

Original Article**A cross sectional study to measure the prevalence of malnutrition and factors associated with malnutrition among under five children of an urban slum of Vadodara city**

Chetan N. Popat*, Arun I. Chaudhari*, V.S. Mazumdar**, S.V. Patel***.

*Resident Doctor, **Professor and Head, ***Associate Professor, Dept. of PSM, Medical College, Vadodara, Gujarat, India

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ABSTRACT

Background: Malnutrition is one of the most common causes of morbidity and mortality among children throughout the world, more so in developing nations. Malnutrition among urban poor children is worse than in rural areas. Children living in the urban slums are exposed to risks of infectious diseases, malnutrition and possibly impaired cognitive development.

Aim: To know the prevalence of malnutrition and its factors among under five children of an urban slum

Material & Methods: Community based cross-sectional study was carried out in an urban slum area of Vadodara city, Gujarat (population = 7000). Total 395 children of 0-5 years of age were enrolled in the study. Equal numbers of children were selected from each of the five Anganwadi area of that urban slum. All mothers or primary care takers of the children were interviewed and weight and height of the children was recorded.

Results: Prevalence of underweight, stunting and wasting was 32.4%, 46.1% and 17.2% respectively. Mother's literacy, low birth weight and morbidities like diarrhoea, fever and cough in previous fifteen days were significantly associated with malnutrition.

Conclusion: chronic malnutrition was more prevalent in this area. No child was found to be overweight or obese. Mother's literacy had a much higher impact on better nutritional status of children. Low birth weight was found to have adverse effect on nutritional status of children. Morbidities like diarrhoea, fever and cough had made the children nutritionally vulnerable as malnutrition was higher in those children.

Key words: under five children, urban slum, prevalence, malnutrition

INTRODUCTION

Malnutrition is one of the most common causes of morbidity and mortality among children throughout the world, more so in developing nations. Under-nutrition continues to be a public health problem in India. According to National Family Health Survey (NFHS) III With a prevalence of underweight, stunting and wasting is 43.5%, 48% and 20% respectively [1]. There is also a wide disparity in the prevalence of under-nutrition among the states of India, ranging from high (55%) to relatively lower (27%). In Gujarat prevalence of underweight is 47.4%, of stunting is 42.4% and of wasting is 17.0%.

Malnutrition among urban poor children is worse than in rural areas. Children living in the urban slums are exposed to risks of infectious diseases, malnutrition and possibly impaired cognitive development. In urban area of Gujarat prevalence of underweight is 42.7% [1]. Very less information is available regarding the nutritional status in this slum area.

Therefore the present study was conducted in this urban slum to find out the prevalence of malnutrition and its risk factors in children below five years of age.

MATERIAL & METHODS

A Community based cross sectional study was carried out during July 2013 to October 2013 at Kalyan nagar slum area of Vadodara city having population of around 7000. From the previous year report of ICDS Vadodara city, it was found that the prevalence of malnutrition was 30 % in the urban area. To calculate the adequate sample size with 5 per cent absolute allowable error and 95 per cent confidence limit, prevalence of malnutrition of previous year had been taken into account. The sample size was calculated using following formula,

$$N = \frac{(1.96)^2 PQ}{L^2}$$

Where, P= prevalence of malnutrition = 30

Q= proportion of normal children = 70

Allowable error L (absolute error) = 5 %

So, the final minimum sample size required was 370 children.

Equal numbers of children were selected from each of the five Anganwadi area of that urban slum. All mothers or primary care takers of the children were interviewed and weight and height of the children was recorded. The data was collected by doing house-to-house visit. At the end of data collection total 395 children of 0-5 years of age were enrolled in the study.

Data was collected using a pre-designed and pre-tested Performa. The information regarding parent's education, occupation, religion, per-capita income, child feeding practices, immunization history of child and past history of illnesses like diarrhoea, fever, cough in the past fifteen days and past history of any major illness in last six months was taken. Anthropometric measurements including weight, height and mid-upper arm circumference were done at home for all the children of 1-5 years of age. All the children of 0-1 years of age were brought to Anganwadi center with their mothers for anthropometric measurements.

The data so obtained was checked for its completeness, quality and internal consistency. The height and weight of each child was compared with WHO growth reference data (2006) for that particular age and sex to get weight-for-age, height-for-age and weight-for-height indices [2]. Children below -2 SD of the reference median on any of these indices were considered as undernourished and termed as underweight, stunted and wasted respectively. Children below -3 SD were considered to be severely undernourished and

children with weights above + 2 SD according to weight-for-height criteria were considered over weight. The mid upper arm circumference (MUAC) was used to classify malnutrition in children aged 1 to 5 years. Children with MUAC 11.5 to 12.5cms were considered as mildly malnourished and those less than 11.5cms were considered as severely malnourished. The collected data were entered and analyzed using the SPSS software (Version 17.0). Descriptive statistics were obtained for different parameters. χ^2 test was used to compare the association between the dependant and independent variable.

Ethical Issues

Before starting enrolment of the participants, necessary clearances and permissions were obtained from concerned authorities including Institutional Ethics committee for Human research (IECHR).

Data safety and confidentiality was also given due consideration. The file containing identity related details was kept password protected and the filled Performa were kept in lock with key accessible only to researcher.

RESULTS

In the present study comprising of 395 children aged 0-5 years, 181 (45.8%) were males and 214 (54.2%) were female children. With regards to age distribution it was observed that highest children were found in 24-35 months (24.6%). in 0-11 months age group, male children were 38 (45.8%) and female children were 45 (54.2%); in 12-23 months males numbered 45 (53.6%) and females were 39 (46.4%); similarly in 24-35 months, 36-47 months and 48-59 months age group male and female children were 44 (45.4%) and 53 (54.6%); 26 (35.1%) and 48 (64.9%) and 28 (49.1%) and 29 (50.9%) respectively.

In this study, majority 253 (64.1%) children were Muslims and 142 (35.9%) children belonged to Hindu religion. Out of total children 344 (87.1%) children belonged to the joint family and only 12.7% children belonged to nuclear family. Only one child belonged to broken family because of death of father.

With regards to socio-economic status, majority 357 (90.4%) of children belonged to Class IV according to modified B.G. Prasad's classification [3]. 20 (5.1%) children belonged to Class III and 18 (4.6%) of the

Table 1: Distribution of Children according to WHO Classification (N= 395)

Indices	Undernourished ($< -2SD$ and $> -3SD$ score)		Severely undernourished ($< -3SD$ score)		Total	
	No.	% and CI	No.	% and CI	No.	%
Underweight (Low Weight-for-age)	82	20.8 (16.9% - 25.2%)	46	11.6 (8.7% - 15.3%)	128	32.4
Stunting (Low Height-for-age)	117	29.6 (25.2% - 34.4%)	65	16.5 (13.0% - 20.5%)	182	46.1
Wasting (Low Weight-for-height)	49	12.4 (9.4% - 16.1%)	19	4.8 (3.0% - 7.5%)	68	17.2

Table 2: Distribution of Malnutrition in Children according to Age and Sex (N= 395)

Age (in months)	Total		Underweight		Stunting		Wasting	
	No	%	No	%	No	%	No	%
0-11	83	21.0	22	26.5	25	30.1	11	13.3
12-23	84	21.3	27	32.1	49	58.3	16	19.0
24-35	97	24.6	27	27.8	40	41.2	14	14.4
36-47	74	18.7	29	39.2	42	56.8	19	25.7
48-59	57	14.4	23	40.0	26	45.6	8	14.0
Total	395	100.0	128	32.4	182	46.1	68	17.2
			$X^2 = 5.444$ P = 0.245		$X^2 = 17.900$ P = 0.001		$X^2 = 5.760$ P = 0.218	
Sex	No	%	No	%	No	%	No	%
Male	181	45.8	54	29.8	83	45.9	32	17.7
Female	214	54.2	74	34.6	99	46.3	36	16.8
Total	395	100.0	128	32.4	182	46.1	68	17.2
			$X^2 = 0.803$ P = 0.370		$X^2 = 0.000$ P = 1.000		$X^2 = 0.008$ P = 0.927	

Table 3: Distribution of Malnutrition in Children according to Birth weight (N= 334)

Birth weight	Total Children		Underweight		Stunting		Wasting	
	No.	%	No.	%	No.	%	No.	%
Normal	204	61.07	49	24.01	82	40.19	26	12.74
Low birth weight	128	39.50	64	50.0	69	53.90	35	27.34
Very low birth weight	2	0.6	2	100.0	1	50.0	1	50.0
Total	334	100.0	115	34.43	152	45.50	62	18.56
			$X^2 = 27.347$ P < 0.0001		$X^2 = 5.978$ P = 0.0503		$X^2 = 12.404$ P = 0.002	

N= 334; children whose birth weight were not known have been excluded

Table 4: Distribution of Malnutrition in Children according to common Morbidities in last 15 days (N= 395)

Morbidity*	Total	Underweight		Stunting		Wasting	
		No	%	No	%	No	%
Diarrhoea	115	83	72.17	72	62.60	40	34.78
Fever	106	68	64.15	61	57.54	30	28.30
Cough	94	59	62.76	56	59.57	28	29.78
Worm infestation	125	70	56.0	69	55.2	37	29.6

*Multiple answers

children belonged to Class V. There were no children in the Class I or Class II socio-economic status.

In context to literacy status of parents, literacy rate among mothers was 61.3% and 86.0% fathers were literate. The female literacy status was lower in our study as compared to national average of 72.9% female and state average of 70.7% [4]. Further among literate mothers, 176 (44.6%) had primary education and 66 (16.7%) had secondary & higher-secondary education.

As shown in Table no. 1, According to WHO growth standard (2006) out of total 395 involved children in the study, percentage of Underweight (low weight-for-age) was 20.8% and percentage of severe underweight was 11.6%. So, the prevalence of Underweight (acute malnutrition) was 32.4%. The prevalence of Stunting (low height-for-age) and severe Stunting was 29.6% and 16.5% which reflected the problem of chronic malnutrition. Wasting (low weight-for-height) was present in 12.4% of children and proportion of severe wasting was 4.8%.

According to age group underweight was present in 22 (26.5%) children in 0-11 month age group. In the 12-23 months age group 27 (32.1%) children were underweight. Similarly in the 24-35 months, 36-47 months and 48-59 months age group children the prevalence of underweight was 27.8%, 39.2% and 40.0% respectively. Although the prevalence was highest with 40.0% in 48-59 months age group being underweight the difference was not statistically significant. ($p= 0.245$). Similarly stunting was highest with 58.3% in 12-23 months age group and lowest with 30.1% in children in age group of 0-11 months. Here the difference was found to be statistically significant ($p= 0.001$).

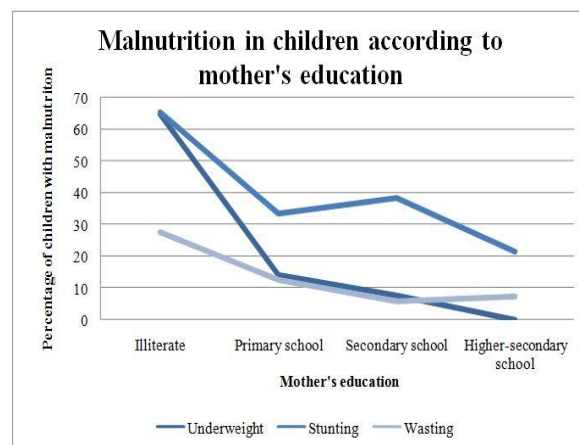
Regarding wasting, it was highest in 36-47 months age group affecting 25.7% children. The distribution of wasting among age group was also not found

statistically significant ($p= 0.218$). In our study only in stunting the second year of life was significantly more affected.

In our study prevalence of underweight and stunting was higher in female affecting 34.6% and 46.3% children respectively but difference was not statistically significant ($p=0.370$, $p=1.000$). In regards with wasting, prevalence was higher in male (17.7%) but this difference was also not statistically significant ($p= 0.927$). (Table no. 2)

The prevalence of underweight among children borne by illiterate mothers and literate mothers was 162 (55.10%) and 126 (37.5%) respectively and difference was highly significant ($p= 0.000$).

In the height for age criteria, stunting was noted in 117(39.80%) and 80(23.81%) of children borne by illiterate and literate mothers respectively and was highly significant ($p= 0.000$).

Graph 1: Malnutrition in children according to mother's education

Similarly the prevalence of wasting among children borne by illiterate and literate mothers was

observed to be 96(32.43%) and 47(13.99%) respectively, which was also highly significant ($p=0.000$). (Graph no. 1)

As shown in Table no. 3, the prevalence of underweight among children having normal birth weight was 24.01% and among the low birth weight children it was 50.0%. There were only two children with very low birth weight and both were suffering from underweight. This difference was statistically significant ($p < 0.0001$).

In context to stunting, 82 (40.19%) children of normal birth weight, 69 (53.90%) children of low birth weight and 1 (50.0%) child of very low birth weight were found to be stunted. This distribution was statistically significant ($p=0.0503$).

Among normal birth weight children, 26 (12.74%) children had wasting. 35 (27.34%) children was suffering from wasting among low birth weight children and 1 (50.0%) child of very low birth weight had wasting. The difference was also found to be statistically significant ($p=0.002$).

In our study common morbidities repeated in previous 15 days were diarrhoea, fever, cough and worm infestation. The prevalence of underweight, stunting and wasting was higher in children who has any of these morbidities in last 15 days and the difference was statistically significant ($p < 0.05$). (Table no. 4)

DISCUSSION

The study attempted to measure the Nutritional status of the children aged 0-5 years and to know risk factors associated with causation of malnutrition.

Prevalence of malnutrition was higher as compared to NFHS 2005-06 report of urban areas of Gujarat in which more than one-third (36%) of children under five years of age were stunted, 16 percent were wasted, and 30 percent children were underweight [1]. Another study conducted by Apurvadan N Ratnu et al., has estimated prevalence of underweight (26.4%), stunting (49%) and wasting (10.7%) in 0-5 year children of Junagadh district of Gujarat [5]. In other study carried out by A Mittal et al., in urban slums of Tripura, Patiala out of 482 children aged 1-5 year who participated in the study, 185 (38.38%) had low weight for age (underweight) whereas 222 (46.06%) had low height for age (stunting) [6].

Problem of chronic malnutrition was higher among the children in our study which might be the effect of poor feeding practices since birth due to lack of knowledge and poor economic condition. Prevalence of acute malnutrition was lower than chronic malnutrition. Acute malnutrition might be the result of some recurrent infections within short time period which had led the children to under nutrition.

In our study prevalence of underweight and stunting was higher in female and prevalence of wasting was higher in male but this difference was not statistically significant. This higher prevalence of acute and chronic malnutrition in female children might be due to some negligence at level of care in terms of less attention towards diet of female children as compared with male children. Similarly in another study conducted by Paramita Sengupta et al., in urban slums of Ludhiana, Significantly more females than males were found to be underweight. More females were also found to be stunted and wasted though the gender differences here were not statistically significant [7].

Higher prevalence of underweight (acute malnutrition) was found among children aged > 3 years which might be due to recurrent infections and poor hygiene. Chronic malnutrition found higher in children of 1-2 years of age group which might be the result of low birth weight and improper breast feeding and delayed starting of complementary feeding.

It was observed that there was a declining trend of malnutrition with increase in educational qualification of the mothers. Similar findings were found in another study conducted by Dinesh Bhandari et al., in Petlad town, Anand district where trend of malnutrition were decreasing with increase in maternal education [8]. In another study carried out by A Mittal et al., in urban slums of Tripura, Patiala Overall 70.75% of the mothers was literate though up to different levels. Prevalence was the highest where mothers were illiterate (60.9%) vs value of 21.2% where mother had education more than high school. Similarly, figures for stunting were 65.25% where mother was illiterate and 31.3% where education level was more than high school. Differences were statistically significant for both the cases [6].

The findings in our study reflect that mother's educational qualification is strongly associated with nutritional status of their children. Mother's literacy played a protective role against malnutrition in children. This might be due to better health care

practices in terms of proper exclusive breast feeding, in-time complementary feeding and quality and quantity of complementary feeding among literate mothers as compared to illiterate mothers.

In our study all three indices of under nutrition were found to be higher in low birth weight children. The reason might be impaired nutritional status since birth which has made children vulnerable for malnutrition and addition to this repeated infection and improper feeding practices worsened the nutritional status. This finding was similar with findings in another study conducted by Paramita Sengupta et al., in an urban slum of Ludhiana where all forms of under nutrition were found to be higher in LBW children. Being born with low birth weight appears to carry a higher risk of being underweight in the first five years of life with the prevalence of underweight being observed to be significantly higher ($p=0.024$) in the LBW children [7].

The prevalence of underweight, stunting and wasting was found higher in children with morbidities like diarrhoea, fever, cough and worm infestation in last 15 days. Findings in our study were similar as compared with another study conducted by Santosh Kumar A et al., in urban slums of Mysore city where prevalence of underweight, stunting and wasting was found to be significantly higher ($p < 0.005$) in children with history of respiratory infections and diarrhoea [9]. So, repeated infections in recent time period might had aggravated the continuous nutritional deficient stage and children's nutritional status worsened further.

CONCLUSION

In our study, nearly one third of children were underweight (32.4%), half of children were stunted (46.1%) and one fifth of children were wasted (17.2%). So, chronic malnutrition was more prevalent in this area. No child was found to be overweight or obese. Mother's literacy had a much higher impact on better nutritional status of children. Low birth weight was found to have adverse effect on nutritional status of children. Morbidities like diarrhoea, fever and cough had made the children nutritionally vulnerable as malnutrition was higher in those children.

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Corresponding Author :

Dr. Popat Chetan N.
"VINAYAK", City bus colony,
Street no-7, near sindhi soc.,
Gandhi gram,
Junagadh- 362001, Gujarat, India
Email: drchetan.popat2011@gmail.com

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