Prevalence and determinants of protein energy malnutrition among under five children in slums of Kannauj district

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Abstract

Introduction: Protein Energy Malnutrition (PEM) in children is a leading public health problem in developing countries like India and is a direct or indirect cause of most of infant and child morbidity and mortality.

Objective: To study the prevalence and determinants of protein energy malnutrition among under five children of Kannauj district.

Materials and Methods: The present study was a cross-sectional study conducted among children in the age group 0-60 months in the slums of Kannauj district. The statistical tools used for analysis were percentages, Pearson's Chi-square test and multiple logistic regression.

Results: The prevalence of PEM in the study population was found to be 59.1%. The study revealed a significant association of age (OR=0.438), timing initiation of breast feeding (OR=0.682), colostrum feeding (OR=0.364), practice of breast feeding (OR=3.611) and initiation of complementary feeding at 6 months (OR=2.651) were significantly associated with PEM.

Conclusion: The present study emphasizes the need to correct behavioural factors like breast feeding practices among Indian mothers to bring down the problem of PEM in under five children.

Keywords: PEM, Under five children, Malnutrition, Determinants.

Introduction

India has the largest number of children in the world. UNICEF has reported that in 2011, the total number of live births in the country was around 27 million, which was approximately 20% of the total number of live births globally.[1] Early childhood, that is the first five years are the most crucial years of life, s this is the time when the foundation is laid for both physical and mental growth and development.

Under-five children comprise around 13% of the Indian population. These children are most vulnerable to deficiencies or malnutrition. Childhood malnutrition is a major public health problem in developing countries like India and is the leading cause of infant and child morbidity and mortality. Childhood morbidity and mortality is a sensitive indicator of a country's socio economic development. Protein energy malnutrition (PEM), which is manifested as decrease in weight for age or height for age or weight for height, is the most widely prevalent form of malnutrition among under-five children. According to UNICEF, worldwide, more than one third of under-five deaths are a consequence of under nutrition. India is among the countries where childhood malnutrition/under nutrition is most common.

As per NFHS-3 (2005-06), in India, 48% of the children below five years are stunted, 42.5% are underweight and 19.8% are wasted. India has 3 out of every 10 stunted children in the world.[2] Around 46% stunted, 9% wasted and 26% underweight children are living in slums. Thus, around one third of the world's children who are stunted, live in India. Also, there are wide variations in nutritional status of children across India. In 2008, the under-five mortality rate in Uttar Pradesh was 91 per 1,000 live births and the prevalence of stunting, wasting and underweight in children under 5 years was 56.8%, 14.8% and 42.4% respectively. Another study from Uttar Pradesh revealed a prevalence PEM of 54.8% in Azamgarh district.[3]

UNICEF report of the year 2014 revealed that in India, early initiation of breast feeding (within 1hour) was done by only 41% mothers.[4] Only 46% children were exclusively breast fed.[5] Solid, semi-solid and soft foods were initiated by 6-8 months by only 56% mothers. Around 77% children were breast fed up to the age of 2 years.

Given the high prevalence of protein energy malnutrition in India and the faulty feeding practices, this study was conducted to study the prevalence and determinants of protein energy malnutrition in under five children of Kannauj district.

Material and Methods

The present study was a cross-sectional study conducted among children in the age group 0-60 months in the slums of Kannauj district. The minimum sample size was calculated taking the prevalence of underweight in children under five years as 42.4% (NFHS-III, Uttar Pradesh, 2005- 2006) using the following formula: Minimum sample size (n) = Z^2 PQ/ d^2 where, Z = Standard normal variate having value 1.96 at 95% confidence interval.

P = Prevalence % (42.4) Q = (100 - P) % (57.6) d = Margin of error (5)

Thus n was calculated to be 390. There were only 10 slums in district kannauj therefore 39 children aged 0-60 months were studied from each slum. During door-to-door survey, mother of study subjects were briefed about the study and their consent was obtained for the same. If

there was more than one sibling in a house, then the youngest sibling was chosen for the study.

Methodology

A predesigned and pre-tested questionnaire was used to elicit the information from mother of study subjects. Information collected comprised the following major components–

Socio demographic variables– included age, sex, education and occupation of parents, religion, caste, socioeconomic status. Social class was assessed according to Modified Kuppuswamy socio economic classification. Detailed history of breast feeding practices was elicited.

Anthropometric examination- the height/ length, weight and Mid Upper Arm Circumference (MUAC) was recorded for each study subject. Every effort was made to get high order of accuracy in measurements.

Height: Height was measured for children who could stand. Height in centimeters was marked on a wall with the help of a measuring tape.

Length: This was measured with the help of infant meter for subjects who could not stand. The child was laid supine, with the head touching the vertical, rigid board.

Legs was fully extended by pressing over the knees, and feet was kept vertical at right angles.

Weight: The spring balance was suspended from the ceiling by the hook and the child was made to sit in the sling and weight recorded. For children who could stand, electronic weighing scale with an accuracy of 100 grams was used. The weighing scale was kept on a firm horizontal surface and the scale was zeroed before each session. The child was made to stand barefoot on the weighing machine with minimal clothing.

Protein Energy Malnutrition in the study subjects was assessed on the basis of: *IAP* classification, which is based on Weight for age and is suitable for Indian children

Statistical Analysis

Data was compiled and analysed using SPSS 23.0. Categorical variables were analysed using percentages and chi square test. Two tiles p value <0.05 was considered significant.

Results

As per IAP classification, 40.1% subjects had normal weight for age while 59.9% were malnourished.There were 34.3%, 21.1 % and 4.6% subjects with Grade I, II and III malnutrition. No study subject had Grade IV malnutrition. (Table 1)

The prevalence of malnutrition was maximum in the age group of 24-36 months (81.2%) followed by 77.8% PEM subjects in the age group of 12-24 months.The association between nutritional status and age of study subjects was found to be statistically significant.There was no association of malnutrition with gender of the child and occupation of the mother. (Table 2)

Among children whose mothers were illiterate, 68.4% were malnourished as compared to 11.1% PEM subjects where mothers were educated upto intermediate. Significant association was found between nutritional status of children and their maternal education. PEM was also significantly associated with social class and place of delivery.

Prevalence of PEM was significantly higher (85.4%) among study subjects who did not receive colostrum as compared to those who received it (42.5%). Significant association was found between colostrum feeding and malnutrition. (Table 3) All the children whose mothers were not following the practice of breast feeding were malnourished. There was a significant association between PEM and practice of breast feeding. PEM was significantly associated with timing of initiation of breast feeding. Children whose mothers initiated breast feeding within 1 hour had lower prevalence of PEM (20.4%) as compared to those who initiated after 1 hour (63.0%). There was no association between practice of giving pre-lacteal feed and PEM.

Upon multiple logistic regression analysis, age (OR=0.438), timing initiation of breast feeding (OR=0.682), colostrum feeding (OR=0.364), practice of breast feeding (OR=3.611) and initiation of complementary feeding at >6 months (OR=2.651) were significantly associated with PEM. (Table 4)

Table 1: Nutritional status of study subjects

Nutritional status	Study subjects	
	No.	**%**
Normal	158	40.1
Grade I	135	34.3
Grade II	83	21.1
Grade III	18	4.6
Grade IV	-	-
Total	394	100

Table 2: Determinants of PEM in study subjects

Determinants	Total	PEM		P value
Age in months	No.(n=394)	No.(n=236)	%	
0-12	54	26	48.1	<0.05
12-24	63	49	77.8	
24-36	85	69	81.2	
36-48	110	57	51.8	
48-60	82	35	42.7	
Gender				
Male	261	161	61.7	>0.05
Female	133	75	56.4	
Education of mother				
Illiterate	174	119	68.4	<0.05
Primary	149	83	55.7	
Middle	48	28	58.3	
High school	11	5	45.5	
Intermediate and above	9	1	11.1	
Graduate/ post graduate	3	0	0.0	
Professional degree	-	-	-	
Occupation of mother				
Unemployed	299	178	59.5	>0.05
Employed	95	58	61.1	
Social class				
I	2	-	-	<0.05
II	17	2	11.8	
III	48	31	64.6	
IV	285	168	58.9	
V	42	35	83.3	
Place of delivery				
Home	312	207	66.3	<0.05
Institutional	82	29	35.4	

Table 3: Determinants of PEM in study subjects

Determinants	Total	PEM		P value
Time of initiation of breast feeding*				
<1 hr	279	57	20.4	<0.05
>1 hr	92	58	63.0	
Practice of breast feeding				
Yes	371	213	57.4	<0.05
No	23	23	100.0	
Colostrum given*				
Yes	254	108	42.5	<0.05
No	117	100	85.4	
Pre-lacteal feed				
Yes	152	88	57.9	>0.05
No	230	120	52.2	
Initiation of complementary feeding				
At 6 months	320	211	65.9	<0.05
<6 months	74	25	33.8	

*371 mothers were practising breast feeding

Table 4: Multiple logistic regression analysis of determinants of PEM

Determinant	Odds ratio	Lower limit	Upper limit	P value
Age(Ref=0-12 months)	0.438	0.153	0.786	0.006*
Social class(Ref=Social class 1)	2.715	0.645	3.651	0.654
Timing of initiation of (Ref=>1hr)	0.682	0.351	.865	0.005*
Colostrum given (Ref = No)	0.364	0.151	0.805	0.037*
Practice of breast feeding (Ref=Yes)	3.611	2.543	6.314	<0.001*
Time of initiation of complementary feeding (Ref= At 6months)	2.651	1.461	5.158	<0.001*

Discussion

In our study, 59.1% subjects had PEM, which is almost similar to the findings (46.06%) of Mittal A et al in a study from Patiala and of Chaturvedi Manish et al from Agra who reported a prevalence of PEM of 53.2% among children.[5,6]

Protein Energy Malnutrition has a multifactorial causation, which includes social and behavioural factors, customs and beliefs, dietary and environmental factors, which in turn are affected by poverty and illiteracy. The growth and nutritional outcome of children is dependent on a complex relationship between the intrinsic characteristics of the child and the competence of mother in providing child care. The reason for malnutrition being more prevalent among lower socioeconomic groups may be due to unavailability of food, insufficient purchasing power, inappropriate distribution and inadequate utilization which might make the children vulnerable to malnutrition in a deprived community.

In the present study, the prevalence of PEM was highest (81.2%) in the age group of 24-36 months followed by 77.8% subjects in the age group of 12-24 months. Our findings are similar to those of Narkhede Vinod et al with maximum PEM in 13-24 months.[7] A study by Srivastava Anurag et al from Bareilly also supports our result.[8] In this study, as per IAP classification, no significant association was seen between sex of the child and nutritional status, though percentage of malnutrition was more in male children (61.7%) as compared to female children (56.4%). Similarly, no significant association was found by Narkhede Vinod et al in Nagpur.[8]

In our study, among the children of illiterate mothers, 68.4% subjects had PEM. No malnourished child was reported among subjects whose mothers were educated upto graduation or above. This may be because of practice of favorable practice and behaviors among educated mothers with regard to child health and nutrition which ultimately affect the nutritional status of children. Findings of Mittal A et al and Ahmad Ehtisham et al also supported our result.[9]

In the present study, the assessment of socioeconomic status was done on the basis of Modified Kuppuswamy classification. It was observed that majority of the subjects (83.3%) of social class V had PEM. Among subjects of class II, only 11.8% were malnourished. This distribution of

PEM across socioeconomic strata in our study was found to be statistically significant. Prasot Ram Milan et al also reported significant association between the two.[10]

Our study revealed that among subjects who received colostrum, only 42.5% had PEM against those who were not given colostrum (85.4%). Colostrum feeding was thus found to be protective against PEM. Baranwal Kavita et al also reported similar findings in Varanasi, with only 43.2% malnutrition among subjects who were fed colostrum.[11]

In the present study, it was observed that children of mothers who started complementary feeding at the age of 6 months had lower prevalence of PEM. Similar trend was also seen by K Madhu et al and Bhanderi Dinesh et al.

In the present study, multiple logistic regression analysis revealed age, timing of initiation of breast feeding, colostrum feeding, practice of breast feeding and timing of initiation of complementary feeding at 6 months were significantly associated with PEM.

In conclusion, this study reveals that correction of simple breast feeding practices can help to go a long way in bringing down the prevalence of PEM among under five children in India.

Conflict of Interest: Nil

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