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A Cross-Sectional Study To Assess The Determinants Of Protein Energy Malnutrition Among Tribal Pre- School Children: A Case Study Of Barjora & Chatna Block, Bankura District In West Bengal, India

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Abstract – In new millennium India faces burden of diseases, like Protein Energy Malnutrition (PEM). UNICEF (2008) estimated that 146 million children were underweight in the developing world. India accounts for 57 million of them. The objectives were to assess the prevalence of PEM among preschool children and to associate the selected socio demographic variables with prevalence of PEM. Cross sectional descriptive design with simple random sampling was used to select two blocks from Bankura district in West Bengal. Totally 1501 children aged between 3-5 years were assessed. The prevalence of underweight was significantly higher in children at 3 years than 4 & 5 years of age. Totally 50% of them were underweight, 32% stunted, 37% wasted and 23% with impaired mid arm circumference. There was significant association between age and sex of the children with PEM at the level of P<0.001. Hence special attention is needed towards nutritional need of children.

A cross-sectional study was done to study the prevalence of Protein Energy Malnutrition (PEM) and interrelationship between Sociodemographic factors and nutritional status of pre-school rural anganwadi children. Cluster sampling technique was used and 245 children aged between 2-6 years were selected. The information was collected using preformed proforma and anthropometry was done to assess the nutritional status of tribal children. It was found that 116(47.3%) of the children are underweight out of them 87(35.5%) and 29(11.8%) of children are in grade I and grade II PEM respectively. 66(27%) children had stunting (low height for age) out of them 54(22%) of children had mild stunting and 12(4.9%) of children had severe stunting. The study showed a significant association between children's nutritional status and each of the explanatory Sociodemographic variables under study.

Nutrition in children is considered as one of the foundation not only for good health and freedom from disease, but also for normal growth and development. Nutrition has a profound and largely incalculable impact on human health. Preschool children are most vulnerable to the effect of undernutrition because of rapid growth and thus their nutritional status is considered to be sensitive indicator of community health. The objective of the study was to study prevalence of protein energy malnutrition in children between one to five years of age; socioeconomic, demographic, ecological and other health problems associated with protein energy malnutrition; immunization status; to suggest appropriate recommendations based on observation.

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INTRODUCTION

Nutrition in children is considered as one of the foundation not only for good health and freedom from disease, but also for normal growth and development. In the global campaign of Health for All, promotion of proper nutrition was one of the eight elements of Primary Health Care (Chakraborty, *et. al.,* 2006).

Nutrition has a profound and largely incalculable impact on human health (Cornelio-Nieto, 2008).

In the millennium declaration of September 2000, member states of the United Nations made a passionate commitment to address the crippling and multiplying problems in many developing areas of the world. Among this, the first goal is to eradicate extreme poverty, which is measured by the prevalence of underweight among the children. The target is to halve the burden of undernutrition. The next goal with regards to children is to achieve two third reductions in under-five mortality and infant mortality by 2015 (Dey, Chaudhuri, 2008). Malnutrition is called an-Invisible Emergency because, much like an iceberg, its deadly menace lies mostly hidden from view. Tribal preschool children are most vulnerable to the effect of undernutrition because of rapid growth and thus their nutritional status is considered to be sensitive indicator of community health (Divakar, *et. al.,* 2013). Malnutrition is more common in India than in Sub-Saharan Africa. One in every three malnourished children in the world lives in India (Ehtisham, *et. al., 2005*). In India, around 46 per cent of all children below the age of three are too small for their age, 47 per cent are underweight and at least 16 per cent are wasted. Many of these children are severely malnourished (Ellen, *et. al.,* 2007). Malnutrition in children is not affected by food intake alone; it is also influenced by access to health services, quality of care for the child and pregnant mother as well as good hygiene practices. Girls are more at risk of malnutrition than boys because of their lower social status (Ehtisham, *et. al., 2005*). Children are at greater risk of dying before age five if they are born in rural areas, poor households, or to a mother denied of basic education. More than half of under-five child deaths are due to diseases that are preventable and treatable through simple, affordable interventions. Strengthening health systems to provide such interventions to all children will save many young lives. Malnourished children, particularly those with severe acute malnutrition, have a higher risk of death from common childhood illness such as diarrhoea, pneumonia, and malaria (Fauveau, *et. al.,* 1990).

Malnutrition lowers the cell mediated immunity and thereby increases the susceptibility for the diseases (Garg, *et. al.,* 1997). In developing nations, there is a significant risk of malnutrition and infection among children who are between first and fifth birthday, particularly those in the process of being weaned from breast milk.

Malnutrition and Infection are the two most important factors that affect the growth of children. In most cases of childhood infections, the cause can be traced to insufficient food intake or absorption, which renders the human system vulnerable to infections. The magnitude of the problem of malnutrition among children under five years of age is high throughout in India. More than 26,000 children under the age of 5 die around the world each day mostly conditions due to preventable causes. Nearly all of them live in developing countries or, more precisely in 60 developing countries. A child's entire life is determined in large measures by the food given to him during his first five years. Childhood is a period of rapid growth and development, and nutrition is one of the influencing factors in this period. A number of anthropometric indices have been used successfully for many years to estimate the prevalence of under-nutrition among tribal pre-school children. These include height-for-age, weight-for-age and weight-for-height. Height-for-age is an index of cumulative effect of under-nutrition during the life of the child. Weight-for-age is the combined effects of both, the recent and the long-term levels of nutrition, whereas weight-for-height reflects the recent nutritional experiences of the child. These indices are reasonably sensitive indicators of the immediate and underlying general causes of nutrition. The risk of mortality is inversely related to children's height-for-age and weight-for-height. Freedom from hunger and malnutrition is a basic human right and their alleviation is a fundamental prerequisite for human and national development.

Nation's wealth depends on its healthy citizens. A healthy adult emerges from a healthy child. As we have entered the new millennium India faces the burden of diseases, especially nutritional deficiency diseases like Protein Energy Malnutrition (PEM).

UNICEF (2008) estimated that 146 million under-five children were underweight in the developing world. India accounts for 57 million of them. It is also attributed that 50 % of childhood deaths in India is due to malnutrition. According to National Family Health Survey (NFHS-3) (2005-06) 45% of under-five children were stunted, 40% were underweight and 23% were wasted in India. In Bankura 30% of children were malnourished.

According to Indian Academy of Pediatrics (IAP) Association, PEM can be classified as underweight, stunted and wasted by using anthropometric measurements of children. PEM affects many children in slum areas. If not adequately treated, some children may progress towards severe acute malnutrition which is life threatening conditions. Therefore, the management of PEM should be a public health priority.

WHO global database of child growth, which covers 87% of the under five years from total population in developing countries, describe the worldwide distribution of PEM, based on nationally representative cross-sectional data gathered between 1980 & 1992 in 79 developing countries in Africa, Asia, Latin America and Oceania. A total 80% of the children were affected

in Asia mainly in Southern Asia. According to many review of literature the prevalence of PEM among children especially in urban slum region is more. Countrywide data for the prevalence of malnutrition in urban slums is lacking. In the NFHS-2 report, the figures for underweight, stunting and wasting in urban areas were 38%, 36% and 13% respectively. The objectives were to assess the prevalence of PEM among tribal preschool children and associate the selected socio demographic variables with that.

METHODOLOGY

The present study was a cross-sectional study carried out over a period of six months. Cluster sampling technique was adopted to select study subjects. There were total 2079 children enrolled in the 35 Anganwadi centres. From each quadrant, Anganwadi centres were selected randomly and from each selected Anganwadi, all children aged between 2-6 years were included in the study. Children who were not attending Anganwadi regularly and severely ill children were excluded from the study. Based on the study by (Mandal, *et. al.,* 2009), the prevalence of underweight for 2 – 6 year old children was 63.3%, assuming for present study the prevalence rate 63% at 95% confidence level and 10% of allowable error, the sample size required was calculated as 226. A total of 19 Anganwadi centres with 245 children aged between 2-6 years were included.. After reviewing previous studies related to this field, a proforma was designed. All the Anganwadi teachers and workers were informed about the study in the monthly meeting. Data collection was done for 2 days in a week from 10:00 AM to 1:00 PM. The data was collected by interviewing the parent or caretaker using proforma during house-to-house visit. The information regarding parents' education, occupation, religion, per-capita income and feeding practices was collected. General physical examination including recording of anthropometry was done. This was followed by relevant systemic examination.

STATISTICAL ANALYSIS

Data thus obtained was coded and entered into Microsoft excel worksheet. This was analyzed using SPSS version 17 and Open Epi version 2.3. The frequency distribution of the study subjects according to age, sex, religion, educational status, socioeconomic status, birth order and feeding practices were analyzed. Prevalence of PEM was worked out along with 95% confidence interval. In addition to overall prevalence rate, the prevalence of PEM was also estimated in relation to certain selected factors such as age, sex, religion, educational status of parents, socioeconomic status, birth order and feeding practices. To find out the association of PEM with the above factors, chi- square test and Fisher exact test was applied for each of the factor. The statistical significance was evaluated at 5% level of significance. Microsoft Word and Microsoft Excel were used to generate graphs and tables.

RESULTS AND DISCUSSION

The study was conducted among 245 children aged 2-6 years. Out of 245 children, 121(49.4%) were boys and 124(50.6%) were girls. Majority 200(81.6%) of children were Hindus and 220(89.8%) of fathers and 208(84.9%) mothers were literate. Most of the children belonged to Socio-economic status class III 149(60.8%) according to modified B G Prasad classification. It was found that 116(47.3%) of the children were underweight. 87(35.5%) and 29(11.8%) of children were in grade I and grade II PEM respectively and no child was of grade III and IV PEM according to IAP classification (Table 1).

PEM Grade (IAP Classification)	Number of children	%
Normal	129	52.7
Grade I	87	35.5
Grade II	29	11.8
Grade III	-	-
Grade IV	-	-

Table 1: Nutritional status of children according to Protein energy malnutrition (IAP Classification) grades

According to NFHS 3 (2005-06), 43% of children fewer than five years of age were underweight which is nearer to the results of the present study. In other studies by Shakur et al., (2009) 51.97% - 67% of the children had underweight.

Stunting: According to the WHO recommended classification the prevalence of stunting (low height for age) in present study was 66(27%), out of them 54(22%) of children had mild stunting and 12(4.9%) of children had severe stunting (Table 2).

Malnutrition (Height for age)	Number of children	%
Normal	179	73.1
Stunting	54	22.0
Severely stunting	12	4.9
Total	245	100.0

Table 2: Nutritional status of children according to Height for age (WHO Classification).

Association between socio-demographic variables and the nutritional status of the children-

Age: It was observed that maximum prevalence of underweight was in age group 36-48 months i.e.

50(59.5%) and least prevalence in 24-36 months i.e. 32(31.4%). This difference was highly significant statistically (Table 3).

Age in months	Children observed		Normal		Underweight	
	No.	%	No.	%	No.	%
24-36	102	41.6	70	68.6	32	31.4
36-48	84	34.3	34	40.5	50	59.5
48-60	59	24.1	25	42.4	34	57.6
Total	**245**	**100.0**	**129**	**52.7**	**116**	**47.3**
					χ^2=17.94	P< 0.001

Table 3: Nutritional status of tribal preschool children according to Age.

Sex: In present study, prevalence of underweight among male and female children was found to be 56 (46.3%) and 60 (48.4%) respectively, this difference was not statistically significant (Table 4)

Gender	Children observed		Normal		Underweight	
	No.	%	No.	%	No.	%
Male	121	49.4	65	53.7	56	46.3
Female	124	50.6	64	51.6	60	48.4
Total	**245**	**100.0**	**129**	**52.7**	**116**	**47.3**
					χ^2=0.037	P=0.84

Table 4: Nutritional status of tribal preschool children according to Sex.

Similar to the results of present study, the study conducted by (Garg, *et. al.,* 1997) showed 57.5 % males and 59% females were malnourished which was not significant statistically. Religion: In present study the proportion of underweight was significantly higher among Hindu children i.e. 99(50%) when compare to Muslim children i.e. 10(27%) (Table5).

Literacy Status	Children observed		Normal		Underweight	
	No.	%	No.	%	No.	%
Hindu	200	81.6	101	50	99	50
Muslim	37	15.1	27	72	10	27
Others*	8	3.3	1	12.5	7	87.5
Total	**245**	**100.0**	**129**	**52.7**	**116**	**47.3**
					χ^2=5.47	P= 0.019

Table 5: Nutritional status of tribal preschool children according to Religion.

According to NFHS 3 (2005-2006) report, Hindu and Muslim children were about equally likely to be undernourished, but Christian, Sikh, and Jain children were considerably better nourished.

CONCLUSION

The nutritional status of a community particularly of its vulnerable groups comprising of children has been recognized as an important indicator of national development which in turn depends on social development indices. Nutritional inadequacies will result in the hampering of the development of the body. Future of the country is determined by the growing generation of the country. It is the health status of children of any country that represents the health status of people of that country. Since this growing generation is going to be the future productive citizens, they should be healthy enough to make use of the full potential of their productive age. Community based preventive measures should be taken to allievate malnutrition. Health education to the parents, especially to the mothers on dietary practices like feeding their children with healthy food in terms of quality and quantity should be given. Nutritional rehabilitation centres should be established. Improving the socioeconomic standards is mandatory.

Protein energy malnutrition is an important public health problem in India. The occurrence of PEM is more in children of 3-6 years of age group and also it has linear trends which mean as the age increases the prevalence rate is decreasing. So the mothers or care givers of the children should pay special attention towards nutrient need of them at the earliest. The PEM is higher in mothers with primary education because of lack of awareness among them. The extent of malnutrition can be countered by educating the parents with respect to basic nutritional requirements of their children and encouraging them to consume locally available low cost foods. If child's health improved, the country status will improve definitely.

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