



**ORIGINAL RESEARCH PAPER**

**Paediatrics**

**"A STUDY OF PREVALENCE OF VITAMIN D DEFICIENCY & THE EFFECT OF VITAMIN D SUPPLEMENTATION IN PATIENTS OF SEVERE ACUTE MALNUTRITION"**

**KEY WORDS:**

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**ABSTRACT**  
**Background:** Severe acute malnutrition is one of the most common causes of mortality and morbidity in pediatric patients. The "silent emergency" is an accomplice in millions of deaths in pediatric patients. Those young lives are needlessly and prematurely lost. Across the globe, an estimated 16 million children under the age of 5 are affected by severe acute malnutrition. **Aims:** To study prevalence of vitamin D deficiency and the effect of vitamin D supplementation in patients of severe acute malnutrition **Method:** After taking informed consent from the parents and after getting ethical committee approval, we have included patients from 6months of age to 60 months of age fulfilling the criteria for severe acute malnutrition according to WHO criteria. **Results:** Vitamin D deficiency was found to be maximum in the age group of 13 months to 24 months. The mean of vitamin D levels in the study group came out to 18.465 ng/ml (with a standard deviation of +/- 8.08 ng/ml). The prevalence of vitamin D deficiency is 76% in the present study. **Conclusion:** Vitamin D should be supplemented in all patients of severe acute malnutrition, and they should be actively tested and monitored for vitamin D deficiency routinely.

**INTRODUCTION**

Across the globe, an estimated 16 million children under the age of 5 are affected by severe acute malnutrition. Nutritional rickets is a nutritional disorder of growing bones. As these severely malnourished children do not develop rickets unless they start growing, vitamin D deficiency is often overlooked. This study focuses on prevalence of vitamin D deficiency in patients of severe acute malnutrition and the effect of supplementation of vitamin D in these patients.

**AIMS AND OBJECTIVE**

To study prevalence of vitamin D deficiency and the effect of vitamin D supplementation in patients of severe acute malnutrition

**MATERIAL AND METHODS**

**Study Design:-** prospective observational type

**Study Site:-** Tertiary care hospital, civil hospital Ahmedabad

**Study Period:-** 1st September 2020 to 30 September 2022

<b>INCLUSION CRITERIA</b>	All patients of severe acute malnutrition aged 6 to 60 months according to the WHO definition are admitted in the pediatrics department, civil hospital Ahmedabad.
<b>EXCLUSION CRITERIA</b>	<ul style="list-style-type: none"> <li>•Patients diagnosed as moderate acute malnutrition according to WHO definition</li> <li>•patients who did not give consent for enrollment in study</li> <li>•Patients with underlying chronic disease</li> </ul>

The patients admitted for severe acute malnutrition were assessed for vitamin D deficiency. Vitamin D levels were done on admission and then again after 2 weeks at discharge from nutritional rehabilitation center.

The patients who were vitamin D deficient (Serum vitamin d levels <20 ng/ml) were given high oral dose of 60,000IU once a week for 6 weeks followed by a maintenance dose of 2000 IU/day up to 12 months of age and 3000 IU/day in 13 month-60 months age.

The patients were again reassessed at 3 months for signs of vitamin D deficiency, Serum vitamin D levels and x-ray wrist. The vitamin D sachets and capsules used for supplementation are available in government supply. The patients were assessed for other vitamin deficiencies, average weight gain, neurological development and response to supplementation.

**RESULTS AND DISCUSSION**

A prospective study was conducted at Civil hospital Ahmedabad from September 2020 to September 2022. 298 of these patients fulfilled the WHO criteria for severe acute malnutrition Total number of patients enrolled in the study were 69.

**1. Age Distribution In The Study**

In the present study, The total number of patients in this study in 6months to 12 months were 27 ( 39.1%), in 13 months to 24 months were 29 ( 42%) and in 25 months to 60 months were 13 (18.8%). 56 (81.1%) patients belonged to the age group of 6 months to 24 months. These first two years of life constitute a period of rapid growth and development in a child.

**2. Sex Distribution In The Study**

The present study consisted of 33 females and 36 males with male to female ratio of 1.09.

**3. Who Criteria For Severe Acute Malnutrition**

According to the World Health Organization, in the age group 6-59 months Severe acute malnutrition is defined if any of the following:

"Mid upper arm circumference (MUAC)<115mm with or without any grade of oedema" **AND/OR** "Weight for Height (WFH) < -3 SD with or without any grade of oedema" **AND/OR** "Bilateral pitting oedema +/++ (children with oedema +++ always need inpatient care)".

**4. Who Classification Of Severe Acute Malnutrition**

In this study 32(46.4%), almost half of the patients came under the category of acute on chronic malnutrition. 28 (40.6%) of these patients had acute form of malnutrition. 9(13%) were nutritional dwarfs, having chronic form of malnutrition.

**5. Serum Vitamin D Levels Of Patients Of Severe Acute Malnutrition On Admission**

Vitamin D level less than or equal to 20 ng/ml as per standard references is considered as deficient. The mean of vitamin D levels in the study group came out to 18.465 ng/ml (with a standard deviation of +/-8.08 ng/ml).

**6. Study Of Age Based Distribution Of Vitamin D Deficiency In Study**

The subjects with vitamin D deficiency were 22 (31.8%), 24(34.7%) and 7(10.1%) in 6month to 12 month, 13 months to 24 months and 25 months to 60 months respectively. Collectively 82% of all patients of severe acute malnutrition in the study were found to be having vitamin D deficiency.

**7. Vitamin D Deficiency Based On Who Classification**

In our study 25(78%) of the acute on chronic malnutrition patients had vitamin D deficiency. Out of 28 patients of acute malnutrition, 20 (71.4%) had vitamin D deficiency on admission and 8 (88.8%) patients of chronic malnutrition had vitamin D deficiency. In the present study, maximum vitamin D deficiency patients belonged to the chronically malnourished patient, followed by acute on chronic malnutrition patients and least vitamin D deficiency was seen in acute malnutrition patients. However, the results need to be verified with a larger number of patients.

**8. Clinical Signs Of Vitamin D Deficiency In Patients Of Severe Acute Malnutrition**

In the present study, bowing of legs was seen in 37.5%, being the most frequent clinical sign in this study, followed by frontal bossing(31.3%), pot belly(12.5%), widening of wrist(12.5%), genu recurvatum(6.3%).

**9. Vitamin D Deficiency Signs On Radiological Examination In Patients Of Severe Acute Malnutrition**

The patients in study were examined for radiological signs of vitamin D deficiency using x-ray wrist. In the present study, cupping and fraying was seen in 3(4.3%), being the most frequent radiological sign in this study. Historically, vitamin d deficiency is a disease of growing bones and may not manifest radiologically.

**10. Vitamin D Supplementation In The Study**

The study had 69 patients, out of which 8 had not received any vitamin D supplementation. 61 patients (88.4%) patients received vitamin D supplementation.

**11. The Average Increase In Levels Of Vitamin D After Supplementation In The Study**

Average increase in vitamin D levels after 2 weeks was 11.65ng/ml and after 3 months was 33.5ng/ml. The number of patients who remained vitamin D Deficient after supplementation were 6(8.6%). These patients need good follow up and reassessment.

The possible reason for this occurrence is due to the coexistence of various factors in these nutritionally deprived vitamin D deficient patients of severe acute malnutrition which could cause suboptimal response to the supplementation therapy. Thus, based on the findings of the study, vitamin D supplementation caused an average increase of 11.65ng/ml. Thus, supplementation of vitamin D in patients of severe acute malnutrition is beneficial.

**12. Follow Up Of Patients Of Severe Acute Malnutrition For Vitamin D Deficiency**

On follow up, after two weeks, 6 (8.6%) patients in the study had vitamin D deficiency. 47 patients (68.1%) who were vitamin D deficient on admission had normal (>20 ng/ml) vitamin D levels on follow up after two weeks. On follow up at 3 months, 17(24.6%) patients were having vitamin D levels >20ng/ml (rest were loss to follow up).

Characteristic Features of the Study		
	Number (%)	
Gender	Female	33 (47.82%)
	Male	36 (60.42%)
Age	6-12 MONTHS	27 (39.1%)
	13-24 MONTHS	29 (42%)
	25-60 MONTHS	13 (18.8%)
WHO classification	Acute on chronic	32 (46.4%)
	Acute	28 (40.6%)
	Chronic	9(13%)
Subjects with Vitamin D deficiency	6-12 MONTHS	22 (31.8%)
	13-24 MONTHS	24 (34.7%)
	25-60 MONTHS	7 (10.1%)
Vitamin D supplement	Received	61
	Not received	8

**CONCLUSION**

- Patients of severe acute malnutrition have low levels of serum vitamin D levels and vitamin D Deficiency is frequently seen in them.
- Supplementation of vitamin D has a significant positive effect on serum vitamin D levels on follow up in patients of severe acute malnutrition.
- The high prevalence of vitamin D deficiency in malnourished children underlies the need for active surveillance and aggressive management. Vitamin D should be supplemented in all patients of severe acute malnutrition, and they should be actively tested and monitored for vitamin D deficiency routinely.
- Further systematic studies need to be done on supplementation of vitamin D in patients of severe acute malnutrition and proper guidelines regarding the same need to be formulated.

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