



ORIGINAL ARTICLE

## Serum Vitamin D levels of children attending pediatric clinic at HMC IBP.

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**ABSTRACT... Objective:** To assess the serum vitamin D levels of children attending pediatric clinic at HMC –IBP. **Study Design:** Prospective Cross Sectional study. **Setting:** This study was carried out in institution based private clinic of padiatrics in Hayatabad Medical Complex Peshawar. **Period:** April 2018 to April 2022. **Material & Methods:** All patients who presented to pediatric clinic with nonspecific bone and muscle pains (especially night time leg pains), mild motor delays and repeated chest infections were included in the study. Patients having clinical signs of rickets were excluded from the study. 5ml venous sample was obtained from each patient after informed verbal consent from parents. Blood test was performed in the hospital laboratory on COBAS E601 instrument employing chemiluminescent Electro Immune assay (ECLIA). Results of vitamin D levels of these patients were recorded on excel sheet and statistically analyzed using SPSS version 25. The variables were put in tables and graph and statistical relationship was assessed for quantitative variables. **Results:** This study was conducted on 146 patients. Out of these 146 patients 78 (53.4%) were male and 68(46.6%) were females. The age range was from 1year to 15 years. The combined prevalence of deficiency and insufficiency was 52% and optimum levels were documented in 47.9% children. Severe deficiency according to definition <10ng/ml was documented in 10 children (6.8%). Vitamin D levels were reported slightly lower in girls 25.88% as compared to boys 25% but severe deficiency was significantly lower in girls 4.7% as compared to boys 2.3%. p value <.05 Older children (7-15 years) showed higher levels of vitamin D deficiency 53.4% as compared to infants (1-2 years) of 4.8%. Vitamin D deficiency was reported more in winter months (October-March) 51% than in summer (April –September)47%. **Conclusion:** The study concluded that more than half of the patients who visited pediatric clinic with nonspecific bone and muscle pains were vitamin D deficient.

**Key words:** Vitamin D, Children, Deficiency, Sunshine, Vitamin D Fortification.

### INTRODUCTION

Geographically Pakistan lies in the region with adequate sunlight throughout the year<sup>1</sup> with U-V index ranging between 5 and 11 during different seasons. However, despite its geographical location, the prevalence of vitamin D deficiency is reported to be very high.<sup>2-3</sup> Vitamin D deficiency can negatively affect a child's growth, immune system and mental health. Although severe deficiency in children cause rickets but mild deficiency can cause a number of nonspecific symptoms in infants like irritability, developmental delays and slow growth. Similarly young children and adolescents may experience bone and muscle pain especially night time bone pains. They may also have pain in weight bearing joints like knees as well as pain in calf and back.<sup>4</sup>

Vitamin D is present in an inactive state and needs to be activated in kidneys and liver at site 1 and 25 to be converted to 1, 25 hydroxyvitamin D.<sup>5</sup> Recently it has been documented that vitamin D inhabits the activation of stress activated kinases directly in keratinocytes.<sup>6</sup> Food provides a limited source of vitamin D (salmon, sardines, cod liver oil, mushrooms and egg yolk) 100 to 200iu units per day. Exposure to sunlight in contrast, produces 10,000 to 20,000iu per day when 30% of body surface area is exposed to sunlight for 15 to 30 minutes per day.<sup>7</sup> Factors identified in Pakistan for vitamin D deficiency are lack of food fortification, decreased intake of vitamin D rich food, increased urbanization, increasing levels of pollution<sup>8</sup> and low maternal levels of vitamin D.<sup>9</sup>

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Thus the objective of this study was to assess the vitamin D status of children attending pediatric clinic for non specific bone and muscle pains, repeated respiratory infections and mild motor delays.

## MATERIAL & METHODS

This prospective cross sectional study was conducted in pediatric clinic of Hayatabad medical complex over a period of April 2018 to April 2022. All patients who presented to this pediatric clinic with non specific bone and muscle pains, mild motor delay and repeated chest infection were included in the study. Patients with clinical signs of rickets were excluded from the study. 5ml venous blood sample was obtained from each patient from informed consent from parents. Blood test was performed in the hospital laboratory on COBAS E601 instrument employing chemiluminescent Electro Immune assay (ECLIA). Results of vitamin D of these patients were recorded on excel sheet and statistically analyzed using SPSS version. The variables were put in graph and tables and statistical relationship was assessed for quantitative variables with a p value of more than .05 set as significant.

## RESULTS

This study was conducted on 146 patients. Out of these 146 patients 78 (53.4%) were male and 68(46.6%) were females. The age range was from 1 year to 15 years. The combined prevalence of deficiency and insufficiency was 52% and optimum levels were documented in 47.9% children. Severe deficiency according to definition <10ng/ml was documented in 10 children (6.8%). Vitamin D levels were reported slightly lower in girls 25.88% as compared to boys 25% but severe deficiency was significantly lower in girls 4.7% as compared to boys 2.3%. p value <.05 Older children (7-15 years) showed higher levels of vitamin D deficiency 53.4% as compared to infants (1-2 years) of 4.8%. Vitamin D deficiency was reported more in winter months (October-March) 51% than in summer (April – September 47%).

## DISCUSSION

To the best of my knowledge this is the first study

in KP province of Pakistan where the vitamin D status of children visiting pediatric clinic for nonspecific bone and muscle aches was assessed. The study for the first time documented that the combined prevalence of deficiency and insufficiency is 52% while the optimum levels were documented in 47.9% of children.<sup>3</sup> These figures are little lower than the Indian multicentre study of vitamin D status in children and adolescents of 58%.<sup>10</sup> Similarly a study carried out in Karachi Pakistan on children under 5 showed 60% of children are deficient in vitamin D.<sup>11</sup> The study from northern Ireland on school children showed 48.9% insufficiency of vitamin D.<sup>12</sup>

Vitamin D level of girls in this study were reported slightly lower 25.88% than boys 25% but severe deficiency less than 10ng/ml was significantly more in girls 4.7% than boys 2.3%. A study from china also documented low levels of vitamin D (17.86%) in girls than boys 19.2%.<sup>13</sup> Study done in Karachi Pakistan also documented vitamin D deficiency of 72% with predominance of female children. The study further reported highest deficiency in 7-15 years age children (53.4%) followed by 5-7 years (22%) and 2-5 years (19.2%). The youngest age group 1-2 years were the least affected group with just 4.8% deficiency. A cross sectional study conducted in Pakistan among children, adolescent, adults and elderly showed high prevalence of vitamin D deficiency in older children and adolescents. A study conducted in china showed highest low levels of vitamin D deficiency in (31.1%) 1-3 years children in comparison to (18.5%) 6-12 years children.<sup>14</sup>

This study further highlighted that vitamin D deficiency mostly occurred in winter months (October –March) 51.0% as compared to summer (April –September) 47%. The optimum levels 40ng/ml-100ng/ml of vitamin D were reported in 53% of children in summer while in winter only 39.0% showed optimum levels of vitamin D. The study conducted in Karachi Pakistan on vitamin D status in children in different seasons showed high percentages than this study. The study showed (60.3%) deficiency in the winter season while in summer this figure dropped to only 44.2%.<sup>15</sup> Study from Busan compared vitamin D status in children

in Autumn and spring to winter and reported [odd ratio OR9.7;95%confidence interval]4.3-22.0 and in winter {OR5.9 ;95%CI}3.5-10.0.<sup>16</sup>

		Frequency (%)	Valid Percent	Cumulative Percent
Valid	1-2 Years	7 (4.8%)	4.8	4.8
	2-5 Years	28 (19.2%)	19.2	24.0
	5-7 Years	33 (22.6%)	22.6	46.6
	7-15 Years	78 (53.4%)	53.4	100.0
	Total	146 (100.0%)	100.0	

Table-I. Age in groups

		Frequency (%)	Valid Percent	Cumulative Percent
Valid	Female	68 (46.6%)	46.6	46.6
	Male	78 (53.4%)	53.4	100.0
	Total	146 (100.0%)	100.0	

Table-II.

		Frequency (%)	Valid Percent	Cumulative Percent
Valid	<10ng/ml	10 (6.8%)	6.8	6.8
	10-30ng/ml	48 (32.9%)	32.9	39.7
	30-40ng/ml	18 (12.3%)	12.3	52.1
	40-100ng/ml	70 (47.9%)	47.9	100.0
	Total	146 (100.0%)	100.0	

Table-III.

Range * Gender Crosstabulation				
Count				
		Gender		Total
		Female	Male	
<10ng/ml(Sever dediciency)		7	3	10
10-30ng/ml(Boder line deficiency)		20	28	48
30-40ng/ml(hypo vitaminosis)		11	7	18
40-100ng/ml(optimum level)		30	40	70
Total		68	78	146

Table-IV.

Chi-Square Tests			
	Value	df	P-Value
Pearson Chi-Square	152.959 <sup>a</sup>	10	.000
Likelihood Ratio	18.318	10	.050
N of Valid Cases	146		

Age in Groups * Range Crosstabulation						
Count						
		<10ng/ml	10-30ng/ml	30-40ng/ml	40-100ng/ml	Total
		Age in Groups	1-2 Years	1	1	1
	2-5 Years	1	7	6	14	28
	5-7 Years	3	12	3	15	33
	7-15 Years	5	28	8	37	78
Total		10	48	18	70	146

Table-V.

Chi-Square Tests			
	Value	df	P-Value
Pearson Chi-Square	6.430 <sup>a</sup>	12	.893
Likelihood Ratio	6.676	12	.878
N of Valid Cases	146		

Range * Season Crosstabulation			
	Count		
	Season		Total
	Summer	Winter	
<10ng/ml	4	6	10
10-30ng/ml	21	27	48
30-40ng/ml	11	7	18
40-100ng/ml	42	28	70
Total	78	68	146

Table-VI.

Chi-Square Tests			
	Value	df	P-Value
Pearson Chi-Square	152.680 <sup>a</sup>	10	.000
Likelihood Ratio	18.013	10	.055
N of Valid Cases	146		

## CONCLUSION

This study concluded that more than half of the patient who presented to pediatric clinic for nonspecific bone and muscle pains are vitamin D deficient.


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### AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Ambreen Ahmad	Concept, Study design and data collection.	
2	Islam Gul Afridi	Manuscript writing and References Collection.	