

Original Research Article

## **Protein Energy Malnutrition and Its Association with Common Morbidities among 1-5 Years Aged Children in a District of Central Uttar Pradesh: A Cross Sectional Study**

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### **ABSTRACT**

**Background:** Malnutrition continues to be a primary cause of ill health and mortality among children in developing countries. It is a major public health problem and accounts for about half of all child deaths worldwide. Under-nutrition is still the major problem in our country especially in underserved areas such as urban slums. So the present study was conducted to know prevalence of Protein Energy Malnutrition (PEM) and its association with common morbidities among 1-5 years aged Children of Urban slums of Farrukhabad District of Uttar Pradesh.

**Methodology:** The present study was conducted in the department of Pediatrics, Major SD Singh Medical College, Farrukhabad (UP). Data were collected from urban slums of Farrukhabad District. It was a cross sectional study and duration of study was one year from January 01 to December 31, 2014. Total numbers of children enrolled for study 600.

**Results:** In the present study total of 600 children were selected from urban slum. Out of which 273 (45.5%) were males and 327 (54.5%) were females. Maximum number of children were in the age group of 2-3 years (34.83%) followed by 4-5 years (26.5%). Minimum number of children was in the age group of 1-2 years i.e. 18%. Overall prevalence of protein energy malnutrition (PEM) in study subjects was 60.17%. It was more in females (65.14%) than males (54.21%). 26.17% children were having history of ARI and among these children 33.76% were underweight, 64.97% were stunted and 29.94% were wasted. 33.67% children were having history of diarrhea and among these children 57.92% were underweight, 56.43% were stunted and 18.32% were wasted.

**Keywords:** PEM, underweight, ARI, diarrhea.

### **INTRODUCTION**

Malnutrition continues to be a primary cause of ill health and mortality among children in developing countries. It is a major public health problem and accounts for about half of all child deaths worldwide. [1] About 150 million children in developing countries are still malnourished and more than half of underweight children live in South East

Asia Region (SEAR). [3] Nearly one in five children under age five in the developing world is underweight (MDG report, 2012). [3] The World health Organization has reported hunger and related malnutrition as the greatest single threat to the world's public health. One in every three malnourished children of the world lives in India [4] and under-nutrition is a major cause in more than half of under-five

deaths. [5] The high levels of under nutrition in children in South Asia pose a major challenge for child survival and development. Besides poverty, there are other factors that directly or indirectly affect the nutritional status of children. Several studies showed that maternal education emerges as key element of an overall strategy to address malnutrition. [6] The best global indicator of children's well being is growth. Assessment of growth is the single measurement that best defines the nutritional and health status of children, and provides an indirect measurement of the quality of life of the entire population. [7] Despite the spectacular increase in the food grain production in recent years the problem of chronic malnutrition continues extensively, especially among 6 years old. Under-nutrition is still the major problem in our country especially in underserved areas such as urban slums. [8] So the present study was conducted to know prevalence of Protein Energy Malnutrition (PEM) and its association with common morbidities among 1-5 years aged Children of Urban slums of Farrukhabad District of Uttar Pradesh.

## MATERIALS AND METHODS

The present study was conducted in the department of Pediatrics, Major SD Singh Medical College, Farrukhabad (UP). Data were collected from urban slums of Farrukhabad District. Prior to study, ethical clearance was taken from the ethical committee of the college. It was a cross sectional study and duration of study was one year from January 01 to December 31, 2014. Total numbers of children enrolled for study 600. Sample

size was calculated by using formula  $n = \frac{4pq}{L^2}$  (allowable error: 10%) and taking prevalence of PEM 40% (NFHS 3 report). [2] Reasons for the study were explained to children's parents; prior to interview, a written consent was taken. All the children between 1-5 years age groups were included in the study. Children, whose parents did not give consent, children who were temporary visitor to the house and children who were severely ill were excluded from the study. A pretested semi structured questionnaires was adopted. The information regarding age, sex height/length and weight of children, parent's education, number of siblings, religion, category, type of family, and socioeconomic status were collected. Body weight was measured without any footwear and with minimal clothing nearest to 0.5 Kgs. For children between 1-2 years, the supine length was measured using an infantometer and for children 2-5 years, standing height was measured without any foot wear to nearest 0.5 cms. Data were analyzed by using suitable statistical tests.

## RESULTS

In the present study total of 600 children were selected from urban slum of Farrukhabad District. Out of which 273 (45.5%) were males and 327 (54.5%) were females.

Table 1: Distribution of study subjects according to Age and (N=600)

Age (Years)	Male		Female		Total	
	No.	%	No.	%	No.	%
1-2	47	43.51	61	56.49	108	18.0
2-3	111	53.11	98	46.89	209	34.83
3-4	64	40.25	95	59.75	159	26.5
4-5	51	41.13	73	58.87	124	20.67
<b>Total</b>	<b>273</b>	<b>45.5</b>	<b>327</b>	<b>54.5</b>	<b>600</b>	<b>100.0</b>

Table 2: Age and Sex wise prevalence of PEM among study subjects (N=600)

Age (Years)	Male		Female		Total	
	No. of children	Under weight	No. of children	Under weight	No. of children	Under weight
1-3	158(49.84)	103(65.19)	159(50.16)	121(76.10)	317(52.83)	224(70.66)
3-5	115(40.64)	45(39.13)	168(59.36)	92(54.76)	283(47.17)	137(48.41)
<b>Total</b>	<b>273(45.5)</b>	<b>148(54.21)</b>	<b>327(54.5)</b>	<b>213(65.14)</b>	<b>600(100)</b>	<b>361(60.17)</b>

Figures in parenthesis show percentages.

Age-  $\chi^2 = 17.223$ ,  $p < 0.05$  Sex-  $\chi^2 = 12.07$ ,  $p < 0.05$

**Table 3: Prevalence of Underweight among study subjects in relation to socio-demographic factors (N=600)**

Variables	Normal weight	Under weight	Total	Significance
<b>Religion</b>				
Hindu	137(32.08)	290(67.92)	427(71.17)	X <sup>2</sup> =37.10 P<0.05
Islam	102(58.96)	71(41.04)	173(28.83)	
<b>Category</b>				
General	145(77.13)	43(22.87)	188(31.33)	X <sup>2</sup> =174.32 P<0.05
Other Backward Class	69(31.80)	148(68.20)	217(36.17)	
Schedule Caste	25(12.82)	170(87.18)	195(32.5)	
<b>Type of family</b>				
Nuclear	112(34.35)	214(65.65)	326(54.33)	X <sup>2</sup> =8.93 P<0.05
Joint	127(46.35)	147(53.65)	274(45.67)	
<b>Mother's education</b>				
Illiterate	141(37.00)	240(63.00)	381(63.50)	X <sup>2</sup> =3.47 P=0.06
Literate	98(44.75)	121(55.25)	219(36.5)	
<b>Father's education</b>				
Illiterate	66(22.08)	233(77.92)	299(49.83)	X <sup>2</sup> =78.43 P<0.05
Literate	173(57.47)	128(42.53)	301(50.17)	
<b>Housing and Environmental conditions</b>				
Poor	77(32.49)	160(67.51)	237(39.50)	X <sup>2</sup> =21.17 P<0.05
Satisfactory	139(41.87)	193(58.13)	332(55.33)	
Good	23(74.19)	8(25.81)	31(5.17)	

Table 1 shows that maximum number of children were in the age group of 2-3 years (34.83%) followed by 4-5 years (26.5%). Minimum number of children was in the age group of 1-2 years i.e. 18%.

Table 2 shows that overall prevalence of protein energy malnutrition (PEM) in study subjects was 60.17%. It was more in females (65.14%) than males (54.21%). Children in the age group of 1-3 years were more malnourished (70.66%) than in the age group of 3-5 years (48.41%).

Table 3 shows prevalence of underweight among study subjects in relation to socio-demographic factors. There was significant association between PEM and religion. More than two third (71.17%) of children were Hindu while rest were Muslims and Hindu children (67.92%) were more malnourished than the Muslim children (41.04%). Regarding the category 32.5% children belonged to schedule caste in which more than three

fourth (87.18%) were significantly malnourished as compared to general caste children (22.87%). Majority (54.33%) of children belonged to nuclear family while the rest (45.67%) to joint family and the prevalence of PEM was significant (65.65% and 53.65% respectively). Children whose mothers were illiterate were having more PEM (63.00%) as compared to children whose mothers were literate (55.25%) and this association was significant. The same association was found in father's literacy also. Statistically significant association was found between PEM and condition of housing and environment. Nearly two third (67.51%) children were affected with PEM who were living in poor conditions of housing and environment.

**Table 4: Common morbidities reported in study subjects in the last one month**

Morbidity	Number	Percentage
Acute Respiratory Infection	157	26.17
Diarrhoea	169	28.17
Worm Infestation	73	12.17
Skin Infection	54	9.00

**Table 5: Nutritional status of study subjects according to history of Acute Respiratory Infection**

ARI	Children observed		Underweight		Stunting		Wasting	
	No.	%	No.	%	No.	%	No.	%
Present	157	26.17	53	33.76	102	64.97	47	29.94
Absent	443	73.83	308	69.52	152	34.31	42	9.48
<b>Total</b>	<b>600</b>	<b>100.00</b>	<b>361</b>	<b>60.17</b>	<b>254</b>	<b>42.33</b>	<b>89</b>	<b>14.83</b>
			X <sup>2</sup> =17.41, p<0.05		X <sup>2</sup> =16.53, p<0.05		X <sup>2</sup> =26.39, p<0.05	

**Table 6: Nutritional status of study subjects according to history of Diarrhoea**

ARI	Children observed		Underweight		Stunting		Wasting	
	No.	%	No.	%	No.	%	No.	%
Present	202	33.67	117	57.92	114	56.43	37	18.32
Absent	398	66.33	244	61.31	130	32.66	42	10.55
<b>Total</b>	<b>600</b>	<b>100.00</b>	<b>361</b>	<b>60.17</b>	<b>244</b>	<b>40.67</b>	<b>79</b>	<b>13.17</b>
			$X^2=0.16,$ $p=0.688$		$X^2=12.62,$ $p<0.05$		$X^2=5.30,$ $p<0.05$	

Table 4 shows common morbidities among children in the last month from the interview. Acute Respiratory Infection was reported in 26.17% children while Diarrhoea was in 28.17% children. Only 12.17% children were having worm infestation.

Table 5 shows that 26.17% children were having history of ARI and among these children 33.76% were underweight, 64.97% were stunted and 29.94% were wasted. There was a significant association between ARI and malnutrition.

Table 6 shows that 33.67% children were having history of Diarrhoea and among these children 57.92% were underweight, 56.43% were stunted and 18.32% were wasted. There was a significant association between Diarrhoea and malnutrition.

## DISCUSSION

In the present study prevalence of PEM and its relation to various epidemiological factors was assessed in 600 children on the basis of weight for age. Out of total 600, 18.00% of children were in the age group of 1-2 years, 34.83% were in the age group of 2-3 years, 26.5% were in the age group of 3-4 years and 20.67% were in the age group of 4-5 years. 45.5% were males while 54.5% were females.

The overall prevalence of underweight was 60.17%. The difference in prevalence of underweight in relation to age and sex was found to be statistically significant. This was similar to study conducted by Chakraborty et al [6] in rural Jhansi who reported prevalence of underweight in 0-6 years as group as 67%, study conducted by Prasot RM et al [7] in

400 children of 1-6 years of age in Lucknow where PEM was 54.8% and Singh et al [8] who conducted study among 406 children of 1-6 years of age in Meerut and revealed that 57.4% children were malnourished. Joshi et al [9] and Santosh Kumar et al [10] reported prevalence of underweight as 49.44% and 31.3% respectively. Other studies including NFHS II reported PEM more prevalent in females as compared to males specially in rural areas and this may be due to more concern for male child. [1,6,11] But Dwivedi et al [12] in their study in urban slum found more male affected with lower grades of under nutrition than females.

Children belonging to nuclear family were more affected with PEM than the joint family which is similar to findings of Prasot RM et al [7] that reported 61.8% and 46.8% and Singh et al [8] that reported 63.8% and 52.9% children of nuclear and joint family were malnourished respectively. 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. In the present study, more than half (63%) children of illiterate mother as compared to children of literate mother were malnourished. These results were similar to study conducted by Prasot RM et al [7] and Singh et al. [8] On the other hand the prevalence of PEM in children was also found to be significant higher whose fathers were illiterate. The condition of housing and environmental sanitation determines health status of children. In the present study it was observed that more than two third children were affected with PEM when housing and environmental conditions were poor. These results were

similar to study conducted by Prasot RM et al [7] and Singh et al. [8]

In the present study there was a significant association between ARI, diarrhea and malnutrition. It was similar to study conducted by Amy LR et al. [13] A study conducted by Suneetha Mishra [14] in a primary school of Cuttack among 132 well nourished children 48.4% of them were found to have infections, whereas 64.3% of malnourished children had one or more types of infection, in which diarrhea and upper respiratory tract infections were common.

## CONCLUSION

The present study shows that more than half (60.17%) of children of 1-5 years of age were underweight and prevalence of PEM was higher in 1-3 years of age group, female sex, Hindu religion, Schedule caste, nuclear family, illiterate father and mother and poor housing and environmental conditions. Protein energy malnutrition is still the major problem in India especially in urban slums. Unclean food and utensils, dirty hands, unsafe water and unsafe excreta disposal which are common in urban slums leads to infections. Repeated attacks of diarrhea and acute respiratory infections lower the nutritional status which in turn makes the child vulnerable to infections. This vicious cycle can be broken by emphasizing the importance of clean hygienic practices in urban slums. The extent of malnutrition can be countered by educating the parents with respect to basic nutritional requirements of their children.

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