pISSN 2349-3283 | eISSN 2349-3291

# **Original Research Article**

DOI: http://dx.doi.org/10.18203/2349-3291.ijcp20190679

# Prevalence of protein energy malnutrition among children: a cross sectional study

# Venkatesha K. R., R. Ravikumar Naik\*

Department of Pediatrics, Sapthagiri Institute of Medical Sciences, Bengaluru, Karnataka, India

**Received:** 01 January 2019 **Accepted:** 09 Febuary 2019

\*Correspondence:

Dr. R. Ravikumar Naik,

E-mail: pediatricdr25@gmail.com

**Copyright:** © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

# **ABSTRACT**

**Background:** In the world, hunger and malnutrition are most significant threat. Malnutrition is global risk factor for significant death among infants and pregnant woman. malnutrition increases the chances of several infections.

**Methods:** A cross sectional study was undertaken in children age group of 1 to 18 years, suffering from protein energy malnutrition, attending Department of Paediatrics, tertiary care hospital, Bangalore during the period January 2016 to December 2016.

**Results:** In the present study, maximum number of cases (44) belongs to age group of 1-5 years, followed by 32 cases belongs to 6-12-year age group and 24 cases belong to 13-18-year age group. Maximum cases (59) belongs to female with male female ratio is 1:1.4. In the present study out of 100 cases, 81 cases came positive for protein energy malnutrition. Out of 81 cases positive for PEM, 34 cases belong to grade I followed by 24 cases belongs to grade II, 13 cases belong to grade III and 10 cases belongs to grade IV protein-energy malnutrition (PEM).

Conclusions: Malnutrition is like an iceberg, most people in the developing countries live under the burden of malnutrition.

Keywords: Children, Kwashiorkor, Marasmic, Protein energy malnutrition (PEM), Severe acute malnutrition (SAM)

# INTRODUCTION

Globally, hunger and malnutrition are two of the most significant challenges. Globally, malnutrition is a risk factor for illness and death, with millions of pregnant women and young children being affected due to infections, poor and inadequate diet. Malnutrition increases the risk and worsens the severity of infections. Infants and young children are most affected by malnutrition as they have increased nutritional needs to support growth. Undernourished children, as well as children with severe malnutrition, have a higher risk of dying than children with an optimal nutritional status. The term "malnutrition" is usually used to describe PEM. The comprehensive term of "PEM" is universally

accepted, and its severe forms are called "marasmus", "kwashiorkor" and "marasmic, kwashiorkor". The term Severe acute malnutrition (SAM) combines all the different forms of PEM, as SAM refers to a weight-for-height below 70%, referred to as "wasted" or pitting oedema is present in both feet, referred to as "oedematous malnutrition". Severe forms of SAM can also be complicated by infections. The different forms still have different causes and are therefore treated differently.<sup>2</sup>

Malnutrition is frequently part of a vicious cycle that includes poverty and disease. These factors are interlinked in such a way that each contributes to the presence and permanence of others. Socio-economic and political changes that improve health and nutrition can

break the cycle, as can specific nutrition and health interventions.

Malnutrition is like an iceberg, most people in the developing countries live under the burden of malnutrition. Malnutrition makes the child more susceptible to infection, recovery is slower, and mortality is higher.<sup>3</sup>

Despite the work done in malnutrition and the reduced prevalence of stunting and underweight in some regions, the number of cases hasn't changed over the last 10 years with about 30% of all children in low and middle-income countries being underweight. Malnutrition is and will continue to be a health threat to developing countries, especially in Southern Asia and Sub-Saharan Africa and might actually be rising in the developing world such as Africa because of the human immunodeficiency virus infection (HIV) pandemic. Although over-nutrition is observed in developed and urban areas of developing countries, it is rarely seen among rural masses, where under nutrition is rampant.<sup>4</sup>

In 1990 an estimated one out of three children (177 million) younger than five years in the developing world were or had been malnourished at one stage in their lives. The diagnosis was based on a weight-for-age below two standard deviations (SD) of the national centre for health statistics (NCHS) median. In countries where the prevalence of malnutrition is high, the total number of malnourished children has not decreased with an increase in population. Ayaya et.al. Stated that malnutrition is still one of the leading causes of morbidity and mortality in children younger than five years and according to Kilic et al, severe PEM still affects 2-3% of the pediatric population worldwide.<sup>5</sup> The objective of this study was the prevalence of protein energy malnutrition among children.

# **METHODS**

A cross sectional study was undertaken in children age group of 1 to 18 years, suffering from protein energy malnutrition, attending Department of Pediatrics, tertiary care hospital, Bangalore during the period January 2016 to December 2016.

# Inclusion criteria

- The study population consisted of children of age group 1-18 years.
- Children suffering from PEM
- Children suffering from kwashiorkor
- Children suffering from marasmus.

# Exclusion criteria

- Children suffering from congenital anomaly
- Children who are already under treatment
- Children who doesn't come for regular follow up.

#### Stastical analysis

SPSS software was used for statistical analysis.

#### **RESULTS**

In the present study, maximum number of cases (44) belongs to age group of 1-5 years, followed by 32 cases belongs to 6-12-year age group and 24 cases belongs to 13-18-year age group. Maximum cases (59) belongs to female with male female ratio is 1:1.4. Although protein energy malnutrition is more common in low-income countries, children from higher-income countries are also affected, including children from large urban areas in low socioeconomic neighborhoods. This may also occur in children with chronic diseases, and children who are institutionalized or hospitalized for a different diagnosis (Table 1).

Table 1: Age and sex wise distribution of the cases.

Age group	Male	Female	Total
1-5 years	18	26	44
6-12 years	12	20	32
13-18 years	11	13	24
Total	41	59	100

In the present study out of 100 cases, 81 cases came positive for protein energy malnutrition. A large percentage of children that suffer from PEM also have other co-morbid conditions. The most common co-morbidities are diarrhea and malaria. However, a variety of other conditions have been observed with PEM, including sepsis, severe anaemia, bronchopneumonia, HIV, tuberculosis, scabies, chronic suppurative otitis media, rickets, and keratomalacia. These co-morbidities tax already malnourished children and may prolong hospital stays initially for PEM and may increase the likelihood of death (Table 2).

Table 2: Prevalence of protein energy malnutrition among cases.

PEM	Male	Female	Total
Positive	30	51	81
Negative	11	08	19
Total	41	59	100

Out of 81 cases positive for PEM, 34 cases belong to grade I followed by 24 cases belongs to grade II, 13 cases belong to grade III and 10 cases belongs to grade IV PEM. The degrees were based on weight below a specified percentage of median weight for age. The risk of death increases with increasing degree of malnutrition. An adaptation of Gomez's original classification is still used today. While it provides a way to compare malnutrition within and between populations, the classification has been criticized for being "arbitrary" and for not considering overweight as a form of malnutrition. Also, height alone may not be the best indicator of

malnutrition; children who are born prematurely may be considered short for their age even if they have good nutrition (Table 3).

Table 3: Grading of protein energy malnutrition among cases.

PEM grade	Male	Female	Total
Grade I	12	22	34
Grade II	08	16	24
Grade III	06	07	13
Grade IV	04	06	10
Total	30	51	81

#### **DISCUSSION**

In the present study, maximum number of cases (44) belongs to age group of 1-5 years, followed by 32 cases belongs to 6-12-year age group and 24 cases belongs to 13-18-year age group. Maximum cases (59) belongs to female with male female ratio is 1:1.4 (Table 1). In the present study out of 100 cases, 81 cases came positive for protein energy malnutrition (Table 2). Out of 81 cases positive for PEM, 34 cases belong to grade I followed by 24 cases belongs to grade II, 13 cases belong to grade III and 10 cases belongs to grade IV PEM (Table 3).

In the developing world, 129 million of children younger than five years are underweight and 10% are severely underweight. Underweight is more prevalent in Asia than in Africa, with Asia showing rates of 27% and Africa rates of 21%. Progress is slow and South Africa is not meeting the MDGs with the prevalence being 25% in 2008, whereas it was 28% in 1990.6

In a study conducted in Rajasthan, prevalence of PEM was observed to be 67%, however it was found to be significantly higher (80.9%) in the age group of 1-3 years as compared to other age groups. This age group also exhibited significantly higher prevalence (x 2 = 14.67, p<0.05) of grade I, II, III PEM. Sen et al. also reported a higher prevalence in the age group of 1-3 years., It was found that in Rajasthan study female had an overall higher prevalence of PEM (70.6%) as also grade I PEM (36.6%) in comparison to males who had overall higher prevalence of PEM and Grade I PEM as 62.6 and 19.7% respectively. Contradictory results were reported by Srivastava (1985) as overall higher prevalence among males. However, Grade II, III, and IV PEM was found to be significantly higher (x 2 = 1.41, p<0.05) in males (27.4, 10.9 and 4.3% respectively) than in females (23.8, 7.3 and 2.7% respectively) in Rajasthan study.<sup>7,8</sup>

The prevalence of PEM is high in 2 -3 years of age group (97.9%), followed by 1-2 years (88.8%), 3-4 years (39.1%) and 4-5 years (28.1%). This association between age and PEM is found to be statistically significant similar findings were noted in a study done by chakraboty. Sen et al, also reported higher prevalence in 1-3 years of age group.<sup>7,9</sup>

Christiaensen and Alderman et al, (2001) found that more boys than girls younger than five years old had malnutrition in Ethiopia and this was the same for a study in Turkey by Kilic et al, (2004) that found 14 male and seven female infants with marasmus and nine male and six female infants with kwashiorkor. Mahgoub et al, (2006) also found that in the age group of children zero to three years old in Botswana, malnutrition was more prevalent in males than in females. Studies in Tamil Nadu, India also showed that PEM was more prevalent in males five to seven years old. <sup>10-12</sup>

#### **CONCLUSION**

Malnutrition in children is the consequence of a range of factors that are often related to poor food quality, insufficient food intake and severe and repeated infectious diseases or frequently some combination of the three. These conditions in turn are closely linked to the overall standard of living and whether a population can meet its basic needs, such as to food, housing and health care. Growth assessment thus not only serves as a means for evaluating the health and nutritional status of children, but also provides an indirect assessment of the quality of life of an entire population. Malnutrition is like an iceberg, most people in the developing countries live under the burden of malnutrition.

Funding: No funding sources Conflict of interest: None declared

Ethical approval: The study was approved by the

Institutional Ethics Committee

### REFERENCES

- Caulfield LE, de Onis M, Blössner M, Black RE. Undernutrition as an underlying cause of child deaths associated with diarrhea, pneumonia, malaria, and measles. Am J Clinical Nutrition. 2004;80(1):193-8.
- Collins S, Dent N, Binns P, Bahwere, P, Sadler K, Hallam A. Management of severe acute malnutrition in children. Lancet. 2006; 368:1992-2000.
- 3. World health organization, global database on malnutrition. Available at: http://www.who.int/nutgrowthdb/en/.
- 4. Müller O, Krawinkel M. Malnutrition and health in developing countries. Canadian Med Assoc J. 2005;173(3):6-8.
- Ayaya SO, Esamai FO, Rotich J, Olwambula AR. Socio-economic factors predisposing under fiveyear-old children to severe protein energy malnutrition at the Moi teaching and referral hospital, Eldoret, Kenya. Eastern African Med J I. 2004;81(8): 415-21.
- United Nations Children's Emergency Fund. 2009. Child malnutrition and household food insecurity remain major concerns for Bangladesh. Press Centre. Available at: http://www.unicef.org/media/media\_48981.

- 7. Sen V, Purohit BK, Jain TP. Weight/height 2 ratio in assessment of protein calorie malnutrition. Indian Pediatr. 1980;17(2):135-8.
- 8. Srivastava. Prevalence of malnutrition among infants. Kanpur: Kanpur University; 1983.
- Chakraborty S, Gupta SB, Chaturvedi B, Chakraborty SK. A study of protein energy malnutrition (PEM) in children (0 to 6 year) in a rural population of Jhansi district (UP). Indian J Community Med. 2006;31(4):291.
- 10. Christiaensen L and Alderman H. 2001. Child Malnutrition in Ethiopia: Can maternal knowledge augment the role of income? The world bank. Available at: http://www.worldbank.org.za.
- 11. Mahgoub SED, Nnyepi M, Bondeke T. Factors affecting prevalence of malnutrition among children under three years of age in Botswana. African J Food Agriculture Nutrit Development 2006;6(1):1-15.
- 12. Jeyaseelan L, Lakshman M. Risk factors for malnutrition in south Indian children. J Biosocial Science 1997;29(1):93-100.

**Cite this article as:** Venkatesha KR, Naik RR. Prevalence of protein energy malnutrition among children: a cross sectional study. Int J Contemp Pediatr 2019;6:329-32.