Epidemiology of Malnutrition among under Five Children in Rural Area in Karnataka, India

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Research Article

Abstract: A cross-sectional study was conducted among 157 children under five years in the field practice area of Vydehi Institute of Medical Sciences and Research Centre. Mothers of the children were interviewed with a pretested questionnaire followed by an anthropometric and a clinical examination of the children. The variables studied were age, sex, religion, parental education, type of family, family composition, socio-economic status, medical illness in the past one month, birth order, gestational age at birth, birth weight, breast feeding, immunization status, dietary intake, housing, environment, iron and vitamin A deficiency. Clinical examination and anthropometric measurements were conducted on all the children. It was found that 42.0 % of these children were malnourished; of these 63.63% had Grade 1 malnutrition, 30.30% had Grade II malnutrition, 4.5% had Grade III malnutrition, 1.5% had Grade IV malnutrition based on Indian Academy of Pediatrics classification. Results showed that socio-economic status, birth weight, housing, mid arm circumference and deficient protein intake were significantly associated with Protein Energy Malnutrition (P<0.05). Thus this study reveals that the above parameters need to be rectified to improve the nutritional status of preschool children in the rural area.

Key words: Protein energy malnutrition, epidemiology.

Introduction

Protein energy malnutrition (PEM) is a potentially fatal body depletion disorder. It is the leading cause of death in children in developing countries[1]. The World Health Organization defines malnutrition as the cellular imbalance between the supply of nutrients and energy and the body's demand for them to ensure growth , maintenance and specific functions. The term protein energy malnutrition applies to a group of related disorders that include marasmus, kwashiorkor and intermediate states of marasmus-kwashiorkor. The term marasmus is derived from the Greek word *marasmas*, which means withering or wasting. Marasmus involves inadequate intake of proteins and calories and is characterized by emaciation. The term kwashiorkor is taken from the Ga language of Ghana and means the sickness of the weaning. Williams first used the term in 1933, and it refers to an inadequate protein intake with reasonable calorie intake. Edema is characteristic of kwashiorkor but is absent in marasmus[2-6]. Internationally in 2000, the WHO estimated that malnourished children numbered 181.9 million (32%) in developing countries. Approximately 50% of the 10 million deaths each year in developing countries occurred because of malnutrition in children younger than five years. In India according to National Family Health Survey-3, the proportion of children with PEM was 46% in 2005-2006 and in Karnataka 41%[7]. The Integrated Child Development Services (ICDS) Scheme was initiated by the Government of India in the Ministry of Social and Women's Welfare in 1975 in the pursuance of the National Policy for Children. Supplementary nutrition is given to children below six years of age. The aim is to supplement nutritional intake by about 200 calories and 8-10g of protein for children below one year and about 300 calories and 15g of protein for children one to five years of age. It is provided for 300 days in a year. An adequate fund for supplementary nutrition is provided in the State Plan under Minimum Needs Programme. The present study was conducted in Anganwadis with the objective of assessing protein energy malnutrition in children below five years and to identify the socio-demographic factors of the disease in the rural field practice area of Vydehi Institute of Medical Sciences and Research Centre at Sarjapura Primary Health Centre, Anekal District, Karnataka.

Materials and Methods

An observational study was conducted over a period of six weeks in Sarjapura Primary Health Centre (PHC) which has a population of 28,332. The study group consisted of 157 children belonging to two anganwadis which were randomly selected out of 33 anganwadis in the PHC area. The parents and the Anganwadi workers were interviewed to obtain the necessary information using a pretested structured questionnaire for initial assessment. The questionnaire comprised of general information of the child and the family, a clinical history of present health status and recent past health status, birth history, immunization status, socio economic status, diet

history and supplementary nutrition. The children were examined clinically and anthropometric measurements were taken as per standards based on the NCHS and CDC 2000 data[8]. The immunization card of every child was examined and the child's attendance at the Anganwadi was noted from the Anganwadi registers. The growth charts maintained at the Anganwadis were also scrutinized. Socio-economic status was based on B.G. Prasad's classification. The dietary intake was calculated based on 24 hour recall method. The calorie and protein content of the food, the Recommended Daily Allowance, the dietary deficit were assessed as per recommendations from the National Institute of Nutrition (NIN), Hyderabad and Indian Council of Medical Research (ICMR)[9-15]. The weights of the children were recorded with Salter's weighing scale with accuracy up to 100g and a standardized stick was used for measurement of height. The grading of PEM was done as per the Indian Academy of Pediatrics classification based on weight for age[16]. The data obtained was analyzed using SPSS Version 10 based on percentages and proportions and associations determined between independent variables and protein energy malnutrition using Chi square test.

Results

The study showed that 42% of the children had protein energy malnutrition according to IAP grading out of the 157 children studied in the under five age group in the field practice area as seen in Table 1.

Table 1: Nutritional Status of Under Five Children

IAP Grading	Total Number	Percentage
Normal	91	58
Grade I	42	26.8
Grade II	20	12.7
Grade III	3	1.9
Grade IV	1	0.6
Total	157	100

The following factors were found to be significantly associated with protein energy malnutrition in the study: a) socio-economic status, b) birth weight, c) housing conditions, d) mid arm circumference and e) protein intake in the diet. Table 2 shows that among the normal children 62.6% children belonged to Class I and Class II (good) socio-economic background and among the malnourished children 54.5% belonged to Class III, IV and Class V (low) socio-economic background.

Table 2: PEM According to Socio-Economic Status

IAP Grading	Socio Economic Status		Total
	Class I & II No.(%)	Class III-V No.(%)	
Normal	57(62.6)	34(37.4)	91
Children with PEM (Grade I,II,III,IV)	30(45.5)	36(54.5)	66
Total(%)	87(55.4)	70(44.6)	157

χ^2=4.63 D.F.=1 P<0.05

Table 3. shows that of the normal children 83.5% were born with an optimal birth weight whereas 37.9 % of the malnourished children were born with low birth weight.

Table 3: PEM Based on Birth Weight

IAP Grading	Birth Weight		Total
	<2500g No.(%)	=>2500g No.(%)	
Normal	15(16.5)	76(83.5)	91
Children with PEM (Grade I,II,III,IV)	25(37.9)	41(62.1)	66
Total(%)	40(25.5)	117(74.5)	157

χ^2=9.22 D.F.=1 P<0.01

In Table 4 it is seen that 60.4% of the normal children lived in good housing conditions. However, among the malnourished children 59.1% of them lived in poor or satisfactory housing conditions.

Table 4: PEM Based on Housing Conditions

IAP Grading	Housing Environment		Total
	Poor or Satisfactory Housing No.(%)	Good Housing No.(%)	
Normal	36(39.6)	55(60.4)	91
Children with PEM (Grade I,II,III,IV)	39(59.1)	27(40.9)	66
Total(%)	75(47.8)	82(52.2)	157

χ^2=5.86 D.F.=1 P<0.05

Table 5 shows that among the normal children 80.2% children had a normal mid arm circumference whereas 42.2% of the malnourished children had a lower mid arm circumference than expected.

Table 5: PEM Based on Mid Arm Circumference

IAP Grading	Mid Arm Circumference		Total
	Normal(=>13.5cms) No.(%)	<13.5cms No.(%)	
Normal	73(80.2)	18(19.8)	91
Children with PEM (Grade I,II,III,IV)	38(57.6)	28(42.2)	66
Total(%)	111(70.7)	46(29.3)	157

χ^2=9.45 D.F.=1 P<0.01

The present study revealed that 87.9% of the normal children consumed sufficient protein in their diet. However, 25.8% of the malnourished children had a deficient protein intake according to the Recommended Daily Allowance.

Table 6: PEM Based on Protein Intake in Diet

IAP Grading	Protein Intake		Total
	Normal Intake No.(%)	Protein Deficiency No.(%)	
Normal	80(87.9)	11(12.1)	91
Children with PEM (Grade I,II,III,IV)	49(74.2)	17(25.8)	66
Total(%)	129(82.2)	28(17.8)	157

χ^2=4.88 D.F.=1 P<0.05

Discussion

It was found in the present study that 42% of the under five children had protein energy malnutrition. Various studies showed that PEM in this age group ranged from 48-71%[17-20]. National Family Health Survey-3 revealed that 46% of children in India and 41% in Karnataka are affected with protein energy malnutrition. PEM is a serious health problem as a large number of children below five years of age are prone to be affected by the co-morbid conditions associated with it leading to a high morbidity and mortality amounting to 50% of the 10 million deaths occurring in developing countries. Thus active participation of Anganwadi workers and health care workers is the need of the hour. Supplementary nutrition alone is of no help especially in malnourished children. Nutrition Education to the mothers of these children is highly important for the proper physical and mental development of these children. One of the reasons for malnutrition among these children was found to be low socio-economic status of the parents. It was seen that 54.5% of the malnourished children belonged to low socio-economic status. The study by Joshi et al also showed that poor socio-economic status and poor housing and environmental conditions significantly contributed to protein energy malnutrition[21]. The housing conditions such as overcrowding, poor ventilation, presence of multiple fly and mosquito breeding sites near the houses where they lived which was indirectly associated with the poor socio-economic status, also significantly contributed to PEM. It is known that malnourished mothers have a high incidence of low birth weight[22]. Birth weight of about 26% of the malnourished children in the present study was found to be below normal. Therefore, maternal nutrition and health status in antenatal period is also an important factor to be looked into. In the study by Udani et al factors such as the longer the PEM, younger the child, poorer the maternal health and literacy the more were the adverse effects of PEM on the nervous system[23]. Mid arm circumference measurement has always been an important indicator of malnutrition more so when age is unknown. In this study too there was significant association of mid arm circumference and protein energy malnutrition. Both protein and calorie intake were inadequate and the daily diet of these children consisted mainly of rice and ragi balls. Inadequate protein intake among affected children had been found to be significantly associated with malnutrition.

Conclusion

Nutrition education to the mothers is essential to help the children grow physically and mentally. The diet should contain more of protein rich foods for nutritional rehabilitation of children with PEM. The Supplementary Nutrition Programme should be implemented more aggressively in the Anganwadis. Socio-economic status of the family can be improved by income generation methods at household level, economic management of finances and indirectly by family planning. Health Education is necessary for mothers regarding good household maintenance, prevention of overcrowding, proper ventilation and lighting and hygienic measures like covering food, providing safe water for children, personal hygiene and improving drainage and sanitation around the house to prevent diseases. MCH services need to be improved and proper nutrition to antenatal mothers is a must to prevent babies being born with low birth weight. Anganwadis should improve their services to antenatal mothers with Supplementary Feeding and Nutrition Education.

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