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Original Research Article

An epidemiological study of malnutrition in children from six months to five years of age to assess the prevalence and factors related to it, in a rural area of Palghar district of Maharashtra

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ABSTRACT

Background: High economic growth in India in the last two decades has unfortunately not been translated into satisfactory progress on reducing hunger and malnutrition. The study aims to determine the prevalence of malnutrition in children from 6 months to five years of age, to find out the socio-demographic, environmental and other factors associated with acute malnutrition and to suggest appropriate recommendations based on observations.
Methods: The area selected for the study is the rural field practice area of Topiwala National Medical College. The study population taken for this was children between the ages of 6 months to 5 years. The study was a community based descriptive cross-sectional epidemiological study.
Results: In the study area, 56.30% children were underweight, 52.96% were stunted and 27.8% were wasted. Majority of the children (96.7%) in this area were Hindu. Majority of the children belong to class IV of socioeconomic class (Modified B.G.Prasad). Maximum children (28.15%) were in the age group of 25 to 36 months. 67.78% children were living in joint families. About 79% mothers were literate at least up to primary education.
Conclusion: The prevalence of malnutrition among all 3 forms i. e underweight, stunting, wasting was slightly more among male children as compared to females, and this can be taken as a positive sign for female child. The literacy rate was quite satisfactory; the diet of children was inadequate for calories and proteins as well as micronutrients.

Keywords: Malnutrition in children, Socio-demographic factors, Rural area

INTRODUCTION

High economic growth in India in the last two decades has unfortunately not been translated into satisfactory progress on reducing hunger and malnutrition.[1] India occupies a hot spot in the global map of childhood stunting as 61 million (37%) of the 165 million stunted children aged under five years globally are Indian children (UNICEF 2014). We cannot hope for a healthy future for our country with a large number of malnourished children, the problem of malnutrition is a matter of 'National shame' despite of impressive growth in our GDP (Dr. Manmohan Singh, Ex. Prime Minister, India).[2] India remains home to one third of the world's stunted children (UNICEF 2016), it therefore falls into serious category, 38.7% of Indian children under 5 are stunted reflecting chronic malnutrition, and 4.8% of children die before 5 years of age.[3] NFHS4 (national family health survey) data shows high prevalence of malnutrition among rural India, prevalence of underweight, stunting, and wasting for rural area was 40%, 38.4% and 26.1% respectively; and for urban area it

was 30.7%, 29.3% and 24.9% respectively.[4] District level health survey (DLHS) 4 also shows considerable extent of malnutrition in Maharashtra specially rural and tribal part (wasting in children for less than 5 years is 34.7% for rural and 33.3% for urban area).[5]

Aim of the study was to determine the prevalence of malnutrition in children from 6 months to five years of age, to study the socioeconomic, demographic, environmental and other factors associated with acute malnutrition and suggest appropriate recommendations based on observations.

METHODS

Study design

This was a community based descriptive cross-sectional epidemiological study.

Study population and place

The area selected for our study is the rural field practice area of Topiwala National Medical College Mumbai which is situated in Palghar district of Maharashtra. Study population was the total beneficiary population of one PHC having seven subcenters under it and total population under it is 19,423 of which 2150 is the under-five population. Study population was the children between 6 months to 5 years of age.

***Study duration**:* February 2017 to January 2018.

Inclusion criteria

Children from 6 months to 5 years of age, Family residing at least for six months in that community, Mother or immediate care taker (informant) who had given consent to participate in the study were included.

Exclusion criteria

Those children who were suffering from severe illness, Cases with potential causes for organic failure to thrive e.g. chronic diseases, malformations, disabilities, and chronic infections, children whose mother or immediate care taker (informant) were not present during the visit were excluded.

Sample size

It was calculated using NFHS (IV) prevalence of malnutrition in under five children years of age in rural area of Maharashtra 40%.[4] The sample size was calculated using the formula

$n=4pq/l^2$

Calculated sample size was 270.

Sampling technique

Data was collected by Systematic Simple Random Sampling Method. The population of under five children in the area of rural primary health centre having seven sub centres namely A, B, C, D, E, F, G is known, i.e.=2150. Sampling interval =2150/270 =7.9 ~8. Hence, every 8th child from 6 months to five years of age in each sub-centre was selected; line listing of houses was obtained from local Surpanch/village guide. Sample size was taken in proportion to under five population of each sub centre. In those families having two under five children, the elder child was included in the study.

Data was collected using pre-structured and pretested Performa. The age of the child was confirmed either by parents or immunization card card/birth certificate or local calendar event system. The informed written consent was taken from parent after the purpose of study was explained to them. The weight of child was recorded by using weighing machine with 100 gm (0.1kg) least count. Before taking weight if any child came with shoes and/or Chappal, they were removed before the weight was taken. The height of child was recorded by the measuring tape with 1cm least count. While measuring it, posterior occipital protuberance, posterior part of heel and buttocks was touching the wall. Infantometer, with 1cm least count was used to record the length of the infant, in proper lying down position. Mid upper arm circumference was measured to the nearest mm at midpoint of the left arm (The point between acromion process of scapula and olecrenon process of ulna) using flexible and non- stretchable tape with 1 mm least count.

Nutritional status indices like weight for age (underweight), height for age (stunting) and weight for height (wasting) were expressed in standard deviation units (z score) from the reference median as per WHO standards.[6] These findings were then compared with reference data for age and sex based on WHO growth standards. Weight for height (wasting) and Weight for age (underweight), height for age (stunting) were taken as deciding criteria. The study was approved by Institutional Ethics committee of T. N. Medical College Mumbai.

RESULTS

Table 1 shows maximum children (28.14%) are in the age group of 25-36 months while 7-12 months age group has only 8.14% children. Maximum female 36 (27.90%) (36/129) are also in the age group of 25-36 months.

Table 2 shows maximum children (56.67%) belongs to class IV as per modified BG Prasad classification, most of the children (67.78%) were living in joint families. 20.37% mothers and 10.74% of fathers were illiterate. Most of the children (96.7%) are Hindu.

Table 1: Age and sex wise distribution of children under the study (n=270).

No. of children (age in months)	Male	Female	Total	Percentage out of total
7-12	16	6	22	22/270
	72.72	27.28	100.0	(8.14)
13-24	34	26	60	60/270
	56.67	43.33	100.0	(22.22)
25-36	40	36	76	76/270
	52.63	47.37	100.0	(28.14)
37-48	31	31	62	62/270
	50.0	50.0	100.0	(22.96)
48-60	20	30	50	50/270
	40.00	60.00	100.0	(18.51)

Table 2: Distribution of children according to Socio-demographic factors.

Sociodemographic factors/ variables	No. of children	Percentage
Class II	18	6.67
Class III	76	28.14
Class IV	153	56.67
Class V	23	8.52
Type of family		
Joint	183	67.78
Nuclear	87	32.22
Educational status of parents-mother		
Illiterate	55	20.37
Primary	100	37.03
Secondary	71	26.30
Higher secondary	44	16.30
Educational status of parents-father		
Illiterate	29	10.74
Primary	94	34.81
Secondary	113	41.85
Higher Secondary	34	12.60
Religion		
Hindu	261	96.7
Buddhist	06	2.2
Christian	03	1.1

Table 3 shows that 40.74% female married before the age of 18 years while 41.48% female have their first child before the age of 20 years. Only 39.25% and 35.56% children are by born as first and second birth order indicates about 25% couples have more than two child norm.18.97% children have birth weight less than 2.5 kg. 38.16% families have children number more than 3.

This Table 4 shows the prevalence of malnutrition in study area by WHO criteria for underweight, stunting, and wasting was 56.30%, 52.96% and 27.8% respectively.

Table 3: Distribution of children according to birth order, birth weight, no. of children in family, age of mother at marriage and at first child.

Variables	N (%)
Age of mother at marriage	
<18 years	110 (40.74)
>18 years	160 (59.26)
Age of mother at first child	
<20 years	112 (41.48)
>20 years	158 (58.52)
Birth order	
First	106 (39.25)
Second	96 (35.56)
Third	42 (15.56)
Fourth and more	26 (9.63)
Birth weight	
<2.5 kg	48 (18.97)
≥2.5 kg	205 (81.03)
No. of children in family	
<3	167 (61.85)
≥3	103 (38.16)

Table 4: Prevalence of malnutrition.

Indices	Number	Percentage
Underweight	152	56.30
Stunting	143	52.96
Wasting	75	27.8

Table 5: Distribution of children according to mid

Mid upper arm circumference		No. of children		Total (%)
		Male	Female	
>13.5 cm	Count	91	81	172
	%	(52.90)	(47.10)	(100)
12.5-13.5 cm	Count	40	39	79
	%	(50.63)	(49.37)	(100)
<12.5 cm	Count	10	9	19
	%	(52.63)	(47.37)	(100)
Total	Count	141	129	270

Table 6 shows that 79 (29.25%) children were having moderate malnutrition while 19 (7.03%) children were suffering from severe malnutrition and there is significant association between malnutrition and type of family, no. of children in family, birth order, educational status of father and mother, maternal age of marriage and there was no statistical significance for age and gender of child.

Table 6: Association between acute malnutrition and various factors.

Factors	Acute malnutrition (WHO criteria) Normal	Malnourished	Total
Age group			
7-12 months	17	5	22
1-3 years	100	36	136
3-5 years	78	34	112
Pearson Chi-square value(X^2=0.767), df=2, p<0.681 non significant			
Birth order			
First	87	19	106
Second	69	27	96
Third	26	16	42
Fourth and more	13	13	26
Pearson Chi-square value(X^2=4.432), df=1, p<0.037 significant			
No. of children in family			
<3	129	38	167
≥3	66	37	103
Pearson Chi-square value(X^2=5.506)	df=1	P<0.019 Significant	
Education of mother			
Illiterate	25	30	55
Primary	72	28	100
Secondary	59	12	71
Higher Secondary	39	5	44
Pearson Chi-square value (X^2=29.74)	df=3	P<0.001 Significant	
Education of Father			
Illiterate	16	13	29
Primary	65	29	94
Secondary	85	28	113
Higher Secondary	29	05	34
Pearson Chi-square value (X^2=8.043)	df=3	P< 0.045 Significant	
Gender			
Male	100	41	141
Female	95	34	129
Pearson Chi-square value (X^2=0.249)	df=1	P<0.618 Non Significant	
Type of family			
Joint	125	58	183
Nuclear	70	17	87
Pearson Chi-square value (X^2=4.342)	df=1	P<0.037 Significant	
Maternal Age of marriage			
Less than 18 years	70	40	110
≥ 18 years	125	35	160
Pearson Chi-square value (X^2=6.821)	df=1	P <0.009 Significant	
Socioeconomic Status			
Class II	18		
Class III	76		
Class IV	153		
Class V	23		

Chi-square value =175 p value<0.001 significant

DISCUSSION

This community based cross-sectional epidemiological study showed that the prevalence of underweight, stunting and wasting was 56.30%, 52.96% and 27.8% respectively. A study conducted by Mallikharjuna et al among primitive tribe of Saharia in Rajasthan found higher prevalence i.e. 72%, 68% and 13% respectively.[7]

In this study maximum proportion of malnutrition was seen in the age group of 4-5 years (30.4%) but the difference was statistically non-significant (p value =0.681). A study carried out by Bhavsar et al in urban slum of Mumbai among anganwadi children found that malnutrition was prevalent among 1-2 years of age group which was nonsignificant.[8] But a similar study conducted by Sahoo et al shows higher prevalence of malnutrition among 7 months to 3 years and that was statistically significant.[9]

Prevalence of acute malnutrition was slightly more among male children than female but it is statistically nonsignificant. A study conducted by Anuradha et al in rural part of Tamil Nadu found that higher prevalence among male children and the difference was statistically significant.[10] Jawaregowda et al found that acute malnutrition (weight for height i.e. wasting) was more common among male children than female children which was statistically significant.[11]

Joint families have more malnourished children than nuclear families and the difference was statistically significant. Similar results found in a study conducted by Kumar et al in an urban slum of Gurgaon in Haryana found that higher prevalence of malnutrition in children in those families who have 3 or more siblings as compared to 1-2 siblings.[12]

In this study significant association was found between maternal education and nutritional status of child (p value=0.001). Another study carried out by Meshram et al among preschool children of tribal Maharashtra shows that risk of underweight was 1.7 times higher among children of illiterate mothers.[13]

This study also emphasizes that father's education also plays an important role as malnutrition is higher among children whose father is illiterate or less literate and the difference is statistically significant (p=0.045). Prasot et al also found significant association between father's educational status and nutritional status of children; whereas it was not significant in case of mother's one.[14] In a study by Govani et al, in an urban slum of Gujarat (Ahmadabad) also significant importance was given to literacy of parents especially mother.[15]

Children with birth order first have 17.9% malnutrition whereas children having second and third birth order have 28.1% and 38.1% malnutrition respectively, it was statistically significant (p=0.037). A study conducted by Tiwari et al among under five children of urban slum of Mumbai found significant association between birth order of child and malnutrition.[16]

Women's age at marriage and child malnutrition was also statistically significant (p=0.009). Raj et al concluded that the risk of malnutrition is higher among young children born to mothers married as minors than in those born to women married at a majority age. Children of women married as minors were significantly having more chance of getting stunted (OR 1.85, 95% CI 1.71 to 1.99), wasted (1.19, 1.07 to 1.30) and underweight status (1.87, 1.74 to 2.01).[17]

CONCLUSION

Among total children, the prevalence of malnutrition among all 3 forms i. e underweight, stunting, wasting was slightly more among male children as compared to females, this can be taken as a positive sign for female child. Out of the total study population, majority of the children were belonging to class IV according to modified B.G Prasad classification (2017 updated) and very few of them were living in pucca house; poverty was the main problem of these people. The literacy rate was quite satisfactory in this area and that was more than our national average of literacy for males and females respectively in a rural area. Age and sex of child were not significantly associated with under nutrition in this study.

RECOMMENDATIONS

At family level, promotion of the use of contraception, health education and education about environment and sanitation.

At community level, local self-help groups at village level to help the family in economic aspect by assisting them in income generation, social awareness about age of marriage.

At state level, ICDS (integrated child development services) need to be strengthened and supervised at regular interval and availability of jobs at local level to avoid migration.

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