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## **A STUDY ON PREVALENCE AND DETERMINANTS OF PROTEIN ENERGY MALNUTRITION AMONG 2 – 6 YEAR ANGANWADI CHILDREN IN RURAL BANGALORE**

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### **ABSTRACT**

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 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.

**Key Words:** *Protein Energy Malnutrition, Sociodemographic Factors and Anganwadi Centres*

### **INTRODUCTION**

Nutrition is an input to and a foundation for health and development. Bhalwar *et al.*, (2009) stated that the interaction of infection and malnutrition is well-documented. Better nutrition means stronger immune systems, less illness and better health.

Tripathi *et al.*, (2006) quoted that the children between 1 to 6 years of age in India constitute 15% of the total population as against 7% in the developed countries of the world. Nutrition of these children between 1 to 6 years of age is of prime importance as they are most vulnerable to deficiencies or malnutrition.

Protein Energy Malnutrition (PEM) remains an important public health problem in all the states of India even after nearly sixty five years of independence. As per the NFHS 3 (National Family Health Survey) (2005-2006) report, 43% of children below 5 years of age are underweight (<2SD) and 15.8% severely underweight (<3SD).

Despite of several national programmes the nutritional status of children remains almost same as of previous years. Lack of food is not the sole cause of malnutrition among anganwadi children; there are many Sociodemographic factors which seem to be important contributory factors in determining the nutritional status of children in rural areas. Hence the present study was undertaken to assess the prevalence of PEM among rural anganwadi children and to evaluate the association between various Sociodemographic factors and PEM among them.

### **MATERIALS AND METHODS**

The present study was a cross-sectional study carried out in Sarjapura, which is a rural field practice area of Vydehi Institute of Medical sciences and Research Centre, Bangalore. The study was carried out over a period of six months between January and June 2010. Cluster sampling technique was adopted to select study subjects; the whole Sarjapura area was divided into four equal quadrants geographically. There were total 2079 children enrolled in the 35 Anganwadi centres. From each quadrant, Anganwadi centres

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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. Ethical clearance was obtained from the Institutional ethics committee and permission of Anekal Taluk CDPO was taken before starting the study.

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.

#### **Anthropometry**

Salter's weighing scale was used to measure the body weight. Weight was measured without any footwear and with minimal clothing nearest 0.1 Kg. The scale was zeroed before each session. Children below 80% of expected weight for age according to IAP classification were considered as underweight.

Standing height was measured without any foot wear to the nearest 0.5 cm using a standard calibrated bar. The children were made to stand straight with heels, buttocks, shoulders and back of head touching the wall on which a measuring tape was fixed. Head was held comfortably erect with the lower border of orbit of the eye in the same horizontal plane as the external canal of the ear and the arms hanging loosely by the sides with palms facing the thigh. Measurement was read by placing the horizontally held wooden board/scale touching the top of the head. The height was compared with the WHO child growth standards, 2006 reference data for that particular age and sex to get height for age. Children below two standard deviation of the reference median were considered as stunted and children below three standard deviation were considered to be severely stunted.

#### **Statistical analysis**

Data thus obtained was coded and entered into Microsoft excel worksheet. This was analyzed using SPSS version 17 and OpenEpi 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**

### **Background characteristics**

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 (updated in 2009)

### **Anthropometric profile of study subjects**

*Underweight:*

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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).

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

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	-	-

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 Ehtisham Ahmed *et al.*, (2005); Chakraborty *et al.*, (2006) and 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).

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

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

In other studies done by Kumar *et al.*, (1996); Mittal *et al.*, (2007); Saxena *et al.*, (1997) and Seetaram *et al.*, (2007) 27.1%-48.4% of children were stunted.

Above studies demonstrated high levels of malnutrition compared to the present study. These findings suggested widespread malnutrition among preschool children.

**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).

**Table 3: Nutritional status of children according to Age**

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
<b>Total</b>	<b>245</b>	<b>100.0</b>	<b>129</b>	<b>52.7</b>	<b>116</b>	<b>47.3</b>
					$\chi^2=17.94$	P< 0.001

**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)

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**Table 4: Nutritional status of children according to Sex**

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
<b>Total</b>	<b>245</b>	<b>100.0</b>	<b>129</b>	<b>52.7</b>	<b>116</b>	<b>47.3</b>
					$\chi^2=0.037$	P=0.84

Similar to the results of present study, the study conducted by Garg SK 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).

**Table 5: Nutritional status of children according to Religion**

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
<b>Total</b>	<b>245</b>	<b>100.0</b>	<b>129</b>	<b>52.7</b>	<b>116</b>	<b>47.3</b>
					$\chi^2=5.47$	P= 0.019

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.

*Educational status of parents:*

With respect to educational status of parents, in present study the prevalence of underweight among children of illiterate mothers, those with below high school and above high school education level was 29 (78.3%), 52 (49%) and 35 (34.3%) respectively and the proportion of underweight among children of illiterate fathers, those with below high school and above high school education level was 17 (68%), 57 (54.3%) and 42 (36.5%) respectively. These differences were statistically highly significant (Table 6 and 7).

**Table 6: Nutritional status of children according to their Mothers' educational status**

Literacy Status	Children observed		Normal		Underweight	
	No.	%	No.	%	No.	%
Illiterate	37	15.1	8	22	29	78.3
Literate but below High school	106	43.3	54	51	52	49
High school and above	102	41.6	67	66	35	34.3
<b>Total</b>	<b>245</b>	<b>100.0</b>	<b>129</b>	<b>52.7</b>	<b>116</b>	<b>47.3</b>
					$\chi^2=21.37$	p=0.002

In a study conducted in West Bengal by Ray *et al.*, (2000) similar findings were observed with prevalence of underweight among children of literate mothers and fathers being comparatively lower i.e. 54.93% and 57.28% respectively than in illiterate mothers and fathers i.e. 69.55% and 74.96 respectively. This difference was statistically significant.

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In the study in Ludhiana, Punjab by Anoop et al., (2003) a highly significant inverse relationship was observed. Higher maternal education was associated with lower prevalence of childhood malnutrition, which is similar to the present study.

**Table 7: Nutritional status of children according to their Fathers' educational status**

Literacy Status	Children observed		Normal		Underweight	
	No.	%	No.	%	No.	%
Illiterate	25	10.2	8	32	17	68
Literate but below High school	105	43	48	45.7	57	54.3
High school and above	115	47	73	63.5	42	36.5
<b>Total</b>	<b>245</b>	<b>100.0</b>	<b>129</b>	<b>52.7</b>	<b>116</b>	<b>47.3</b>
					$\chi^2=11.71$	P= 0.002

*Socio-economic status:*

The present study showed that the prevalence of malnutrition was more among children belonging to low socioeconomic families. The prevalence of underweight among children of socio-economic status class II, class III and IV was found to be 10 (15.6%), 76 (51.0%) and 30(93.8%) respectively. Nutritional grade with economic status was found to be highly significant (Table 8).

**Table 8: Nutritional status of children according to Socio-Economic Status**

Socio-economic status	Children observed		Normal		Underweight	
	No.	%	No.	%	No.	%
Class I*	0	-	-	-	-	-
Class II	64	26.1	54	84.5	10	15.6
Class III	149	60.8	73	49	76	51
Class IV	32	13.1	2	6.2	30	93.8
Class V*	0	-	-	-	-	-
<b>Total</b>	<b>245</b>	<b>100.0</b>	<b>129</b>	<b>52.7</b>	<b>116</b>	<b>47.3</b>
					$\chi^2=54.27$	P< 0.001

\*Excluded for Chi square test

In a study done by Harishankar et al (2004) b, the prevalence of malnutrition was found to be 52.2%, 35.7% and 11.9% in children belonging to low, middle and high socioeconomic status group respectively. This is similar to the results of present study.

*Birth order:*

In present study it was observed that as birth order increased prevalence of malnutrition also increased, with least prevalence for first birth and maximum prevalence with higher birth order. This difference was not statistically significant. The prevalence of underweight was least in children with birth order one, i.e. 60 (46%) and was found to be high in children with birth order three and above i.e. 9 (53%) (Table 9)

**Table 9: Nutritional status of children according to Birth order**

Birth order	Children observed		Normal		Underweight	
	No.	%	No.	%	No.	%
1	130	53.1	70	54	60	46
2	98	40	50	51	48	49
≥3	17	6.9	8	47	9	53
<b>Total</b>	<b>245</b>	<b>100.0</b>	<b>129</b>	<b>52.7</b>	<b>116</b>	<b>47.3</b>
					$\chi^2=0.37$	P= 0.82

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NFHS 3 (2005-2006) reports that undernutrition is generally lower for first births than for subsequent births and consistently increases with increasing birth order for all measures of nutritional status.

Similar to present study, study conducted by Sen *et al.*, (1996) among 587 preschool children it was observed that prevalence of PEM was more with birth order equal to or more than three and found to be statistically significant.

#### Prelacteal feeds

The prevalence of underweight was found to be high in children who were given prelacteal feeds i.e. 77(69.4%) than those who were not given prelacteal feeds i.e. 39(29.1%) and this difference was statistically highly significant (Table 10).

**Table 10: Nutritional status of children according to Prelacteal feeds**

Prelacteal feeds	Children observed		Normal		Underweight	
	No.	%	No.	%	No.	%
Given	111	45.3	34	30.6	77	69.4
Not Given	134	54.7	95	70.9	39	29.1
<b>Total</b>	<b>245</b>	<b>100.0</b>	<b>129</b>	<b>52.7</b>	<b>116</b>	<b>47.3</b>
					$\chi^2 = 37.88$ P<0.001	

#### Exclusive Breast feeding:

In present study the proportion of underweight was significantly high among children who were not exclusively breast fed till the age of 6 months i.e. 111 (51.6%) compare to children who were exclusively breastfed till the age of 6 months (Table 11)

**Table 11: Nutritional status of children according to Exclusive Breast Feeding**

Exclusive Breast Feeding	Children observed		Normal		Underweight	
	No.	%	No.	%	No.	%
<6 months	215	87.8	104	48.4	111	51.6
6 months	28	11.4	25	89.3	3	10.7
>6 months*	2	0.8	0	0	2	100
<b>Total</b>	<b>245</b>	<b>100.0</b>	<b>129</b>	<b>52.7</b>	<b>116</b>	<b>47.3</b>
					$\chi^2 = 15.05$ P< 0.001	

\*Excluded for Chi square test

Similar findings was reported by Bloss Emily *et al.*, (2004), that lack of giving exclusive breast feeding up to 6 months was associated significantly with underweight.

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