# Prevalence of Nutritional Deficiencies in Undernourished Hospital Visiting Paediatric Patients

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## Abstract

*Introduction*: The Millennium Development Goals (MDG) report of 2012 says that almost one in five children below the age of five years in developing countries is underweight.The prevalence of malnutrition in India is high and almost one third of worlds malnourished children are from India. The present study was aimed at finding the nutritional deficiencies and comorbid conditions in children with PEM. *Aim of the Study:* To study the prevalence of nutritional deficiencies and common comorbid conditions in undernourished hospital visiting paediatric patients. *Materials and Methods:* This wasaprospective study carried out in the department of Paediatrics forover a period of 20 months. Patients attending the Paediatrics out-patient department during the study period were selected based on inclusion criteria. They were studied for the prevalence of common nutritional deficiency diseases and anemias. Detailed clinical history and complete examination with specific emphasis on signs of nutritional deficiencies and anthropometry was done for all the cases. Grading of PEM was done based on WHO classification. *Results:* Moderate PEM was more common than severe PEM in both genders. Vitamin B complex, vitamin A and vitamin C deficiency were seen in 23.3%,9.0% and 1.1%children respectively. Anemias were more common in girls (34.7%) than in boys (14%). Among the comorbidities, nutritional deficiencies and anemias were common and were seen in 22.6% and 23% cases. *Conclusion:* Protein energy malnutrition is a very common problem in paediatric practice in India. Very often children with PEM present with comorbid conditions and multiple nutritional deficiencies and anemia. Regular health check-ups can detect PEM at an earlier stage.

**Keywords:** PEM; Comorbidities in PEM; Vitamin A, C, B Complex Deficiency; Nutritional Deficiency.

## Introduction

The Millennium Development Goals (MDG) report of 2012 says that almost one in five children below the age of five years in developing countries is underweight [1]. This is a cause of concern as it gives rise to continuous ill health and contributes to increased mortality among children. According to the World Health Organization (WHO) hunger and malnutrition are great threats to the world'spublic health. The prevalence of malnutrition in India is high and almost one third of worlds malnourished children are from India [2].

Malnutrition is also common among Indian adolescent children. It leads to poor growth, short stature and low lean body mass and many concurrent and future adversehealth outcomes [3]. Poor nutrition leads to various comorbid conditions and increased susceptibility to recurrent infections which further slow the growth process.

### Aim of the Study

To study the prevalence of nutritional deficiencies and common comorbid conditions in undernourished hospital visiting paediatric patients.

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## Materials and Methods

The present study was a prospective study and was carried out in the department of Paediatrics at over a period of 20 months.

Patients attending the Paediatrics out-patient department during the study period were selected based on inclusion criteria. They were studied for the prevalence of common nutritional deficiency diseases and anemias. Detailed clinical history of presenting complaints, complete examination with specific emphasis on signs of nutritional deficiencies, anthropometry, immunization status, socioeconomic status was taken into account for all the cases. The weight (in kg) of the children was measured using a regular bathroom weighing scale in the OPD. The weight was taken with minimal clothing and without footwear. The WHO classificationwas used to classify the protein energy malnutrition (PEM). Relevant laboratory investigations were done in some of the cases. The data was entered into a predesigned proforma.

### Inclusion Criteria

1. Patients between the age group of 5 to 15 years who were less than the required weight and height for age and gender were selected.

2. Only out-patient department (OPD) cases were included.

3. Patients coming for repeat visit within the study period were included only once.

### Exclusion Criteria

1. Admitted patients were excluded.

2. Patients visiting only for immunization or elective/emergency surgery were excluded.

## Observations and Results

There were a total of 265 patients in the study with 150 boys and 115 girls. The male to female ratio was 1.3:1.

Vitamin B complex deficiency was seen in 62 children (62/265 cases) ie, in 23.3% and some had more than one sign of deficiency.

Acrodermatosis was taken as a sign of Zinc deficiency and was seen 1.8% children.

Vitamin C deficiency was seen in 1.1% cases.

Phrynoderma and xerophthalmia were seen in a total of 24 patients as a few patients had both. These were taken as signs of vitamin A deficiency and were seen in (24/265 cases) 9.0% children.

## Discussion

The present study was done to look at the prevalence of nutritional deficiencies and clinical presentation in young children and young adolescents with underlying protein energy malnutrition (PEM).

The prevalence of malnutrition in paediatric age group is a global problem and is more so in the developing and underdeveloped countries. In terms of underweight, stunting and wasting, the prevalence of malnutrition has been reported globally as 27%, 31% and 10% respectively [4].

**Table 1:** Age and gender wise distribution of cases

| Age in years | Males | | Females | |
| --- | --- | --- | --- | --- |
| | No. of Cases | Percentage (%) | No. of Cases | Percentage (%) |
| 5 -10 | 56 | 37.3% | 45 | 39.1% |
| 11-15 | 94 | 62.6% | 70 | 60.8% |
| Total | 150 | 100% | 115 | 100% |

**Table 2:** Distribution of PEM based on WHO classification

| Age in years | | Males No. of Cases | Females No. of Cases | Total (%) No. of Cases (%) |
| --- | --- | --- | --- | --- |
| 5-10 | Moderate | 49 | 40 | 89 (33.5%) |
| | Severe | 7 | 5 | 12 (4.5%) |
| 11-15 | Moderate | 79 | 62 | 141 (53.2%) |
| | Severe | 15 | 8 | 23 (8.6%) |
| Total | | 150 | 115 | 265 (100%) |

**Table 3:** Distribution of morbidity pattern

| | | Males (150) No. of cases (%) | Females (115) No. of cases | Total (265) No. of cases (%) |
|---|---|---|---|---|
| Nutritional deficiency* | | 28 | 32 | 60 (22.6%) |
| Anemia* | | 21 | 40 | 61 (23.0%) |
| ENT | Tonsillitis | 5 | 6 | 11(4.1%) |
| | Adenoiditis | 3 | 4 | 7 (2.6%) |
| | ASOM/CSOM | 4 | 3 | 7(2.6%) |
| | Mastoiditis | 1 | 1 | 2 (0.7%) |
| Eye | Refractive errors | 10 | 8 | 18 (6.7%) |
| | Blepharitis | 4 | 5 | 9 (3.3%) |
| | Stye | 2 | 1 | 3 (1.1%) |
| Skin | Impetigo/infection | 9 | 5 | 14 (5.2%) |
| | Fungal infections | 6 | 5 | 11 (4.1%) |
| | Acne | 18 | 12 | 30 (11.3%) |
| Scalp | Lice | 4 | 12 | 16 (6.0%) |
| | Hairfall/lustreless | 5 | 17 | 22 (8.3%) |
| Endocrine- | Thyroid | 3 | 5 | 8 (3.0%) |
| Lymph-adenopathy | | 3 | 6 | 9 (3.3%) |

* Not mutually exclusive:  More than one deficiency present in same patient

**Table 4:** Distribution of nutritional deficiencies

| | Males (150) No. of Cases | Females (115) No. of Cases | Total(265) No. of Cases (%) |
|---|---|---|---|
| Angular stomatitis | 8 | 9 | 17(6.4%) |
| Cheilosis | 12 | 13 | 25 (9.4%) |
| Glossitis | 6 | 4 | 10 (3.7%) |
| Aphthous ulcers | 7 | 12 | 19 (7.1%) |
| Pellagrous dermatosis | 3 | 1 | 4 (1.5%) |
| Acrodermatosis | 3 | 2 | 5 (1.8%) |
| Spongy/Bleeding gums | 2 | 1 | 3 (1.1%) |
| Phrynoderma | 9 | 10 | 19 (7.1%) |
| Xerophthalmia | 7 | 3 | 10 (3.7%) |
| Dry skin | 20 | 23 | 43 (16.2%) |

Appropriate nutrition plays an important role in the overall health status of children and adolescents and also the nutritional needs in these age groups are different from those of adults [5].

*PEM:* In the present study moderate grade PEM was more common than severe grade PEM. PEM was slightly more in the 11-15 years age. It was moderate grade in 53.2% children and of severe grade 8.6% children in the young adolescent age group. Ramavat et al [6] in their study observed PEM in 13.2% children of adolescent age.

Thakore et al [7] observed PEM in 8.9% children in their study.

Prasot et al [3] in their study on 1 to 6 year old children found the prevalence of PEM according to Indian Academy of Pediatrics, to be 54.8%. In their study, theproportion of grade I, II and III PEM was 33%, 18.3% and 3.5%, respectively. They did not find any child in grade 4 PEM. Our findings correlate well with the observations of the above authors.

*Anemias:* Anemias due to nutritional deficiencies, vitamin- A and vitamin- B deficiencies are well-recognized among children and adolescents [5].

In the present study the prevalence of anemia in girls and boys was 34.7% and 14% respectively. Hari Krishna et al [8] in their study found the prevalence of anemia in girls to be 34.2% and in boys as 17.7%. Theirs was a field based study where school going children between 10-16 years were examined. Our findings compare well with the observations of above authors. Yerpude et al [9] found the prevalence of anemia in their study around 20% in boys 67% in girls respectively.

Ananthakrishnan et al [10] in their study found 57.1% school children had anaemia. Verma et al [11] in their study in Punjab found 51.5% of urban school children had anemia.

World Health Organization (WHO) has defined adolescence as the period of life between 10 to 19 years. In India, adolescents (10-19 years) comprise

one-fifth of the entire population accounting for 21.4 percent of the population [12].

*Morbidity Pattern:* In the present study various morbidity patterns were present in the children.

ENT problems were encountered in a total 10.1% (27 out of 265 cases) of which 8.6% were boys and 12.7% were girls. Yerpude et al [9] reported ENT problems in 17.6% of their cases. Ananthakrishnan et al [10] reported ENT problems in 3.1% of their cases.Our findings compare well with the above authors.

In the present study, Eye related problems were around 11% (30/265 cases). Yerpude et al [9] observed eye problems in 11.43% of their cases, whereas, Ananthakrishnan et al [10] reported this figure to be 2.7% in their study.

As per District Level Household and Facility Survey (DLHS 2002-2004), In India 6-7% adolescents aged 10-14 years have problem with their eye sight [13].

In the present study, Skin disorders of bacterial and fungal etiology and acne were seen in 20.7% cases. Most of the cases were related to acne as the study had more individuals in peri/post pubertal age. Yerpude et al [9] also encountered around 20.9%cases with skin problems though they have not mentioned acne as the predominant problem.

Negi et al [14] and Anaanthakrishna et al [10] have reported similar observations.

Srinivasan et al [15] who studied mainly 10-14 year age children, reported skin disorders in 29.9% of their study subjects. Our findings compare well with those of the above authors.

In our study, we encountered 3% children with minimal to mild enlargement of the thyroid gland. All these cases were from the young adolescent age group and were thought to be associated with puberty goitre. During puberty as there is growth spurt and increased hormone requirement, the thyroid is thought of as undergoing structural and functional changes and hence may have mild enlargement. Goitre at puberty is not a uniform condition and other causes like iodine deficiency etc should be actively looked for [16].

### Nutritional Deficiencies

McLaren has proposed that the term "xerophthalmia" should be used as the single descriptive term for the spectrum of ocular manifestations of vitamin-A deficiency. It includes night blindness, xerosis of conjunctiva and cornea, bitot spots, corneal ulceration and keratomalacia.

Vitamin-A deficiency in a milder form causes impaired immune function which can give rise to frequent infections. This in turn can affect the overall growth and development in children [5].

Ramavat et al [6] studied the prevalence of nutritional deficiencies and most of their cases were in the 10-15 years age. They observed 7.0% of children in their study had vitamin A deficiency and 23.2% hadsigns of Vitamin B complex deficiency and 10.5% had signs of Vitamin C deficiency.

Rema N [17] et al reported prevalence of vitamin A deficiency in boys as 5.65% and in girls as 8.64%.

Thakor et al [7] studied children and adolescents between 5-19 years with mean age being 13.80±1.96 years. They observed the prevalence of vitamin A deficiency in 6.2% children. Vitamin B complex deficiency signs were observed in 20.6% children and Vitamin C deficiency signs were seen in 9.9% children. PEM was observed in 77 (8.9%) children.

### Conclusion

Protein energy malnutrition is a very common problem in paediatric practice in India. Very often children with PEM present with comorbid conditions and multiple nutritional deficiencies and anemia. Regular health check-ups with detailed clinical examination and anthropometry can detect PEM at an earlier stage. Prompt therapy and parent education will go a long way in ensuring good health of this large segment of Indian population.

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