

Research Article

An epidemiological study of protein energy malnutrition among children below six years' age in an urban slum of Gurgaon, Haryana, India

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ABSTRACT

Background: Poorly nourished child grows less rapidly during first 6 years of age. In India, around 43% of fewer than five children were underweight. Child protein energy malnutrition reflects a number of intermediately processes such as household access to food, access to health service and caring practices. The present study was undertaken to assess prevalence of PEM as well as the nutritional status of children below six years' age group and to explore most probable risk factors influencing PEM.

Methods: The study was a community based cross-sectional study carried out in 500 randomly selected households in a slum area of Gurgaon among the children below 6 years of age using pretested Performa which contained details regarding socio-demographic, nutritional conditions and utilization of health care services. Nutritional status was assessed by Physical examination, anthropometric measurement, haemoglobin and parasitological (stool) tests. Nutritional grading was done according to by physical and anthropometric examination of child using Indian Academy of Pediatrics (IAP) classification and supplemented by WHO growth chart. Data was entered in the MS Excel sheet and analyzed using Epi info Ver 7.

Results: During survey acute illness detected among 0.25% children and chronic illness prevalence was 25%. Prevalence of PEM was found to be 43.86% (37.73% among males, 50.0 % among females). Clinical signs of nutritional deficiency were detected among 31.48 % of children. Common types of nutrition deficiency were anemia, PEM, and vitamin A and B complex deficiencies. Main reasons of PEM were attributed to female sex, poor literacy of parents, low socioeconomic status, higher No. siblings and large family, recurrent diarrhea and other infections, prolonged breast feeding with delayed introduction of supplements particularly semisolid and poor quality of supplements. Intestinal parasite detected among 38.43% of children, commonest parasite being giardia, ascariasis and thread worms; existing health services utilized in 30.72% of total illness. This was identified not due to lack of knowledge but other domestic problems.

Conclusions: Prevalence of PEM was attributed to poor living conditions, poor literacy status of parents, higher No. of siblings, poor utilization of health services, poor nutritional services of children and faulty breast feeding and weaning practices in the family. Public health specialists should plan interventions focusing on these issues.

Keywords: Protein energy malnutrition, Preschool children, Morbidity, Poor weaning practices

INTRODUCTION

The most crucial period in a child's growth is first 6 years of life since 40% of physical growth and 80% of mental growth are believed to take during these years.¹ In India,

around 43% of under five children were underweight according to the report of third National Family Health Survey (NFHS-3) conducted during 2005-06.² Nutritional status indicators like wasting, stunting, low birth weights, breast feed availability and vitamin A

deficiency are also still high in India compared to the USA and China.³ Child protein energy malnutrition (PEM) reflects a number of intermediately processes such as household access to food, access to health service and caring practices.⁴

Nutritional status and magnitude of morbidity of children particularly due to nutritional factors of slum dwellers in Haryana have not been worked out except for patchy studies carried out.

Therefore, the present study was carried out to assess the prevalence of PEM and nutritional status of children below six years' age group in an urban slum and also to explore probable risk factors influencing PEM.

METHODS

The present study was carried out in Basai slum area which represents a typical urban slum of Gurgaon city. The study was a community based cross-sectional study based on random sampling technique used for selection of households.

Study participants were all the children below 6 years of age residing in study area. An optimum sample size for study was obtained by $4PQ/L^2$ assuming the PEM prevalence (P) of 40% in children (0-6 years) with 10% relative precision and 95% confidence interval. Expecting 10% family nonresponsive, 660 children were targeted for interview.

The Study was confined to 500 randomly chosen families out of 12000 populations by house to house visits on predesigned structured, pretested performa which contained details regarding socio-demographic, environmental factors, nutritional morbid conditions and information regarding utilization of available health care services that provide preventive, promotive, curative services to inhabitants.

Nutritional status was assessed by physical examination, anthropometric measurement, haemoglobin and parasitological (stool) tests done (for 06 months-72 months of age group).

Nutritional grading was done according to physical and anthropometric examination of child using Indian Academy of Pediatrics (IAP) classification supplemented by WHO growth chart.

The weight (in kg with precision up to 100 gm.) of the children was measured using standardized electronic weighing scale with minimal clothing and without footwear.

Height of the respondents recorded in centimetre's with 10 cm precision using infantometer (below 2 years age)/stadiometer. Socio-economic status was determined by

using modified Prasad's scale (Prasad's SES classification, 2013).⁵

Dietary Survey was attempted using 24 hours recall method of family followed for assessing the dietary status of children by food frequency method. Data was entered in the MS Excel sheet and analyzed using Epi info Ver 7.

Statistical value (p- value) was calculated using chi-square tests. Children identified with unhealthy conditions/diseases were examined and treated. Participants who required further management and follow up were referred to medical college.

RESULTS

Prevalence of PEM

During survey, acute illness detected among 0.25% children and chronic illness prevalence was 25%. Common types of nutrition deficiency (Table 1) were anemia, PEM, and vitamin A and B complex deficiencies.

Age and sex and PEM

As depicted in Table 2-4, prevalence of PEM was found to be 43.86% (37.73% among males, 50.0 % among females). PEM showed a significance difference in various age groups of children, the peak being in 13-24 months' age followed by 36-47 months.

Other factors and PEM

Main reasons of poor nutritional status were attributed to female sex, large family size and more siblings, low socioeconomic status of parents and poor literacy of parents (Table 5 and 6).

Other risk factors associated with malnutrition found in the study were history of death more than 2 siblings, recurrent attack of diarrhoeal and other infections, prolonged breast feeding with delayed introduction of supplements particularly semisolid and poor quality of supplements.

As shown in Table 5, Intestinal parasite detected among 38.43% of children, commonest parasite being giardia, ascariasis and thread worms. Existing govt. health services were utilized in 30.72% of total illness (Table7).

This was identified not due to lack of knowledge but other domestic problems. Utilization of services was poor not only among curative services but also regarding preventive services.

Table 1: Various clinical sign of malnutrition among children examined.

Clinical sign of malnutrition	No of children male	No of children female	Total (n=700)	
			No.	(%)
Hair changes	123	153	256	(36.87)
Skin changes	61	84	145	(20.75)
Xerosis conjunctiva	17	24	41	(20.75)
Bitot's spots	03	03	06	(00.88)
Chellosis	20	22	42	(06.00)
Angular stomatitis	12	24	36	(05.12)
Muscle wasting	17	28	45	(6.50)
Pallor	123	135	258	(36.88)
Marasmus	02	05	07	(1.00)

Table 2: Distribution of children nutritional status based on weight for age.

Age group in months	Adequate weight	Grade I malnutrition	Grade II malnutrition	Grade III malnutrition	Grade IV malnutrition	Total malnutrition
06-12	51	22	03	03	02	30
13-24	63	51	25	11	03	90
25-36	99	42	18	02	02	64
37-48	108	48	16	01	0	65
49-60	58	33	05	01	0	39
61-72	14	13	05	01	0	19
Total	393	209	72	19	7	307

$\chi^2 = 25$; DF=5; P=0.00012.

Table 3: Distribution of male children nutritional status based on weight for age.

Age group in months	Adequate weight	Grade I malnutrition	Grade II malnutrition	Grade III malnutrition	Grade IV malnutrition	Total malnutrition
06-12	29	05	0	0	0	05
13-24	33	26	08	01	01	36
25-36	63	24	05	01	01	31
37-48	59	21	06	01	0	28
49-60	30	17	03	01	0	21
61-72	04	08	02	01	0	11
Total	218	101	24	05	02	132

$\chi^2 = 24$; DF=5; P=0.00019

Table 4: Distribution of female children nutritional status based on weight for age.

Age group in months	Adequate weight	Grade I malnutrition	Grade II malnutrition	Grade III malnutrition	Grade IV malnutrition	Total
06-12	22	17	04	03	01	25
13-24	31	26	17	09	02	54
25-36	36	17	11	01	02	31
37-48	49	27	10	0	0	37
49-60	27	16	03	0	0	19
61-72	10	05	03	01	0	09
Total	175	108	48	14	05	175

$\chi^2 = 9.90$; DF=5; P=0.07793

Table 5: Other factors and PEM.

Factor		Normal	Malnutrition	Stat calculations
Family size	1	32	16	
	2	118	67	
	3	80	62	$\chi^2 = 8.6276$
	4	66	65	DF = 4
	5+	97	97	P=0.0711
Total		393	307	
Socio economic status				
	Class II	63	21	
	Class III	45	28	$\chi^2 = 15.9825$
	Class IV	92	83	DF = 3
	Class V	193	175	P=0.0001
Total		393	307	
Literacy status				For father $\chi^2 = 8.2963$
	Literate father	280	187	DF = 1
	Illiterate father	113	120	P=0.0039
	Literate mother	206	89	For mother $\chi^2 = 38.7961$
	Illiterate mother	187	218	P=0.00001
Worm infestation				
	Ascariasis	06	14	
	Hookworm	00	03	
	Threadworm	04	15	$\chi^2 = 11.719$
	E. histolytica	02	06	DF = 1
	Giardiasis	11	27	P=0.0006
	Negative	92	72	
Total		115	137	
Age solid started (months)				
	-6	72	33	
	6-9	114	54	$\chi^2 = 50.156$
	9-11	150	102	DF = 4
	12-17	42	70	P=0.00001
	18-24	15	48	

Table 6: Distribution of children by duration of breast feeding.

	Not breast fed	Below 3	3-5 months	6-11 month	12-17	Over 18	Total
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)
Breast fed duration	13 (1.8)	26 (3.7)	39 (1.8)	58 (5.6)	246 (35.2)	318 (45.4)	700 (100.0)
Supplementation with artificial milk	At birth 233 (33.3)	207 (29.6)	71 (10.2)	58 (8.4)	7 (0.09)	66 (9.3)	58 (8.3)

Table 7: Utilization of health services.

Source of getting treatment	No.	(%)
Allopathic/ Govt hosp/ dispensary	215	(30.72)
Local/ indigenous practitioner	370	(52.85)
Homeopathic	12	(01.71)
Ayurveda/ Unani	20	(02.86)
Folk medicine	63	(09.0)
None treatment	20	(02.86)
Total	700	(100.0)

DISCUSSION

In the present study, the prevalence of malnutrition and its relation to various epidemiological factors among 700 children was assessed on the basis of weight for age, using IAP classification. As per study, 43.86% of children were malnourished which is in accordance to the previous study of Singh et al done in rural Meerut district of India among 406 children (1-6 years) and revealed that 57.4% children were malnourished whereas another study reported that prevalence of underweight among children under six years of age was 53.3% in Uttar Pradesh, a largest populated state of India.^{6,7}

Nearly three fourth of children of 1-3 years age group were malnourished which is similar to finding of a study done by Chakraborty et al in rural Jhansi who observed that malnutrition was significantly ($p \leq 0.05$) more prevalent in the younger age (1-3 years) group children (80.9%).⁸ Regarding the sex, nearly two third of female children (61.8%) in comparison to male children (48.6%) were more malnourished. In a study, done by Stalin P et al among 563 under five children in rural Tamil Nadu, India found a significant association between malnutrition and sex of children with prevalence of underweight, 62.6% and 44% among female and male children, respectively.⁹

As per study, only 45.2% children were of normal weight whereas 33%, 18.3% and 3.5% children of grade I, II and III were malnourished which is in accordance to the previous study⁸ that reported, 46.69% children were of normal weight but 32.09%, 20.24% and 0.98% of grade I, II, and III/IV under six children were of underweight in Uttar Pradesh, India, respectively.

Children belonging to nuclear family were more affected with PEM than the joint family which is similar to findings of Singh et al that reported 63.8% and 52.9% children of nuclear and joint family were malnourished, respectively.⁶ It may be due to the reason that children in the joint family are nutritionally better cared as there is tendency to share the food with the children by all the family members.

The prevalence of PEM was found to be higher in those children who have ≥ 3 siblings compare to children with 1-2 siblings which is in accordance to findings of Sengupta et al and Bhavsar et al that reported majority of children, 51.7% and 67.2% were malnourished who have ≥ 3 siblings, respectively.^{10,11}

Literate mothers adopt many improved behaviors related to maternal and child health care, feeding and eating practices which ultimately affect the nutritional status of children. As per study, more than half (59%) children of illiterate mother as compared to children of literate mother were malnourished. Similar result that the prevalence of PEM among children decreased with

increasing mother's literacy was reported by NFHS-III (2005-06) and Singh et al.^{2,6}

On the other hand the prevalence of PEM in children was also found to be significantly higher whose father's educational level was illiterate or primary school. whereas in another study by Sengupta et al observed that most (80.2%) of children belonging to lower class (IV+V) were significantly malnourished.¹⁰ A study done by Bhavsar et al in Mumbai urban slum also revealed that nearly two third children under six of illiterate/primary school father were malnourished.¹¹ It was observed that the socio economic status of the family improved the nutritional status of the children. A study done by Stalin P et al in rural Kancheepuram, Tamil Nadu found that nearly two third (63.4%) and half (47.2%) children in category IV and V were significantly ($p < 0.05$) malnourished, respectively.⁹

In the present study, the majority (43.86%) of children who were malnourished, their mother did not have adequate knowledge regarding the diet requirements of her child and the nutritional value of food items. This is similar to the findings from a study done by Joshi et al in western Nepal that reported, 58% children (4-14 years) were malnourished whose mother has inadequate knowledge about diet. In India although majority (76.2%) of under six children were covered by an ICDS but only 14.7% of children received service of supplementary food (NFHS-III).^{2,12} As per the study, more than half children were malnourished who were not utilizing service of complementary food which is in accordance to the study of Stalin P et al where that more than half (54.8%) of children were malnourished. In present study, it was observed that malnutrition children were significantly more in large family, higher No. of siblings, poor literacy status of parents and low socioeconomic conditions, these were comparable with findings of other study carried out by Prasoti et al in Uttar Pradesh region.^{9,13}

CONCLUSION

Prevalence of PEM was attributed to poor living conditions, poor literacy status of parents, higher No. of siblings, poor utilization of health services, poor nutritional services of children and faulty breast feeding and weaning practices in the family. Public health specialists should plan interventions focusing on these issues.

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REFERENCES

1. Millennium Development Goals (MDG) report 2012. Available at: <http://www.un.org/>

- millenniumgoals/ reports.shtml (accessed on 10/06/2016).
2. National Family Health Survey (NFHS-3), India, 2005-06. Ministry of Health and Family Welfare, Govt. of India, International Institute for Population Sciences Deonar, Mumbai. Available at: <http://www.indiahealthstat.com>. (Accessed on 11/06/2016).
3. UNICEF India. The Children - Nutrition. (Pb) .New Delhi 2014 Available at: http://www.unicef.org/india/ children_2356.htm (accessed on 10/06/016)
4. Levels and trends in child mortality report 2011. Estimates developed by the UN inter-agency group for child mortality estimation. Available at: http://www.unicef.org/media/files/Child_Mortality_Report_2011_Final.pdf (accessed on 11/06/2016).
5. Reddy SD, Arlappa N. An updated Prasad's socio economic status classification. *Int J Res Dev Health*. 2013;1:2-4.
6. Singh AK, Jain S, Bhatnagar M, Singh JV, Garg SK, Chopra H, et al. Socio-demographic determinants of malnutrition among children of 1-6 Years of age in rural Meerut. *IOSR Journal of Dental and Medical Sciences*. 2012;3:37-40.
7. Freedom from hunger for children under six. An outline for save the children and civil society involvement in childhood under nutrition in India, April 2009; 4th Floor, Farm Bhavan, Nehru Place New Delhi.
8. Chakraborty S, Gupta SB, Chaturvedi B, Chakraborty SK. A Study of Protein Energy Malnutrition (PEM) in Children (0 to 6 years) in a Rural Population of Jhansi District (U.P.) *Indian J Community Medicine*. 2006;31:1-4.
9. Stalin P, Roy JB, Dimri D, Singh Z, Senthilvel S, Sathyanarayanan S. Prevalence of underweight and its risk factors among under five children in a rural area of Kancheepuram district in Tamil Nadu. *IOSR Journal of Dental and Medical Sciences*. 2013;3:71-4.
10. Sengupta P, Philip N, Benjamin AI. Epidemiological correlates of under-nutrition in under-5years children in an urban slum of Ludhiana. *Health and Population: Perspectives and Issues* 2010;33:1-9.
11. Bhavsar S, Mahajan H, Kulkarni R. Maternal & environmental factors affecting the nutritional status of children in Mumbai urban slum. *International J Scientific and Research Publications*. 2012;2:11-4.
12. Joshi HS, Gupta R, Joshi MC, Mahajan V. Determinants of nutritional status of school children, western region of Nepal. *NJIRM*. 2011;2:10-2.
13. Prasoti RM, Verma SK, Kashyp S, Khanaujiya MK. An epidemiological study of Protein Energy Malnutrition (PEM) among 1-6 years children in rural Lucknow, Uttar Pradesh, India. *IOSR Journal of Dental and Medical Sciences*. 2014;4:10-4.

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