

Role of Vitamin D Supplementation for Resolution of Growing Pains in Children with Hypovitaminosis D

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Abstract

Background: Growing pains (GP) are one of the common causes of parental anxieties nowadays. The exact causes of growing pain is unknown. Vitamin D plays an important in bone growth and metabolism. Currently few studies showed that hypovitaminosis D is associated with growing pains and vitamin D therapy may reduce the pain intensity in these children.

Objectives: The aim of the study was to evaluate the role of vitamin D supplementation for resolution of growing pains in children who have hypovitaminosis D.

Methods: The study was conducted in the Department of Paediatrics, Sylhet M.A.G. Osmani Medical College Hospital, Sylhet from July, 2021 to June, 2023. A total of sixty children aged 4 to 12 years were enrolled in the study. Serum 25 hydroxyvitamin D and serum calcium level were estimated at time of enrollment among the 60 children. Thirty-five children had low level of vitamin D. Visual analogue scale VAS scoring was done to see the pain intensity. Children aged ≤ 6 years received 1,50,000 IU single oral dose of vitamin D and children aged >6 years received 3,00,000 IU single oral dose of vitamin D. After one month of vitamin D therapy VAS, serum 25 hydroxy vitamin D level and serum calcium level were done. After 3 months of vitamin D therapy VAS was done again among the study children.

Results: Among 60 children, 35 had low level of vitamin D Among the 60 children, 35 had low levels of vitamin D. Among 35 children, 21(60%) children were male and 14(40%) were female. Twenty-three (65.7%) children were from urban areas and 12(34.3%) children were from rural areas. The mean age of the children was 6.60 ± 2.13 years and mean height was 115.40 ± 12.33 cm. About 51.4% children had family history of GP. Mean VAS was 6.88 ± 1.07 at the beginning of study and it was 1.17 ± 2.35 and 0.71 ± 1.86 after one and three months of vitamin D therapy which was statistically highly significant ($p < 0.001$). Before vitamin D statistically highly significant ($p < 0.001$)

Conclusions: Vitamin D supplementation significantly reduced the intensity of growing pains in children who have hypovitaminosis D.

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Introduction

Growing pains are cramping achy muscle pain that occurs in preschool and pre-teen children feel in both leg. Dr. William Feldman stated that GP occurs in both legs usually around bed time. Pain improves usually after massaging of limb or after taking acetaminophens.¹

The prevalence of GP ranges from 2.6% to 49% of children.² In India and Pakistan prevalence of GP is 28.1% and 43.3% respectively.^{3,4} Haque et al conducted a study among the school children of Bhairab Upazilla and found that 19.3 % Bangladeshi children are suffering from GP.⁵ The exact etiology of growing pains is unknown. Recently some studies found that deficiency of vitamin D can cause growing pains.^{6,7,8}

Vitamin D is an essential component for proper muscle function and bone mineralization. Vitamin D increases the intestinal absorption of calcium and phosphorus.⁷ Low Vitamin D level adversely affects bone mass, bone turnover and muscle strength in children.⁹

A study was conducted in Iraq to observe the efficacy of vitamin D therapy in GP. After the supplementation of vitamin D, a significant reduction of pain intensity of children with GP was observed.⁸ Study conducted in Turkey proposed that vitamin D treatment may diminish the pain severity of growing pains.⁶ The present study aims to see the role of Vitamin D supplementation for resolution of growing pains in children with hypovitaminosis D.

Objective

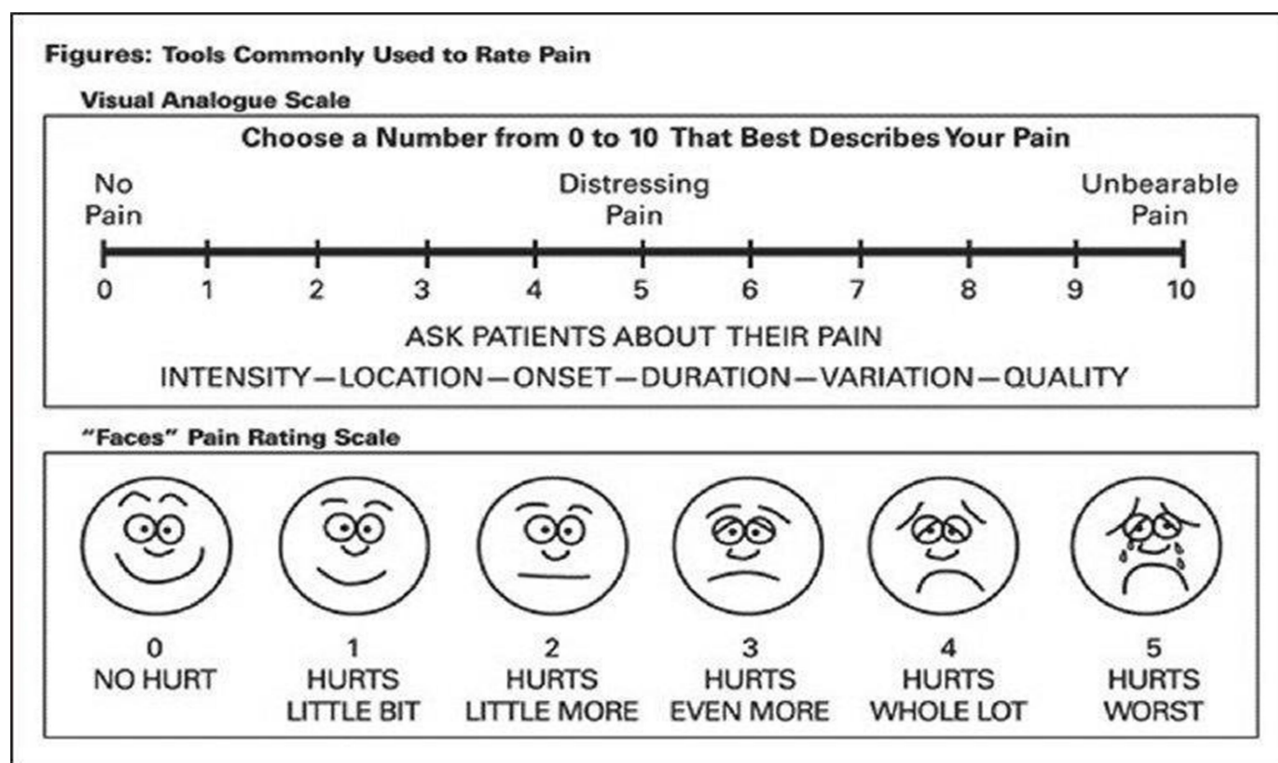
General objective of the study was to observe the efficacy of vitamin D supplementation on the resolution of growing pains in children with hypovitaminosis D. Specific objectives were to assess vitamin D level in children with growing pains, to assess the score of pain

intensity by using visual Analogue score (VAS) before treatment, to assess the pain intensity by using VAS after treatment, to find out the resolution of growing pains and to observe the side effects of Vitamin D therapy in study children.

Methods

This was a prospective observational study conducted in Department of Pediatrics, Sylhet MAG Osmani Medical College Hospital, Sylhet, during the period of July 2021 to June 2023. Study population was 4-12 years aged children having GP with hypovitaminosis D. Convenient sampling, every consecutive case satisfying the inclusion criteria were enrolled in the study. Sample size was 60. Children diagnosed as GP were enrolled in the study. To measure the vitamin D level with all aseptic precautions 5 ml of venous blood were collected. Serum Vitamin D status were categorized into deficiency (<20ng/ml), insufficiency (20-29 ng/ml) and sufficient (>30 ng/ml).¹⁰ Children with low level of vitamin D were enrolled in the study. The pain intensity were estimated by using visual analogue score (VAS) before supplementation of vitamin D. Children aged ≤6 years received 1,50,000 IU (Inj. D Rise 200000 IU/ml of Beximco Pharmaceuticals Ltd.) in a single dose orally. Children aged >6 years received 3,00,000 IU single dose of oral vitamin D.^{6,9} After one month visual analogue scoring were done to see the pain intensity and again 25(OH)D level and serum calcium level were estimated with all aseptic precautions. Three months later another visual analogue scoring were done to see the pain intensity of GP.

Visual Analogue Scale



All data were processed and analyzed both manually and with the help of SPSS (statistical package for social science) version 25. Differences in the visual analogue score (VAS) and differences in the vitamin D level before and after vitamin D therapy in children with hypovitaminosis D were tested using the Paired t-test and Chi square test. P value less than 5% ($p < 0.05$) was considered statistically significant.

Results

About 62.9% within the 6 to 10 years age, with a notable presence of children aged 5 or younger, constituting 31.4%. Males account for 60.0% of the population and females make up 40.0%. About 65.7% (23) children came from urban and 34.3% (12) from rural areas.

Table I: Demographic characteristics of the study subjects (n=35)

Characteristics	Frequency	Percentage (%)
Age in years		
≤5 years	11	31.4
6-10 years	22	62.9
11-12 years	2	5.7
Sex		
Male	21	60.0
Female	14	40.0
Residence		
Urban	23	65.7
Rural	12	34.3

Table II: Mean distribution of age and anthropometric parameter of study subject (n=35)

Parameter	Mean±SD	Minimum	Maximum
Age	6.60±2.13	4	12
Height	115.40±12.33	98	140
Weight	19.38±6.36	13.5	41
WHZ	-1.2±0.26	-0.60	-1.70

The mean age of the subjects was 6.60±2.13 years ranging from a minimum of 4 years to a maximum of 12 years. The mean height was 115.40±12.33 cm. The average weight is 19.38±6.36. The mean weight-for-height Z-score (WHZ) was -1.2±0.26.

Table III: Characteristic of growing pain in children (n= 35)

Characteristics	Frequency	Percentage (%)
Location of the pain		
Calf muscle	16	45.7
Shin	3	8.6
Popliteal fossa	5	14.3
Thigh	11	31.4
Unilateral/Bilateral		
Unilateral	0	00
Bilateral	35	35.0
Time of onset of		
Evening	9	25.7
Night	26	74.3
Frequency of attack		
Weekly	31	88.6
Monthly	4	11.4
Duration of pain		
<5 minutes	2	5.7
5-<30 minutes	32	91.4
30-<60 minutes	1	2.9
Child cries/wake up at night due		to pain
Yes	35	100.0
No	0	00
Pain aggravate with activity		
Yes	34	97.1
No	1	2.9
Pain resolves		
Spontaneous	5	14.3
Massage	27	77.1
Paracetamol	3	8.6

Pains predominantly affects the calf muscles (45.7%) and thighs (31.4%), with all cases reported as bilateral. Pain onset was typically at night (74.3%), occurring weekly for the majority (88.6%) and lasting between 5 to less than 30 minutes (91.4%). Interestingly, all children experience pain disrupting their sleep (100%), often exacerbated by activity (97.1%).

Table IV: Family history of growing pain (n= 35)

Family history	Frequency	Percentage (%)
Parents	1	2.9
Siblings	18	51.4
Cousin	1	2.9
None	15	42.9

About 51.4% report a family history of growing pain among their siblings, while only one individual (2.9%) mentions a family history among parents and cousins each.

Table V: Visual analogue score before and after treatment (n= 35)

VAS	Before treatment	ter 1 month treatment	ter 3 month treatment	P value
	No(%)	No(%)	No(%)	
No pain	0(00)	27(77.1%)	30(85.8%)	0.310
Mild pain	00(00)	2(5.7%)	2(5.7%)	1.00
Moderate pain	20(57.1%)	4(11.8%)	2(5.7%)	0.001
Severe pain	15(42.9%)	2(5.7%)	1(2.8%)	0.001
Mean±SD	6.88±1.07	1.17±2.35	0.71±1.86	0.001

Chi square test and paired t-test

About 57.1% children reported moderate pain and 42.9% children reported severe pain. After one month of treatment, the majority of participants (77.1%) reported no pain and this improvement was sustained after three months of treatment. Statistical analysis reveals a significant reduction in pain levels after treatment, as indicated by the p-values of 0.001. The mean VAS score decreased substantially from 6.88±1.07 before treatment to 1.17±2.35 after both one and 0.71±1.86 three months of treatment.

Table VI: Vitamin- D status of pre-treatment and post treatment (n=35)

Level of vitamin-D	Pre treatment		Post treatment		P value
	No	%	No	%	
<20 ng/ml	12	34.3	0	00	0.001
20-29 ng/ml	23	65.7	0	00	
>30 ng/ml	0	00	35	100	
Mean±SD	23.95±3.75		44.64±9.06		0.001

Chi square test and paired t-test

About 34.3% of participants had a vitamin D level of less than 20 ng/ml, while 65.7% had levels between 20-29 ng/ml. The mean vitamin D level increased substantially from 23.95 ng/ml before treatment to 44.64 ng/ml after treatment. This increase was statistically significant with a p-value of 0.001.

Table VII: Serum vitamin D and Calcium level after vitamin D therapy

Level	Normal	Abnormal
Serum Vitamin D level	35(100%)	0(0%)
Serum calcium level	35(100%)	0(0%)

After one month of vitamin D therapy 35 children have normal level of serum vitamin D and serum calcium level. No children developed hypervitaminosis D and hypercalcemia.

Discussion

This study shows majority of respondents, 62.9% were within the 6 to 10 years age with a notable presence of children aged 5 or younger, constituting 31.4%. In terms of gender, males account for 60.0% of the population, while females make up 40.0%. These findings are consistent with a Bangladeshi study by Ali et al. (2022).¹¹

In the current study, boys were found to be predominant in the children with growing pains. This finding is consistent with the Haque et al. (2021), where 60.7% were boys.⁵ Ali et al. found that most (63.3%) of the GP case were boys.¹¹ In a Turkish study by Vehapoglu et al. found that most (56.6%) of the GP cases were girls.⁶ This dissimilarity may be due to socio-cultural context of our country where boys are getting more care. In this study 23(65.7%) children were from urban areas and 12(34.3%) children from rural areas. This findings are similar with Insaf et al. (2017).⁸ They found 77.1% children were from urban areas.

This study shows height measurement was 115.40 ± 12.33 , varying between a minimum of 98 centimeters and a maximum of 140 centimeters. The average weight is 19.38 ± 6.36 , ranging from a minimum of 13.5 kilograms to a maximum of 41 kilograms. The mean weight-for-height Z-score (WHZ) is -1.20 ± 0.26 with values ranging from -0.60 to -1.70. This findings are in well agreement with Insaf et al. (2017) which reported mean weight was 22 kg (13-33 kg), mean height was 119 cm (85-147 cm).⁸

In this study, calf muscle was the commonest site (45.7%) of pain. Pain in the thigh was reported by 19 children (31.4%). The majority of the children experienced pain onset at night (26, 74.3%). The majority of children had weekly pain attacks, with 31 children (88.6%). 4 children (11.4%) experienced monthly pain attacks. This findings are in conformity with previous studies.^{6,8,11} All children had experienced pain mostly at night (66.7%) and at evening (33.3%), which is consistent with the studies conducted by

Haque et al. 2016.⁵

Among the study children, 51.4% reported a family history of growing pain among their siblings, while only one individual (2.9%) mentions a family history among parents and cousins each. Notably, a significant proportion (42.9%) of the respondents do not report any family history of growing pain. This findings are consistent with Insaf et al. (2017) they observed that 65 percent of the children had family history of growing pain.⁸

This study shows a great difference in visual analogue scores (VAS) before and after treatment. The data demonstrates a significant improvement in pain levels following treatment. Before treatment, the majority of individuals experienced moderate to severe pain, with 57.1% reporting moderate pain and 42.9% reporting severe pain. However, after one month of treatment, the majority of participants (77.1%) reported no pain, and this improvement was sustained after three months of treatment. Statistical analysis reveals a significant reduction in pain levels after treatment, (p-value of 0.001). Moreover, the mean VAS score decreased substantially from 6.88 ± 1.07 to 1.17 ± 2.35 and 0.71 ± 1.86 after one and three months of treatment respectively. This findings are in well agreement with previous study.^{7,6,8,11}

This current study shows a significant rise in serum vitamin D level after vitamin D therapy. Before treatment, 34.3% of participants had a vitamin D level of less than 20 ng/ml, while 65.7% had levels between 20-29 ng/ml. After treatment all participants (100%) achieved levels above 30 ng/ml, indicating a successful outcome of the treatment. The mean vitamin D level increased substantially from 23.95 ng/ml before treatment to 44.64 ng/ml after treatment. This increase was statistically significant ($p=0.001$), suggesting that the treatment had a significant impact on improving vitamin D status among the participants. Morandi et al. (2014) assessed 33 children with GP.⁷ They found a mean vitamin D level of 15.0 ± 6.9 ng/ml and after vitamin D therapy mean vitamin D was 34.7 ± 17.1 ng/ml with a huge reduction in pain seriousness. Vehapoglu et al. (2015)⁶ reported the level of vitamin D in the children with (GP) and vitamin

D inadequacy expanded following 1 month of vitamin D treatment from 13.4 ± 7.2 to 44.5 ± 16.4 ng/ml, which was statistically significant ($p < 0.001$). This current study are in well agreement with above mentioned studies.

Serum vitamin D level and serum calcium level were estimated in study group children one month after vitamin D therapy to see any development of hypervitaminosis or hypercalcemia (Table VII). About 100% had normal level of vitamin D and calcium level. Vehapoglu et al. (2015) and Insaf, (2017) also observed no adverse effects of vitamin D therapy.^{6,8}

Conclusion

It can be concluded that vitamin D supplementation is effective in resolution of growing pains in children with hypovitaminosis D.

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