Prevalence and Epidemiology of Undernutrition amoung Preschool Children in A Selected Area

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ABSTRACT

Introduction: Under nutrition is still the major problem in our country. Since young children are vulnerable to social and health hazards which can influence their growth and development, they deserve special attention by administration, general population and the family. Hence the present was undertaken to study the prevalence of under-nutrition among the pre-school children and to suggest measures for prevention and control.

Material and Methods: A cross sectional study was conducted among pre-school children in a selected area of Ranga Reddy District over one year with the objectives to find out the prevalence of under-nutrition, determine association with socio-demographic factors and with some epidemiological factors and suggest measures for prevention and control of under nutrition based on finding.

Results: A total of 592 pre-school children aged 2-5 years were selected. Among the study population prevalence of under nutrition was 48.2%, 158 (26.69%) were under weight and 128 (21.62%) were severely under weight. Proportion of under nutrition was higher in 49-60 months, Hindu children (52.62%), class IV socio-economic-status(61.11%) and children from nuclear families, with illiterate mothers (52.84%),employed mothers (66.67%), illiterate fathers(54.27%),unemployed fathers (58.33%), family size of 4 or more (62.69%), birth spacing < 3 years(50.74%), prelacteal fed babies (55.40 %),not exclusive breast fed(55.05%), weaning delayed >10 months (60.25%) and unimmunized children (73.33%).

Conclusion: It was observed that 48.2% of the children were undernourished more in above 36 months of age, Hindus and class IV. Parent's literacy, socio-economic status and family size had an impact on nutritional status of children besides faulty feeding practices, partial immunization, frequent diarrhea.

Keywords: Prevalence and Epidemiology, Undernutrition Children

INTRODUCTION

The preschoolers (2-5 years) are at the greatest risk of malnutrition because of the fact that growing period demands high intake of proteins and calories.[1]

The nutritional problems are multifactorial with its roots in the sectors of education, demography, agriculture and development.[2] Most common causes of under nutrition include faulty infant feeding practices, impaired utilization of nutrients due to infections and parasites, poor immunization status, inadequate food and heath security, poor environmental conditions and lack of proper child care practices.[3] Under nutrition during the critical phases of early growth, can lead not only to the stunting of physical growth, but also to sub-optimal intellectual development and poor neuro integrative competence in children.[4]

Under nutrition is still the major problem in our country. According to NFHS 3 (2005-2006) 43% of the children fewer than 5 years of age are underweight, 48% are stunted and 20% are wasted.[5] Since young children are vulnerable to social and health hazards which can influence their growth and development, they deserve special attention by administration, general population and the family.[6]

Considering the above, the present study was undertaken to assess the nutritional status of pre-school children in a selected area of Peerancheruvu of Ranga Reddy District and status of immunization, feeding practices and family size in them.

Aim and objectives of the study were to study the prevalence of under-nutrition among the pre-school children to determine association of socio-demographic factors with under nutrition, to study association of nutritional status with some epidemiological factors and to suggest measures for prevention and control of under-nutrition based on finding of study

MATERIAL AND METHODS

The Study design was a Cross Sectional Study undertaken in Peerancheruvu of Ranga Reddy District over a one year (October 2013 to September 2014) in Pre-school children (2-5years)

Inclusion criteria: Pre-school children residing in the given area for more than 1 year.

Exclusion criteria: Parents not cooperating on frequent visits.

Estimation of sample size: Sample size was calculated using the formula $n = 4pq/L^2$ where 'p' is probability of occurrence 'q' probability of non occurrence and L is allowable error. Using prevalence of under-nutrition around 48% taking national average[2] and allowable error at 10%, the sample size was calculated to be 434 children. A 30% margin was added to allow for a maximum estimated non-response, giving a sample size of 564 subjects.

Pilot study: A pilot study was undertaken for assessing feasibility and finalization of proforma, on 50 respondent's. Necessary modifications were made after analyzing responses. The proforma was then finalized keeping in mind the objectives and variables of the study. Approval of Ethical committee of Shadan Institute of Medical Sciences was obtained. Data was collected by interviewing parents or caretakers using semi structured; predesigned and pretested proforma in respective anganwadi centers as well as house-to-house visit of those selected children. This was with consent of parents.

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STATISTICAL ANALYSIS

Data thus obtained was coded and entered into Microsoft excel worksheet. Data was analyzed using Epi info version 7. The frequency distribution of the study subjects according to age, sex, religion, educational status, occupation of their parents, socioeconomic status and other study variables were analyzed. Prevalence of under nutrition was estimated. Relation between under nutrition and major socio-demographic factors such as age, sex, religion, educational status of parents, socioeconomic status and other study factors was estimated. The association of under nutrition with the above factors was found by chi-square test. The statistical significance was evaluated at 5% level of significance.

RESULTS

Prevalence of undernutrition in pre-school children: Prevalence of under nutrition was 286 (48.31%). Out of 592 children 158 (26.69%) were under weight and 128 (21.62%) were severely under weight.

Distribution of pre-school children according to age group and nutritional status (Table-1) $\chi2 = 42.1262$, df 5, p= 0.000 Maximum children i.e. 241 each were present in 37-48 months age groups. Maximum proportion of under nourished children were in the age group of 49-60 months i.e. 109(52.91%) followed by 98(40.66%) in 37-48 months and least proportion in 25-36 months i.e. 49(33.79%). This difference was statistically highly significant.

Distribution of pre-school children according to sex and nutritional status $\chi2 = 0.3515$, df 1, p= 0.5530 Higher number of girls i.e. 320 was seen in the study. It was observed that 169(52.81%) of the girls and 137(50.37%) of the boys were normal. Among the undernourished maximum number were boys i.e. 135(49.63%). No significant difference was observed between boys and girls as far as under nutrition is concerned (p < 0.05)

Distribution of pre-school children according to religion and nutritional status $\chi2 = 7.521$, df 1, p= 0.006. Majority of the children i.e. 382 were Hindu. Proportion of underweight children was maximum among Hindu children i.e. 201(52.62%) and 84(40.19%) among Muslim and consisted of only one Christian child who was normal. This difference was statistically significant.

Age in months	Undernutrition	Normal	Total
25-36	49(33.79%)	96(66.21%)	145 (100%)
37-48	98(40.66%)	143(59.34%)	241(100%)
49 – 60	109(52.91%)	97(47.09%)	206(100%)
Total	286(48.31%)	306 (51.69%)	592(100%)

Table-1: Distribution of pre-school children according to age group andnutritional status

Distribution of pre-school children according to socio economic class and nutritional status $\chi2 =5.9429$, df 3, p= 0.1144. Majority of the children i.e.335 (56.59%) belonged to class IV followed by 172 (29.05%) in class III and no children were found in class I, according to modified kuppuswamy classification. Proportion of under nutrition was highest i.e. 11(61.11%) among children who belonged to class V socio-economic-status followed by class III and class IV, where as lowest i.e. 24 (35.82%) in children belonging to class II category.

Distribution of pre-school children according to type of family and nutritional status $\chi2 =2.0796$, df 2, p = 0.3535. In the present study 302 (51.01%) belonged to nuclear type of family followed by 233 (39.36%) from Joint family and least i.e. 57 (9.63%) belonged to three generation families. Proportion of underweight was higher among children from three generation families and nuclear families i.e. 29(50.88 %) and 153(50.66 %) respectively, compared to 104(44.64 %) children from joint families.

Distribution of pre-school children according to education of the mother and nutritional status Table-2: $\chi2 = 4.7814$, df 3, p = 0.1885 Majority of the mothers i.e. 282 were illiterate. The proportion of underweight children was maximum i.e. 149(52.84%) among children of illiterate others and was least i.e.11 (39.29%) among children of literate mothers who had graduate or post graduate degree. This difference was not statistically significant.

Distribution of pre-school children according to occupation status of the mother and nutritional status: Mothers employed in semi professional/ professional occupations i.e. teachers or lectures had high proportion of children being under weight i.e. 4(66.67%) followed by mothers employed in unskilled /semiskilled mainly as laborers or domestic servants 49(62.03%). This difference was not statistically significant.

Distribution of pre-school children according to education of the father and nutritional status $\chi2 = 7.826$, df 3, p = 0.0497. Most of the fathers of study population were illiterates i.e. 234 (39.53%). Maximum number of under nutrition children 127 (54.27%) had illiterate fathers compared to maximum number of normal children 122(58.94%) whose fathers had completed high school or secondary education. This difference was statistically significant.

Distribution of pre-school children according to occupation of the father and nutritional status $\chi2 = 6.114$, df 3, p = 0.1062 Majority of the fathers were involved in unskilled occupation or semiskilled occupation like laborers or vendors i.e. 356 (60.13%). Unemployed fathers had a higher proportion of undernourished children 7(58.33%); followed by fathers involved in unskilled /semiskilled work 183(51.4%). Fathers involved in semi professional/ professional occupation had

Education of the mother		Undernutrition	Normal	Total
Illiterate		149(52.84%)	133(47.16%)	282(100%)
Literate	Primary /Middle school	52(45.61%)	62(54.39%)	114(100%)
	High school /Secondary	74(44.05%)	94(55.95%)	168(100%)
	Degree/Pg/honours	11(39.29%)	17(60.71%)	28(100%)
Total		286(48.31%)	306(51.68%)	592(100%)

Table-2: Distribution of pre-school children according to education of the mother and nutritional status

Weaning age in months	Undernutrition	Normal	Total	
<6	19(47.50%)	21 (52.5%)	40(100%)	
6 - <10	107(41.47%)	151(58.53%)	258(100%)	χ2 =0.515, p = 0.4727
> 10	144(60.25%)	95(39.75%)	239(100%)	χ2 =17.5014, p = 0.0000
Total	270	267	537* (100%)	

Table-3: Distribution of pre-school children according to weaning practice and nutritional status.

Clinical sign		Frequency	Percent
General appearance	Thin	71	11.99
Hair	Lack of lusture	20	3.37
	Dyspigmented	1	0.17
	Thin and sparse	14	2.36
Face	Diffuse depigmentation	40	6.75
	Moon face	1	0.17
Eyes	Brown pigmentation	1	0.17
	Pale conjunctiva	118	19.93
Tongue	Pale and flabby	97	16.38
	Geographic	5	0.84
Teeth	Mottled enamel	1	0.17
	Caries	83	14.02
Skin	Dry and scaly	60	10.13
	Follicular hyperkeratosis	1	0.17

Table-4: Distribution of pre-school children according to clinical signs of undernutrition (n=592)

maximum proportion of normal children 7(77.78%). This difference among the various groups was not statistically significant.

Distribution of pre-school children according to family size and nutritional status: Majority i.e. 243(41.04%) of the families had a family size of two. Proportion of under nutrition was maximum i.e. 42(62.69%) when family size was 4 or more and least i.e. 65(43.33%) when family size was one. This difference was not statistically significant.

Distribution of pre-school children according to birth order and nutritional status. χ2 = 4.4058, df 3, p = 0.2209. Proportion of under nutrition was least in children with birth order two, i.e. 87(43.17%) and was found to be high in children with birth order three i.e. 49(55.68%). This difference was not statistically significant.

Distribution of pre-school children according to birth spacing and nutritional status.χ2 =1.7059, df 1, p= 0.191 *n=343. As children with birth order one were excluded. Maximum proportion of under nutrition i.e. 103(50.74%) was seen in children in whom birth spacing was less than 3 years compared to 61(43.57%) in whom birth spacing was 3 or > 3 years. This difference was not statistically significant.

Distribution of pre-school children according to prelacteal feeding and nutritional status: χ2 = 18.6281, df 1, p = 0.00001 In the present study 361(60.97%) children had been fed with prelacteal feeds. Proportion of under nutrition was higher among children who had received prelacteal feeds 200 (55.40 %). This difference was statistically highly significant.

Distribution of pre-school children according to exclusive breast feeding practice and nutritional status χ2 = 18.7602,

df 1, p= 0.00001 Out of 592 children 216(36.4%) children were exclusively breast feed. Majority i.e. 137 (63.43%) of the children were normal in whom exclusive breast feeding was practiced and 79(36.57%) were under nutrition. Among the children in whom exclusive breast feeding was not practiced 207(55.05%) were under nutrition and 169(44.95%) were normal.This difference was statistically highly significant.

Distribution of pre-school children according to weaning practice and nutritional status (Table-3): *n=537. A children <6 months in whom weaning was not initiated were excluded. Maximum number of children i.e. 151(58.53%) were normal if weaning was done at 6-9 months. Maximum number of children in whom weaning was delayed upto 10 or more months i.e. 144(60.25%) were under nutrition. The difference was statistically significant.

Distribution of pre-school children according to immunization practice and nutritional status: χ2 = 4.061, df 2, p = 0.131. Out of the 548 fully immunized for age children a maximum i.e. 288 (52.55%) were normal. Maximum i.e. 11(73.33 %) of the unimmunized children were undernutrition. This difference was not statistically significant.

Distribution of pre-school children according to clinical signs of undernutrition Table-4: (n=592) In the present study among the different clinical features of undernutrition maximum number of children i.e. 118 (19.93%) had pale conjunctiva, 83(14.02%) had caries, 71 (11.99%) had a thin general appearance and 60 (10.13%) had dry and scaly skin.

Distribution of pre-school children according to past medical illness (n=592) Among children who had illness in the last one year maximum children i.e. 54 (9.12%) had diarrhea, 53(8.95%) had acute respiratory infection.

DISCUSSION

In the present study prevalence of under nutrition was 48.31%. This findings were more or less similar with Sable Rupali et al (2012)[7] 51.8%, Gholamreza Sharifzadeh et al (2010)[8] 47.3%, S Bisai K et al (2008)[9] 50.00%, Jakhar et al (2011)[10] 58.3 %, M. K. Goel et al[2] 57.4%. Few studies showed a higher prevalence then the present study namely RN Mishra et al (2001)[11] 75%, Munesh Kumar Sharma, et al (2011)[12] 72.5%, Shally Awasthi et al (2003)[13] 67.3%. According to Paramita Sengupta et al (2010)[14] 29.5 %, Nguyen Ngoc Hien et al (2008)[15] 31.8% were undernourished.

Table-1 shows distribution of pre-school children according to age group and nutritional status that maximum proportion of undernourished children were in the age group of 49-60 months i.e. 109(52.91%) followed by 98(40.66%)in 37-48 months and least proportion in 25-36 months i.e. 49(33.79%). This difference was statistically highly significant. High proportion

in the age group of 49 - 60 months may be due to various factors like low socio economic status, low education of parents and low awareness of parent's regarding growing children and their nutritional requirement and other factors like food fads and food taboos and various cultural factors. These findings are in confirmation with Anjali B et al in (2012)[32], Paramita Sengupta et al (2010)[14], M. K. Goel et al (2007)[2] While these findings are not in confirmation with Bhatia et al (2007)[16] which revealed the peak prevalence of under nutrition in the age group of 6–12 months, Prema Ramachandran et al (20091)[17] between 3-23 months, Bloss Emily et al (2004)[28] and Ray SK et al(2001)[18] where higher prevalence was in <2yr children which was statistically significant, Deeksha Kapoor et al (2005)[19] found higher under nutrition in the age group of 9-36 months. Bisai K et al (2008)[21] and Tripathi MS (2006)[21] showed that higher prevalence of underweight was seen in preschool children compared to school going children.

169 (52.81%) of the girls and 137 (50.37%) of the boys were normal. Among the undernourished maximum number were boys i.e. 135 (49.63%). This difference was not statistically significant. Study done by M. K. Goel et al[2] also showed no statistical significance of undernourishment in gender. These findings are in confirmation with Bhatia et al.[16] These findings are not in confirmation with Paramita Sengupta et al (2010)[14] S. Biswas et al (2009).[22] Dey et al (2008)[23], Shally Awasthi et al[13] Anjali B et al[32] which showed that female children were at the high risk of being under-nourished.

Proportion of undernutrition was maximum among Hindu children i.e. 201 (52.62%) and 85 (40.67%) among Muslim children. This difference was statistically significant. These findings are not in confirmation with I Dey et al (2008)[42] which found high prevalence in both Hindus and Muslims. Among both, Muslims had a higher proportion of under nutrition children but the difference was not significant.

The proportion of under nutrition was highest i.e. 11(61.11%) among children who belonged to class V socio-economic-status, where as lowest i.e. 24 (35.82%) in children belonging to Class II category. These findings are in confirmation with Munesh Kumar Sharma et al (2011)[12], Harishankar et al (2004)[24]

It was observed that 302 (51.01%) belonged to nuclear type of family followed by 233 (39.36%) from joint family and least i.e. 57 (9.63%) belonged to three generation. Proportion of under nutrition was higher among children from three generation families and nuclear families i.e. 29(50.88 %) and 153(50.66 %) respectively compared to 104 (44.64 %) children from joint families. These findings are in confirmation with Srivastava Anurag, et al (2012)[25] Megha Luthra et al (2009).[26] A cross-sectional study done by M. K. Goel et al[2] revealed that undernourishment was influenced by type of family. Kumkum kumara et al (2007)[27] revealed that there was no significant difference between type of family and undernutrition (p>0.05). The proportion of under nutrition was maximum i.e. 149 (52.84%) among children of illiterate mothers and was least i.e.11 (39.29%) among children of literate mothers who had graduate or post graduate degree or had done honors (Table-2). This difference was not statistically significant. These findings are in confirmation with Anjali B et al in[32] Jakhar et al (2011)[10], Paramita Sengupta, et al[14], by Nguyen Ngoc Hien et al[15], by M. K. Goel et al.[2]

Maximum numbers of the mothers of study population were housewife i.e. 486 (82.09%). Children of mothers employed in semi professional/ professional occupation had high proportion of being under nutrition i.e. 4(66.67%) followed by mothers employed in unskilled /semiskilled 49(62.03%). This difference was not statistically significant. These findings are in confirmation with Gholamreza Sharifzadeh et al[8], Nguyen Ngoc Hien et al[15], Sabu S Padmadas et al.[31]

Most of the fathers of study population were illiterates i.e. 234 (39.53%). Maximum number of under nutrition children 127(54.27%) had illiterate fathers compared to maximum number of normal children 122(58.94%) whose fathers had completed high school or secondary education. This difference was statistically significant. These findings are in confirmation with Gholamreza Sharifzadeh et al[8], and Ray SK et al (2000).[18] These findings are not in confirmation with Bloss Emily et al[28] which showed neither underweight nor stunting was associated with father's literacy status.

Majority of the fathers were involved in unskilled occupation or semiskilled occupation i.e. 356 (60.13%). Unemployed fathers had a higher proportion of under nutrition children 7(58.33%); followed by fathers involved in unskilled /semiskilled work 183(51.4%). Fathers involved in semi professional/ professional occupation had maximum proportion of normal children 7(77.78%). This difference among the various groups was not statistically significant. Paramita Sengupta et al[14] and Swami HM et al (2000)[29] found statistically significant association of being under-nourished and having unskilled laborer father.

It was observed that proportion of under nutrition was maximum i.e. 42 (62.69%) when family size was 4 or more and least i.e. 65(43.33%) when family size was one. These findings were in consideration with Bloss Emily et al[28] and Swami HM et al[29] which revealed that with increase in family size, the prevalence of malnutrition also significantly increased.

Proportion of under nutrition was least in children with birth order two and was found to be high in children with birth order three. Though this difference was not statistically significant, these findings were in confirmation with M. K. Goel et al[2], Harishankar et al[25] which revealed that undernourishment increases with birth order.

Maximum proportion of under nutrition was seen in children in whom birth spacing was less than 3 years compared to birth spacing 3 or > 3 years. This difference was not significant statistically. Paramita Sengupta et al[24] revealed significant association of higher malnutrition in children with low birth interval. In the present study 60.97% children had been fed with prelacteal feeds. Proportion of under nutrition was higher among children who had received prelacteal feeds. This difference was statistically significant and were in confirmation with and Megha Luthra et al[26]

Out of 592 children majority (63.43%) of the children were normal in whom exclusive breast feeding was practiced. Among the children in whom exclusive breast feeding was not practiced 55.05% were under nutrition. This difference was statistically significant. These findings were in confirmation with Paramita Sengupta et al[24], Nguyen Ngoc Hien et al.[15] In 2007 Braja Kishori et al[30] showed that the higher prevalence of malnutrition was observed among children who were exclusively breast-fed beyond six months.

Maximum number of children (58.53%)were normal if weaning was done at 6-9 months (Table-3). Further it was observed that a maximum number of children in whom weaning was delayed up to 10 or more i.e. (60.25%) were under nutrition. The difference was statistically significant and findings were in confirmation with by Braja Kishori et al[30], Sabu S Padmadas et al.[31]

Out of the 548 fully immunized for age children a maximum i.e. 288 (52.55%) were normal. Maximum i.e. 11(73.33 %) of the unimmunized children were under nutrition. This difference was not statistically significant. Paramita Sengupta, et al (2010)[24] showed that incomplete vaccination status was found to be important predisposing factors for childhood malnutrition. Among the different clinical features of malnutrition maximum number of children i.e. 118 (19.93%) had pale conjunctiva, 83 (14.02%) had caries, 71 (11.99%) had a thin general appearance and 60 (10.13%) had dry and scaly skin.(Table-4)Sudesh Jood et al[4] observed that 16.67% of preschool children had hair with lack of luster, 16.67% had diffuse pigmentation on face, 23.03% had pale conjunctiva and 4.4% of them had Bitot's spots, 3.33% had beading of ribs and 6.67% of them had bow legs. Among children who had illness in the last one year, maximum children i.e. 54 (9.12%) had diarrhea and 53(8.95%) had acute respiratory infections.

A community based cross sectional study of under five children in a slum of Pune by Anjali B et al[32] in 2012 showed that the overall prevalence of morbidities was 43.4%. Taufiq Mashal et al[33] showed that diarrhoea (32.5%) and acute respiratory infection (41.0%) were common child health problems.

CONCLUSION

In the present study, majority of the children were more than 36 months of age, female slightly higher than male. Majority of the children were Hindus, belonged to class IV and to nuclear type of family.

48.2% of the children were undernourished. Parent's literacy, socio-economic status and family size had an impact on better nutritional status of children. Faulty feeding practices, partial immunization, frequent diarrhea and other infections in the past one year were some of the epidemiological determinants for undernourishment. Clinical features of under nutrition were common.

RECOMMENDATIONS

Proper nutritional care of pre-school children with special attention of 49-60 months age group, educate mothers about growth chart, increase overall literacy and education level with emphasis on female literacy, importance of small family norms, increase Immunization coverage, inculcate importance of exclusive breast feeding, encourage hospital delivery, educate about disadvantages of prelacteal feeds and initiation of weaning at appropriate age with special attention towards nutritional status of mother with adequate birth spacing should be explained. Importance of proper care of their children during febrile illnesses and diarrhea along with use of O.R.S., timely referral and immunization.

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