

DETERMINANTS OF PROTEIN ENERGY MALNUTRITION AMONG RURAL PRESCHOOL CHILDREN

Mangala Subramanian¹, Subrahmanyam G²

HOW TO CITE THIS ARTICLE:

Mangala Subramanian, Subrahmanyam G. "Determinants of protein energy malnutrition among rural preschool children". Journal of Evolution of Medical and Dental Sciences 2013; Vol. 2, Issue 47, November 25; Page: 9157-9162.

ABSTRACT: CONTEXT: Protein energy malnutrition (PEM) is a widespread problem in developing countries and 60-70% of them suffer from mild to moderate type. **AIMS, SETTING AND DESIGN:** This was a cross-sectional study in Hoskote Rural Health Centre area of Vydehi Institute of Medical Sciences and Research Centre conducted a) to assess nutritional and health status of the anganwadi children and b) to determine factors contributing to protein energy malnutrition. **METHODS AND MATERIAL:** 268 children under five years of age formed the study group. Interview of the mothers, clinical and anthropometric measurements of the children was conducted. **RESULTS:** 63.8% of the children were undernourished according to IAP classification. Multivariate analysis revealed that birth weight and anemia were significant risk factors for development of protein energy malnutrition (Odds Ratio 1.4 and 2.5 respectively). Only 26.9% of these children had received colostrum. 13.8% had received exclusive breast feeding for six months. Complementary feeding was initiated either too early (<4months) in 22.0% or too late (>7months) in 39.9% of the children. 66.7% of the children were completely immunized. During the study 30.2% of the children suffered from illnesses, acute respiratory infections 57(21.3%), diarrhea 10(3.7%) and 14 (5.2%) had viral fever, fits or acute suppurative otitis media. **CONCLUSIONS:** a) antenatal nutrition to be improved to prevent low birth weight b) nutrition education for mothers to prevent anemia in children c) advocacy for breast feeding and appropriate complementary feeding practices by all health functionaries and anganwadi workers d) nutrition and health education should be given for mothers to enable them to prevent protein energy malnutrition in their children.

KEY WORDS: protein energy malnutrition, health, under five children.

INTRODUCTION: Protein energy malnutrition (PEM) is a widespread problem in developing countries. About 60-70% of children with PEM suffer from mild to moderate type and 2-5% is of severe type.^[1] PEM in turn makes children more prone to infections. Infections and helminthic infestations are important contributing factors in the causation of malnutrition in preschool children consuming inadequate diets.^[2] Other factors such as poverty, illiteracy, large family have been shown to contribute to malnutrition. The risk of death from common childhood diseases is doubled for a mildly malnourished child, tripled for a moderately malnourished child and eight times for a severely malnourished child.^[3] A strong foundation in the very early years of a child are important in the form of care and nurturing, good nutrition including exclusive breast feeding for six months, immunization, access to safe water and sanitation. It also requires that mothers are well cared for during antenatal, intranatal and postnatal period so that children will have a good start in life.^[4] The Integrated Child Development Services Programme was started in 1975 incorporating interventions such as food supplementation, immunization, health care and referral services for children as well as pregnant and lactating mothers. The following study was conducted in Anganwadis in Hoskote,

ORIGINAL ARTICLE

Bangalore rural area with the objectives a) to assess nutritional and health status of anganwadi children in the rural area in Hoskote, Bangalore and b) to determine factors contributing to protein energy malnutrition among preschool children.

MATERIALS AND METHODS: A cross-sectional study was conducted in seven anganwadis around Hoskote, Bangalore rural area in the field practice area of Vydehi Institute of Medical Sciences and Research Centre. Sample size was calculated as 140 based on prevalence of 43% undernutrition among under five age group in National Family Health Survey-3, at 95% confidence interval and β error of 20% with expected drop out of 10%. It was carried out over a period of three months from September to November 2006. All children attending the anganwadis formed the study group. The mothers of the children under five years of age were interviewed using a semi-structured pretested questionnaire comprising of factors which may determine PEM or specific deficiencies in children namely age, sex, parents literacy, socioeconomic status, antenatal care, birth history, birth order, family size, breast feeding, complementary feeding, immunization, infections, feeding during illness and diet history. Socioeconomic status was assessed based on Udai Parikh scale.

The children were assessed clinically as well as anthropometrically as per the guidelines of World Health Organization^[5] and were weighed on a Salter scale with a precision of 100g. Height of children over two years of age was measured using a locally made measuring scale. For children less than two years an infantometer was used. Data analysis was done using SPSS Version 10. Multivariate logistic regression was used in this study.

RESULTS: A total of 281 children were assessed during the study. However, complete information was available only from 268 children. Majority of the families 267(99.6%) belonged to Class 4 and Class 5 of Udai Parikh scale of socioeconomic classification.

Based on Indian Academy of Pediatrics' classification, it can be seen from Table 1 that 171(63.8%) of the children suffered from malnutrition out of which 65(24.2%) suffered from moderate degree and 16(6.0%) from severe malnutrition.

Nutritional Status	Number	%
Normal	97	36.2
Grade I	90	33.6
Grade II	65	24.2
Grade III	15	5.6
Grade IV	1	0.4
Total	268	100

Table 1: Frequency distribution of malnutrition

The majority of the children, 105 (61.4%) with protein energy malnutrition, belonged to the age group of two to four years as shown in Table 2 and this was highly significant statistically($P < 0.001$).

ORIGINAL ARTICLE

Age (months)	Normal (%)	PEM (%)
1-12	19(19.6)	10(5.8)
13-24	23(23.7)	20(11.7)
25-36	28(28.9)	49(28.7)
37-48	14(14.4)	56(32.7)
49-60	13(13.4)	36(21.1)
Total	97(100.0)	171(100.0)

Table 2: Age distribution of children with malnutrition

$$\chi^2 = 26.298 \text{ df}=4 \text{ P} < 0.001$$

Protein energy malnutrition was seen equally among the boys and girls in this study as depicted in Table 3.

Sex	Normal (%)	PEM (%)	Total
Female	46(34.8)	86(65.2)	132(100.0)
Male	51(37.5)	85(62.5)	136(100.0)

Table 3: Sex distribution of children with malnutrition

$$\chi^2 = 0.204 \text{ df}=1 \text{ P} > 0.05$$

In the present study logistic regression forward stepwise was used. The dependent variable consisted of two values zero and one. The independent variables included in this study were i) age ii) sex of the child, iii) educational status of the father of the child, iv) educational status of the mother of the child, v) socioeconomic status, vi) exclusive breastfeeding, vii) complementary feeding after six months, viii) immunization status, ix) infections in the child at the time of the study or within two weeks prior to the study, x) birth weight of the child, xi) clinical signs of Vit. A deficiency, xii) clinical signs of anemia, xiii) clinical signs of malnutrition in the child at the time of the study.

The independent variables birth weight and anemia were significant in the logistic regression as depicted in Table 4. Of the independent variables that have been included in the study these two variables predict malnutrition. The Odds Ratio is 1.4 for birth weight and 2.5 for anemia. It means that the lower the birth weight the chances of becoming malnourished increases by 1.4 times. Similarly if the child is anemic the chances of the child also suffering from protein energy malnutrition are increased by 2.5 times.

Variable	Regression Coefficient	SE	Wald	DF	P-Value	Odds Ratio	95% Confidence Interval
Birth weight	0.321	0.111	8.309	1	0.004	1.378	1.109-1.714
Anemia	0.921	0.341	7.290	1	0.007	2.511	1.287-4.901

Table 4: Logistic Regression Analysis

ORIGINAL ARTICLE

It was found in the present study that only 26.9% of the children received colostrum and the rest received sugar water 147(54.9%), diluted cow's milk 45(16.8%) and 4(1.5%) honey or date juice.

Exclusive breastfeeding was given in only 37(13.8%) for the prescribed six months period. Complementary feeding was started either too early(less than four months) in (22.0%) or too late (more than seven months) in 107(39.9%) of the children.

It came to light that only 179(66.7%) of the under five children were completely immunized.

Out of the 268 children in the study, 81(30.2%) had infections at the time of the study or within the previous two weeks. There were 41(28.5%) of normal children, 19(25%) of first degree malnourished children, 17(45.9%) of second degree malnourished children and 4(36.4%) of third degree malnourished children who suffered from infections during the period of the study. Most of these children suffered from acute respiratory infections (ARI) 57(21.3%), diarrhea 10(3.7%) and 14(5.2%) had viral fever, fits or acute suppurative otitis media.

DISCUSSION: The prevalence of malnutrition in various studies ranged from 48.2% to 71.6%.^[6-9] The present study revealed that 63.8% of the children in Hoskote rural area were malnourished in spite of the fact that the Integrated Child Development Services Programme has been functional in the area since 1991.

It is known that malnourished mothers have a high incidence of low birth weight babies with poor nutritional reserves.^[10] This study shows that such children have a higher risk of becoming malnourished in the long run. Therefore, to prevent protein energy malnutrition it becomes imperative for all antenatal mothers to have regular antenatal care and to improve the nutritional status of the mothers so as to prevent low birth weight babies thus giving them a good start in life. Cohort studies may be taken up in future to look into the nutritional status of antenatal mothers and the contribution to the birth weight of the babies.

Several studies^[11-13] have brought out the prevalence and consequences of micronutrient deficiencies such as anemia. As nutritional deficiencies are generally multiple, anemia due to deficiencies of iron or vitamin B12 and deficiency in folate or protein may be associated. Our study revealed that the risk of the anemic child becoming malnourished was two and a half times more than that of the normal child. Thus it is necessary for appropriate management of anemia by oral iron and folic acid supplements and nutrition education for the mothers to empower them to give iron rich foods to the children.

Totally 81(30.2%) of the children had infection at the time of the study or within the previous two weeks. The study by Sandip et al^[14] also highlighted that acute respiratory infections and diarrhea are the main causes of morbidity in children.

Importance of breastfeeding and colostrum feeding have been highlighted in several studies.^[15,16] The study by Sinha^[17] showed that prelacteal feeds were given by 90% of the mothers. In the study by Kumar et al^[18] more than half the newborns received breastfeeding as late as the third day. Our study showed that 196(73.1%) of the children received prelacteal feeds such as sugar water, diluted cow's milk, honey and date juice while only 72(26.9%) received the precious colostrum. Only 37(13.8%) of the children received exclusive breastfeeding for six months.

ORIGINAL ARTICLE

Complementary feeding is advocated at six months of age whereas in the present study either mothers were giving complementary foods too early (22%) or too late (39.9%) similar to the study by Rao et al.^[19]

It was noted that 66.7% of the children in our study were completely immunized similar to other anganwadi children.^[20] The Integrated Child Development Services Programme needs to be intensified in these anganwadi areas as recommended.^[21]

CONCLUSIONS: Antenatal nutrition should be improved to prevent low birth weight babies and thus prevent PEM in future.

Nutrition education should be given for mothers to prevent anemia in children which is highly associated with PEM.

There should be advocacy for breastfeeding and appropriate complementary feeding practices by all health functionaries and anganwadi workers.

Nutrition and health education should be given to mothers to enable them to prevent PEM in their children.

REFERENCES:

1. IAP Textbook of Pediatrics, 3rd Ed 2006. Jaypee Brothers Medical Publishers (P) Ltd, New Delhi: 120-39.
2. Swaminathan M. Advanced Textbook on Food and Nutrition, 2000. Bangalore Printing and Publishing Co. Ltd: 317-20.
3. UNICEF 1996. The Progress of Indian States: 23-30.
4. UNICEF. The State of the World's Children 2000: 52-55.
5. WHO TRS 854, 1995. Physical Status: The Use and Interpretation of Anthropometry.
6. Rajarathnam Abel, Sampath Kumar V. Tamil Nadu nutritional survey comparing children aged 0-3 years with NCHS/ CDC reference population. Indian J. Pediatr 1998; 65: 565-72.
7. Nandini S, Deepika N, Umesh K. Prevalence of underweight, stunting and wasting. Indian Pediatrics 1997; 34: 627-31.
8. Laxmiah A, Mallikarjuna Rao K, Brahman GNV et al. Diet and nutritional status of rural preschool children in Punjab. Indian Pediatrics 2002; 39: 331-38.
9. National Family Health Survey 1992-93. Reports from Maharashtra, Uttar Pradesh, Haryana, Tamil Nadu and Karnataka. Bombay International Institute for Population Science.
10. Ghai Essential Pediatrics, 6th Ed, 2005. Published by Dr. O. P. Ghai, Delhi: 101-116.
11. Chirmuley D, Nisal R. Nutritional status of tribal under five children in Ahmadnagar District, Maharashtra in relation to weaning/ feeding practices. Indian Pediatrics 1993; 30: 215-22.
12. WHO 2002. Childhood and maternal undernutrition. The World Health Report 2002: 52-56.
13. Hanumantha Rao D, Mallikarjana Rao K, Radhiah G, Prahlad Rao N. Nutritional status of tribal preschool children in the ecological zones of Madhya Pradesh. Indian Pediatrics 1994; 31: 635-40.
14. Sandip Kumar Ray, Anima Haldar, Biswajit Biswas, Raghunath Misra, Satish Kumar. Epidemiology of undernutrition. Indian J Pediatr 2001; 68:1025-30.
15. Kasla RR, Bavdekar SB, Joshy SY, Hathi GS. Exclusive breastfeeding: Protective efficacy. Indian J Pediatr 1995; 62:449-53.

ORIGINAL ARTICLE

16. Geeta G, Anil N. Breast is Best. Indian J Pediatr 1995; 62:687-90.
17. Sinha A, Kumar AR. Infant growth in relation to feeding practices in low income families. Indian Pediatrics 1991; 28: 57-64.
18. Kumar S, Nath LM, Reddaiah VP. Breastfeeding practices in resettlement colony and its implications for promotional activities. Indian J Pediatr 1989; 56: 239-42.
19. Rao S, Rajpathak. Breastfeeding and weaning practices in relation to nutritional status of infants. Indian Pediatrics 1992; 29:1533-39.
20. Tandon BN. ICDS- Past, Present and Future. Indian Pediatrics 1997; 34: 187-91.
21. Shanti Ghosh. Integrated Child Development Services Programme- Need for Reappraisal. Indian Pediatrics 1997; 34: 911-18.

AUTHORS:

1. Mangala Subramanian
2. Subrahmanyam G.

PARTICULARS OF CONTRIBUTORS:

1. Professor, Department of Community Medicine, Vydehi Institute of Medical Sciences & Research Centre, Bangalore.
2. Professor & HOD, Department of Community Medicine, Vydehi Institute of Medical Sciences & Research Centre, Bangalore.

NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Mangala Subramanian,
53, 3rd Main Road,
S.B.M. Colony, Anand Nagar,
Bangalore – 560024.
Email – mangalashubra@gmail.com

Date of Submission: 28/10/2013.
Date of Peer Review: 29/10/2013.
Date of Acceptance: 16/11/2013.
Date of Publishing: 20/11/2013