
No	76	51.7%
children under 5 years of age	90	61.2%
Yes	90	61.2%
No	57	38.8%
Child Malnutrition Status	69	46.9%
Child	69	46.9%
No	78	53.1%

Table 2: Factors which lead to nutritional rickets

		Age (in months)				p-value
		<= 10.00		11.00+		
		Count	Row N %	Count	Row N %	
Limited Exposure to Sunlight	Yes	26	50.0%	26	50.0%	0.501
	No	42	44.2%	53	55.8%	
Less Maternal Education	Yes	50	45.0%	61	55.0%	0.604
	No	18	50.0%	18	50.0%	
Not sufficient Weaning Practices	Yes	32	43.8%	41	56.2%	0.558
	No	36	48.6%	38	51.4%	
Vitamin D deficient Supplementation	Yes	55	45.8%	65	54.2%	0.827
	No	13	48.1%	14	51.9%	
Animals Milk feeding	Yes	33	46.5%	38	53.5%	0.959
	No	35	46.1%	41	53.9%	
Different 2 children under 5 years of age	Yes	40	44.4%	50	55.6%	0.579
	No	28	49.1%	29	50.9%	
Child Malnutrition Status	Yes	30	43.5%	39	56.5%	0.525
	No	38	48.7%	40	51.3%	

Table 3: distribution of common factors agewise

		Gender				p-value
		Male		Female		
		Count	Row N %	Count	Row N %	
Very limited Exposure to Sunlight	Yes	31	59.6%	21	40.4%	0.865
	No	58	61.1%	37	38.9%	
Limited Maternal Education	Yes	68	61.3%	43	38.7%	0.755
	No	21	58.3%	15	41.7%	
Not enough Weaning Practices	Yes	46	63.0%	27	37.0%	0.543
	No	43	58.1%	31	41.9%	
Vitamin D lack supplementation	Yes	75	62.5%	45	37.5%	0.306
	No	14	51.9%	13	48.1%	
Animals Milk feeding	Yes	39	54.9%	32	45.1%	0.178
	No	50	65.8%	26	34.2%	
children under 5 years of age	Yes	51	56.7%	39	43.3%	0.227
	No	38	66.7%	19	33.3%	
Child Malnutrition Status	Yes	42	60.9%	27	39.1%	0.939
	No	47	60.3%	31	39.7%	

Table 4: Distribution of common factors genderwise

Discussion

Nutritional rickets remains an endemic issue all over the world. It is much restricted to breastfed in the USA on the other hand in Europe, it has been detected in the children who migrated from India, Bangladesh, Pakistan, North Africa and Middle East. Increased skin pigmentation, sun exposure limitation and prolonged breast feeding are some common features. Vitamin D deficiency is obvious and prominent during pregnancy in the groups which are at risk. There are a lot of factors which are responsible for vitamin D deficiency and rickets for example atmospheric pollution, increased skin pigmentation, low dietary Ca ,high phytate diet etc.

According to labenese, children and adolescent of higher socioeconomics status eat calcium and vitamin D fortified foods to save them from upgrowth of

nutritional rickets. Another factor is malnutrition which causes nutritional rickets. Vitamin D deficiency was fulfilled by adding vitamin D supplements of infants and dairy products.

Conclusions

Nutrition ricket is very common among children all over the world. It is dependent on number of factors like lack of exposure to sunlight, calcium deficiency, prolonged breast feeding without supplementation and inadequate weaning practices. Health education is of great significance as it can influence all of the above factors.

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