

VITAMIN D LEVEL IN CHILDREN PRESENTING WITH RECURRENT LOWER RESPIRATORY TRACT INFECTION IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Introduction: Acute lower respiratory infection (ALRI), like pneumonia and bronchiolitis, is among the leading cause of death worldwide in children under 5 years of age and is the most common reason for hospital admission of children under 5 children. Risk factors of ALRI include low birth weight, top feeding, incomplete vaccination, air pollution, over-crowding, parental smoking, and chronic ailments. It is also hypothesized that the increased prevalence of ALRI during winter months is due to decrease in Ultraviolet B radiation exposure to skin resulting in decreased Vitamin D production. The rationale of this study is to see the magnitude of Vitamin D deficiency in children presenting with LRTI in emergency of a Tertiary care hospital.

Objective: The objective of my study was to:

- “determine the frequency of Vitamin-D deficiency among children presenting with lower respiratory tract infections in a tertiary care hospital”

Study Design: Cross sectional survey.

Duration of Study: Six months i.e; From: 01.06.2017 to 30.11.2017

Settings: Pediatric ward, General Hospital, Lahore.

Results: In this study, total 130 patients were taken, 46.15%(n=60) were between 02-12 months of age and 53.85%(n=70) were between 13-24 months of age, mean \pm sd was calculated as 12.57 \pm 6.22 months, 48.46%(n=63) were male while 51.54%(n=67) were females. Frequency of vitamin-D deficiency among children presenting with lower respiratory tract infections was recorded in 39.23%(n=51) while 60.77%(n=79) had normal levels.

Conclusion: We concluded that the patients having LRTI have a high frequency of Vitamin D deficiency. So, it is recommended to screen every child who is diagnosed with lower respiratory tract infection for vitamin D deficiency. It is also recommended that every setup should have their surveillance to know the exact magnitude of this problem.

Keywords: Lower respiratory tract infections, children, Vitamin-D deficiency, frequency

INTRODUCTION

Vitamin D also known as “THE SUN VITAMIN”³ is a prohormone, 95% of which is made in the skin under effect of ultraviolet rays and less than 10% is acquired from diet.^{1,2,11} like fish, salmon, cod liver oil, egg yolk, liver and organ meat.¹ Prematurity,⁹ exclusively breast fed infants beyond weaning age, infants on diluted top milk, babies born to Vitamin D deficient mothers, dark complexion, inadequate exposure to sunlight,^{6,9} use of sunscreen or extra clothing like veil in certain countries like Pakistan^{7,9} and strict vegetarian diet are the factors leading to Vitamin D deficiency.^{1,8,10} Even in 21st century, one billion people around the world are Vitamin D deficient^{4,11} including western countries^{5,11} but situation is worst in South Asian countries like Pakistan.³ This is a matter of great concern that despite

having adequate sunlight majority of our population is Vitamin D deficient.

Vitamin D deficiency is defined as a value of 25 [OH]-D less than 20 μ g/ml.^{7,11} Level of 1, 25[OH]-D is not taken as it does not reflect the true picture.¹¹

We generally consider role of Vitamin D for calcium homeostasis,¹ but recent studies show that Vitamin D receptors are present on many tissues including the lung epithelium and immunomodulatory cells.^{1,2,4,12} It plays an important role in preventing respiratory tract infections in children under 5 years of age.^{1,12-14} Vitamin D deficiency is associated with a high risk of respiratory tract infections¹⁶ including Pneumonia,^{5,17,18} and Bronchiolitis.^{5,17,18,20}

Approximately 1.5 million children of the world die of lower respiratory tract infections every year.¹⁸ In a study conducted at Lahore, 120 children from 2

months to 3.5 yrs were taken to see the frequency of nutritional rickets. Rickets was present in 67.5% children and out of these 24.51% children presented with upper respiratory tract infections and 51.96% had lower respiratory tract infections.²¹ In another study conducted at Egypt to see the association of cord blood Vitamin D levels and risk of Lower RTI in early childhood, out of 206 newborns taken in the study 62 (30.1%) infants developed LRTI in first year of life in which 49(79%) had Bronchiolitis and 13(21%) had pneumonia. Vitamin D level were below normal in children who developed LRTI.²² In a study conducted at Karachi, out of 79 patients between one to ninety years of age presenting in outdoor, 92% patients were having low serum Vitamin D levels.²⁵

Vitamin D is a very important Vitamin in regulating growth and preventing infections,²³ its deficiency may be subclinical¹ and not enough studies show the magnitude of Vitamin D deficiency in children with Lower respiratory tract infections in Pakistan, I want to look for Vitamin D deficiency in children presenting with pneumonia and bronchiolitis in emergency of a Tertiary care hospital. So that, if deficiency comes out to be significantly high, then we can start giving regular Vitamin D supplementation in children of lower respiratory tract infection at the time of admission to decrease the risk of these infections in future, which is a practice in many parts of the world.^{1,24}

OBJECTIVE

The objective of my study was to:

- “determine the frequency of Vitamin-D deficiency among children presenting with lower respiratory tract infections in a tertiary care hospital”

MATERIAL AND METHODS

Study Design

- Cross sectional survey.

Duration of Study

- Six months i.e. From: 1.7.2017 to 31.12.2017

Settings

- Pediatric ward, General Hospital, Lahore.

Sampling Technique

- Non-probability: Purposive Sampling.

SAMPLE SIZE

- Sample size estimated from win-epi ver:11.15. To estimate a proportion Confidence Level=95%, Acceptable difference= 0.08, Expected percentage= 30.1% (LRTI with vitamin D deficiency) Required Sample size= 130

SAMPLE SELECTION

Inclusion Criteria

1. Age 02 months -24 months
2. Both genders
3. Children presenting in pediatric emergency with LRTI as defined in operational definition.

Exclusion Criteria:

1. Children presenting in pediatric emergency with congenital heart disease
2. Children with history of Allergies or Asthma
3. Children with immunodeficiency or a known disease causing LRTI e.g. Cystic fibrosis, α_1 -antitrypsin deficiency etc.
4. Aspiration pneumonia

DATA COLLECTION PROCEDURE

130 subjects those fulfilling the inclusion criteria were recruited for the study from pediatric emergency of Lahore General hospital. After informed consent from parents or guardian the children were clinically examined by researcher herself and blood sample was taken for Vitamin D level. All the information was taken in a structured proforma.

DATA ANALYSIS PROCEDURE

Data was entered and analyzed in SPSS version 20.0. Mean and standard deviation was calculated for numerical variable like age, duration of illness. Frequency and percentages were done for qualitative variables like gender, presence or absence Vitamin deficiency. Vitamin D deficiency is labelled for a value of 25-Oh Vit D less than 20 μ g/ml . Stratification was done for gender, and type of lower respiratory tract illness to address effect modifiers. Chi-square test was applied post-stratification with P-value \leq 0.05 taken as significant.

RESULTS

A total of 130 cases fulfilling the inclusion/exclusion criteria were enrolled to determine the frequency of Vitamin-D deficiency among children presenting with lower respiratory tract infections in a tertiary care hospital.

Age distribution of the patients was done which shows that 46.15%(n=60) were between 02-12 months of age and 53.85%(n=70) were between 13-24 months of age, mean \pm sd was calculated as 12.57 \pm 6.22 months. (Table No. 1)

Patients were distributed according to gender and it shows 48.46%(n=63) were male while 51.54%(n=67) were females. (Table No. 2)

Frequency of vitamin-D deficiency among children presenting with lower respiratory tract infections was recorded in 39.23%(n=51) while 60.77%(n=79) had no findings of the morbidity. (Table No. 3)

Stratification for age shows that out of 51 cases of vitamin D deficiency 26 were between 02-12 months of age while 25 were between 13-24 months, p value was calculated as 0.37 (Table No. 4)

Stratification for gender shows that out of 51 cases of vitamin D deficiency 25 were male while 26 were females, p value was calculated as 0.92 (Table No. 5)

Table 1: Age Distribution (n=130)

Age(in months)	No. of patients	%
02-12	60	46.15
13-24	70	53.85
Total	130	100
mean±sd	12.57±6.22	

Table 2: Gender Distribution (n=130)

Gender	No. of patients	%
Male	63	48.46
Female	67	51.54
Total	130	100

Table 3: Frequency of Vitamin-D Deficiency Among Children Presenting with Lower Respiratory Tract Infections (n=130)

Vitamin D Deficiency	No. of patients	%
Yes	51	39.23
No	79	60.77
Total	130	100

Table 4: Stratification For Frequency Of Vitamin-D Deficiency Among Children Presenting With Lower Respiratory Tract Infections With Regards To Age (n=51)

Age (in months)	Vitamin D Deficiency		P value
	Yes	No	
02-12	26	34	0.37
13-24	25	45	

Table 5: Stratification For Frequency of Vitamin-D Deficiency Among Children Presenting with Lower Respiratory Tract Infections With Regards To Gender (n=51)

Gender	Vitamin D Deficiency		P value
	Yes	No	
Male	25	38	0.92
Female	26	41	

DISCUSSION

Acute lower respiratory infection (ALRI), such as pneumonia and bronchiolitis, is the leading cause of mortality worldwide in children less than age 5 years and represents the most common reason for hospital admission of children within this age group. Risk factors for the development of ALRI include low birth weight, non-exclusive breastfeeding, incomplete immunization, indoor air pollution, crowding, parental smoking, and chronic disease. It is also hypothesized that the reduction of ultraviolet-B (UVB) radiation exposure during winter is associated with decreased vitamin D production that could account partly for the increased prevalence of ALRI during winter months. We planned this study to see the magnitude of Vitamin D deficiency in children presenting with pneumonia and bronchiolitis in emergency of a Tertiary care hospital.

In this study, 46.15%(n=60) were between 02-12 months of age and 53.85%(n=70) were between 13-24 months of age, mean±sd was calculated as 12.57±6.22 months, 48.46%(n=63) were male while 51.54%(n=67) were females. Frequency of vitamin-D deficiency among children presenting with lower respiratory tract infections was recorded in 39.23%(n=51) while 60.77%(n=79) had no findings of the morbidity.

The findings of our study are in agreement with a study conducted at Egypt to see the association of cord blood Vitamin D levels and risk of Lower RTI in early childhood, out of 206 newborns taken in the study 62 (30.1%) infants developed LRTI in first year of life of whom 49(79%) had Bronchiolitis and 13(21%) had pneumonia. Vitamin D level were below normal in children who developed LRTI.²²

Another study conducted at Lahore, 120 children from 2 months to 3.5 yrs were taken to see the frequency of nutritional rickets. Rickets was present in 67.5% children and out of these 24.51% children presented with upper respiratory tract infections and 51.96% had lower respiratory tract infections.²¹

In our study, equal occurrence was recorded for vitamin D deficient children in less than and more than one year of age. Early occurrence of rickets could depend on various factors. It is known that concentrations of metabolites related to bone health in breast milk and cow's milk are far from meeting the requirements in the infancy period.⁷⁶ The vitamin D level of the newborn reflects their mother's level. Insufficient vitamin D stores and/or low vitamin D intake of the mother during pregnancy lead to congenital rickets and neonatal tetany.²⁶ Infants born with low vitamin D stores and perpetuated with low additional vitamin D would develop rickets.²⁶ Andiran et al²⁷ found that 80% of healthy breast-fed newborns

had low serum 25(OH)D3 level, and 48% of their mothers had low 25(OH)D3 levels. Low maternal serum 25(OH)D3 levels are found to be associated with low socioeconomic class, being covered, and low educational level.

On the basis of our results, we are of the view that we can start giving regular Vitamin D supplementation in children of lower respiratory tract infection at the time of admission to decrease the risk of these infections in future, which is a practice in many parts of the world.

CONCLUSION

We concluded that the frequency of vitamin D deficiency is high among children presenting with lower respiratory tract infection. So, it is recommended that every children who is diagnosed with lower respiratory tract infections should be sort out for vitamin D deficiency. However, it is also required that every setup should have their surveillance in order to know the frequency of the problem.

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