Original Research Article

Anthropometric assessment of nutritional status of children attending anganwadi in urban slums of Miraj city, Maharashtra

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ABSTRACT

Background: Children between 1 to 6 years of age in India constitute 15% of total population as against 7% in the developed countries. Nutrition of these children is of prime importance as they are most vulnerable to malnutrition. Anthropometry has become a practical tool for evaluating the nutritional status of children in developing countries which is the best indicator of global wellbeing of children. The objectives were to study nutritional status of study subjects and to identify various socio-demographic risk factors associated with under-nutrition.

Methods: This is a cross-sectional study carried out in 205 Children of 0-6 years of age registered in Anganwadis in adopted urban slum area of community medicine department of Government Medical College, Miraj during January – December 2014. Data was collected using a pre-designed proforma and was analyzed at 5% level of statistical significance. For all the classifications in study WHO classifications were used.

Results: Out of 205 children, 113 (55.12%) were males and 92 (44.88%) were females. Majority were Hindus (54.1%), from joint family (67.8%), belonged to class IV Socio-economic status, with literate parents (81% fathers and 70.7% mothers), having maternal age between 20-30 years, having birth order one (37.5%), were attending Anganwadi regularly (71.7%), completed their immunization as per age (92.2%). Prevalence of malnutrition was 26.8% (Weight for height or length). 32 (15.6%) children were underweight, 20 (9.8%) children were in MAM i.e. moderate acute malnutrition, and 03 (1.4%) were in SAM i.e. severe acute malnutrition. Prevalence of malnutrition in 166 under 5 children was 72.9 %. 94 (56.6%) children were underweight, 24 (14.5%) children were in MAM, and 03 (1.8%) were in SAM. Prevalence of stunting was 64.5%. Majority children had normal mid arm circumference.

Conclusions: Undernutrition was more prevalent in age group of 13-24 months, females, Hindus, class 4 SES, in those having illiterate mothers, in children having birth order one and those with incomplete immunization.

Keywords: Urban slum, Malnutrition, Anthropometry, Anganwadi

INTRODUCTION

'Angan' literally means a courtyard. Anganwadi centres have been established by Social and women Welfare department of Government of India.[1] Anganwadi centre is a part of ICDS (Integrated Child Development Services) scheme initiated in 1975. ICDS is India's most ambitious multi-dimensional welfare programme to reach millions

of children and mothers who are caught in the grip of malnutrition, diseases, illiteracy, ignorance and poverty.[2]

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 is of prime importance as they are most vulnerable to deficiencies or malnutrition.[3] Protein Energy malnutrition (PEM) characteristically occurs in children less than 6 years of age, whenever the diet is poor in energy and proteins. In the 1970's, it was widely held that PEM was due to protein deficiency. Over the years, the concept of "protein gap" (deficiency of proteins in diet) has given place to the concept of "food gap".[4] Nutritional status can be determined with the help of clinical examination of symptoms of nutritional deficiencies, dietary intake and anthropometry etc. Anthropometry has become a practical tool for evaluating the nutritional status of populations, particularly of children in developing countries.[1]

Children in Anganwadis have taken because it is most representative sample of entire community. There is tremendous impact of socio-demographic factors over normal growth & development of children. Also these factors are constantly changing, due to interventions made. Malnutrition is frequently a part of a vicious cycle that includes poverty and disease. These factors are interlinked in such a way that each contributes to the presence and permanence of others. Socio-economic and political changes that improve health and nutrition can break the cycle, as can specific nutrition and health interventions.[5] So, study of baseline condition is always needed to understand present situation to plan and modify interventions accordingly as the problem is more preventable than curable.

METHODS

It is a descriptive cross-sectional study which is carried out in Anganwadis in adopted urban slum area of Community Medicine department of a Govt Medical College.

Study period

One year (1st January 2014– 31st December 2014).

Study population

Children of 0-6 years of age registered in Anganwadis in the urban slum area of adopted community of a Government medical college.

Inclusion criteria

Inclusion criteria were children of age 0-6 years, registered in Anganwadis in adopted community; those

children whose parents were willing to participate in study.

Exclusion criteria

Exclusion criteria were those children whose parents were not willing to participate in study; those not present at the time of examination even after 3 visits.

Sample size

There are two Anganwadis in adopted area having total 209 children registered. All efforts were taken to cover all children and finally 205 were included in the study using inclusion and exclusion criteria. Anganwadi workers were informed about the study. The aim, objectives and procedure were explained to all of them. All the Anganwadi teachers and helpers were co-operative throughout the study.

Data collection

Data collection was done for 4 days in a week from 10 AM to 1 PM. The data was collected by interviewing the parent or caretaker using pre-designed proforma. The information regarding child's age, gender, birth order, maternal age, Anganwadi attendance, immunization status, parents' education, religion, per-capita income, type of family, etc. was collected.

Study tools

Pre-designed and pre-tested questionnaire, weighing machine, measuring tape, Shakir's tape.

Measurements

Weight

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.

Height / length

For children more than 2 years of age, standing height was measured without any foot wear to the nearest 0.5 cm using a standard calibrated measuring tape. 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 touching the top of the head. For children up to 2 years of age, length is taken by laying the

child firmly in supine position. Measurement was read by placing the horizontally held wooden boards one touching the top of the head and another touching bottom of sole.

Mid upper arm circumference

The left arm was measured at its midpoint while hanging freely. The midpoint was assessed by measuring the distance between the acromial process of scapula and the olecranon process of ulna, taking the midpoint of that distance and the measurement was taken to the nearest 0.1 cm.

Classifications used for malnutrition

1) WHO classification based on weight for height/length was used to classify the nutritional status for particular age and sex, using readymade chart for wasting i.e. children below one standard deviation of reference median were considered as underweight, children below two standard deviation of the reference median were considered as moderately acute malnourished (MAM) and children below three standard deviation were considered as severely acute malnourished (SAM).[6]
2) WHO classification of weight for age (for 0-5 years) was also used to classify the under five children.[6]
3) 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.[6]
4) The mid upper arm circumference was also used to classify malnutrition. Mid arm circumference exceeding 13.5 cm was considered as satisfactory nutritional status, between 12.5 and 13.5 as mild-moderate malnutrition and below 12.5 as severe malnutrition.[1]

Complete immunization status

Children who had been administered all the recommended vaccines and recommended doses for that age, as per UIP guidelines.

Incomplete immunization status

Children who have not received one or more recommended vaccines or dose for that age as per UIP guidelines.

The socio-economic status

It was determined using the modified BG Prasad's classification updated in 2014.[7]

Analysis

Data obtained was coded and entered into Microsoft excel worksheet. This was analyzed using SPSS version 16 and Open Epi version 2.3.

RESULTS

In the present study comprising of 205 children, aged 0-6 years, it was observed that maximum numbers of children were in the age group of 25-36 months i.e. 46 (22.4%) and least number of children was observed in the age group of 49-60 months i.e. 22 (10.7%). Out of 205 children, 113 (55.12%) were males and 92 (44.88%) were females. Maximum numbers of children were Hindus i.e. 111 (54.1%), followed by 75 (36.6%) Muslims, 13 (6.3%) Buddhist and 06 (3%) Christian. Regarding Socioeconomic status, majority of children i.e. 125 (61.0%) belonged to Class IV and 67 (32.7%) belonged to Class III, only 10 (4.9%) were Class II, while 03 (1.4%) were Class V families. There were no families who belonged to socio economic class I. In present study 139 (67.80%) children were belonging to either joint or 3 generation family, while 66 (32.20%) were belonging to nuclear family (Table 1).

77 (37.5%) were of Birth order one, 69 (33.7%) were of Birth order two, while 59 (28.8%) were of birth order three and above. Maternal age of 160 (78.0%) children was between 20-30 years, for 40 (19.6%) children it was <20 years, while for only 05 (2.4%) children it was >30 years (Table 1).

147 (71.7%) children were attending Anganwadi regularly and taking supplementary nutrition, while 58 (28.3%) were not attending the Anganwadi regularly. Out of 58 children not attending Anganwadi, the major reason was not having an attendant to bring i.e. 47%, while 19% parents were found ignorant (Table 1).

In the present study, majority of the children i.e. 189 (92.2%) were completely immunized as per the age, while 16 (7.8%) children were not completely immunized till date (Table 1).

In context to the education status of parents of study subjects, 39 (19.0%) fathers, 60 (29.3%) mothers were illiterate and 166 (81%) fathers, 145 (70.7%) mothers were literate. Further, among literate fathers it was observed that maximum i.e. 64 (31.2%) had completed middle school and only 17 (8.3%) of them were graduated. Among mothers also maximum i.e. 60 (29.3%) had completed middle school, and no one was graduated (Table 1).

In the present study overall prevalence of malnutrition according to the WHO classification of weight for height was 26.8%. 32 (15.6%) children were underweight, 20 (9.8%) children were in MAM i.e. moderate acute malnutrition, and 03 (1.4%) were in SAM i.e. severe acute malnutrition. WHO reference growth tables were

used and children between median and -1SD were considered normal, between -1 SD to -2 SD as underwt, -2 SD to -3 SD as Mam and ≤ 3 SD as SAM (Table 2).

In the present study overall prevalence of malnutrition according to the WHO Classification (Wt for age for 0-5 yrs was taken as reference table was upto 5 yrs of age), out of 166 children was 72.9%. 94 (56.6%) children were underweight, 24 (14.5%) children were in MAM i.e. moderate acute malnutrition, and 03 (1.8%) were in SAM i.e. severe acute malnutrition. WHO reference growth tables were used and children between median and -1 SD were considered normal, between -1 SD to -2 SD as underweight, -2 SD to -3 SD as Mam and ≤3 SD as SAM (Table 3).

Table 1: Distribution of children according to socio-demographic variables.

S. no.	Variables	Categories	Number of children	Percentage (%)
1	Age in months	0-12	31	15.2
		13-24	44	21.4
		25-36	46	22.4
		37-48	23	11.3
		49-60	22	10.7
		61-72	39	19.0
2	Gender	Male	113	55.12
		Female	92	44.88
3	Religion	Hindu	111	54.1
		Muslim	75	36.6
		Buddhist	13	6.3
		Christ	06	3.0
4	Socio-economic status	Class I	0	0
		Class II	10	4.9
		Class III	67	32.7
		Class IV	125	61.0
		Class V	03	1.4
5	Type of family	Nuclear	66	32.2
		Joint/3Generation	139	67.8
6	Birth order	1	77	37.5
		2	69	33.7
		≥3	59	28.8
7	Maternal age at birth	<20 years	40	19.6
		20-30 years	160	78.0
		>30 years	05	2.4
8	Anganwadi attendance	Regular	147	71.7
		Irregular	58	28.3
9	Immunization status	Complete	189	92.2
		Incomplete	16	7.8
10	Literacy of parents	Mothers literacy	145	70.7
		Father literacy	166	81.0
Total			205	100

Table: 2 Nutritional status of children according to WHO classification of weight for height/length.

S. no.	PEM grade (WHO classification)	No. of children	Percentage (%)
1	Normal	150	73.2
2	Underweight	32	15.6
3	Moderately malnourished (MAM)	20	9.8
4	Severely Malnourished (SAM)	03	1.4
Total		205	100

Table 3: Nutritional status of children according to weight for age (WHO classification - 0 to 5 years).

S. no.	PEM Grades	No. of children	Percentage (%)
1	Normal	45	27.1
2	Underweight	94	56.6
3	MAM	24	14.5
4	SAM	03	1.8
Total		166	100

Table 4: Nutritional status of children according to height/length for age (WHO classification- 0 to 5 years).

S. no.	Malnutrition (Ht/Lth for Age)	No. of Children	Percentage (%)
1	Normal	59	35.5
2	Mild Stunting	70	42.2
3	Severe Stunting	37	22.3
Total		166	100

Table 5: Nutritional status of children according to mid upper arm circumference (MUAC).

S. no.	Malnutrition (MUAC)	No. of Children	Percentage (%)
1	Normal	186	90.7
2	Mild – Moderate Malnutrition	16	7.8
3	Severe Malnutrition	03	1.5
Total		205	100

Table 6: Association of malnutrition with other factors.

S. no.	Variable		Children observed		Normal		Malnutrition		Chi-square and P value
			No.	%	No.	%	No.	%	
1	Age in Months	0-12	31	15.2	26	83.9	05	16.1	Chi-sq=15.64 p=0.007940
		13-24	44	21.4	26	59.0	18	41.0	
		25-36	46	22.4	39	84.8	07	15.2	
		37-48	23	11.3	20	87.0	03	13.0	
		49-60	22	10.7	16	72.7	06	27.3	
		61-72	39	19.0	23	59.0	16	41.0	
2	Gender	Male	113	55.1	85	75.2	28	24.8	Chi-sq=0.5393 p= 0.4627
		Female	92	44.8	65	70.7	27	29.3	
3	Religion	Hindu	111	54.1	78	70.3	33	29.7	Chi-sq=1.14 p=0.5655
		Muslim	75	36.6	58	77.3	17	22.7	
		Others	19	9.3	14	73.7	05	26.3	
4	Maternal education	Illiterate	60	29.3	41	68.3	19	31.7	Chi-sq=1.036 p=0.5957
		Literate but below high school	91	44.4	68	74.7	23	25.3	
		High school and above	41	26.3	41	76.0	13	24.0	
5	Socio-economic status	Class I*	0	0	0	0	0	0	Chi-sq=0.5359 p=0.7649
		Class II	10	4.9	8	80.0	02	20.0	
		Class III	67	32.7	50	74.6	17	25.4	
		Class IV	125	61.0	89	71.2	36	28.8	
		Class V*	03	1.4	03	100	0	0	
6	Birth order	1	77	37.6	50	65.0	27	35.0	Chi-sq=4.262 p=0.1187
		2	69	33.6	54	78.3	15	21.7	
		≥ 3	59	28.8	46	77.9	13	22.1	
7	Immunization status	Complete	189	92.2	139	73.5	50	26.5	Chi-sq=0.1726 p=0.6777
		Incomplete	16	7.8	11	68.7	05	31.3	
Total			205	100	150	73.2	55	26.8	

Categories marked with *were excluded for chi square test.

In the present study overall prevalence of Stunting according to the WHO classification was 64.5%. 70 (42.2%) children were mildly stunted, while 37 (22.3%) were severely stunted. WHO reference growth tables were used (Table 4).

Based on mid upper arm circumference, mild to moderate malnutrition was present in 16 (7.8%) children and only 03 (1.5%) children had severe malnutrition (Table 5).

Prevalence of undernutrition was more prevalent in the age group of 13-24 months and the age group of 61-72 months while least prevalent in the age group of 37-48 months. This difference found to be statistically significant. Female children were found to have stronger association with the malnutrition as compared to male children though not statistically significant. Undernutrition was more prevalent in hindus, in children with illiterate mothers, class 4 SES, those having birth order one and those with incomplete immunization (Table 6).
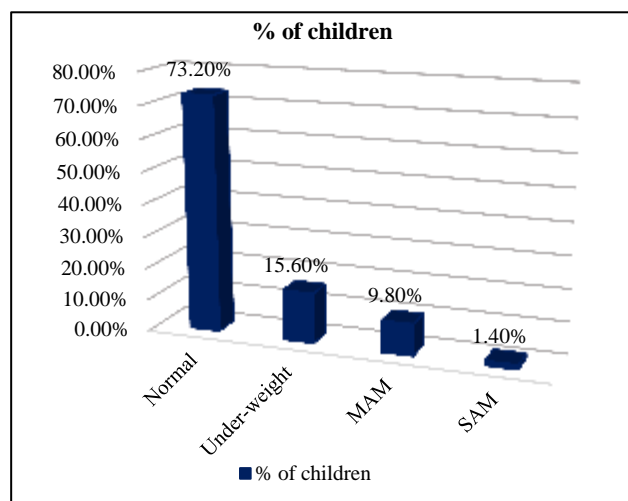

Figure 1: Nutritional status of children according to WHO classification of weight for height/length).

DISCUSSION

Main victims of protein energy malnutrition are children under the age of 15, but the children under the age of six years are hit the hardest. Weight is the first to be affected when compare to other parameters in protein energy malnutrition. The current weight (in kgs) of the child is compared with the expected standard weight and the deficiency in percentage is expressed in terms of degrees of malnutrition.[8] According to NFHS – 2, the prevalence of malnutrition in India was 43%.[9] According to NFHS-3, (in 2005-06) 42.5% of children under 5 years of age were underweight, 19.8% were wasted and 48% were stunted.[10] According to study conducted by Chakraborty et al, Ahmad et al, Bains and Brar, Behera et al, children of less than six years were having high prevalence of malnutrition.[11-14]

In the present study overall prevalence of malnutrition according to the WHO classification was 26.8%. 32 (15.6%) children were underweight, 20 (9.8%) children were in MAM, and 03 (1.4%) were in SAM. Highest prevalence was found in the age group of 13-24 months (41.0%) and 61-72 months followed by 49-60 months (27.0%) and this difference is statistically significant. Study by Ray et al revealed highest prevalence of malnutrition (74.19%) in the age group 12-23 months, followed by 24-35 months (66.18%) and 36-59 months (60.47%).[15] But the trend was somewhat different in case of severe degree of malnutrition (Grade III and IV) which was highest in 6-11 months of age group (12.82%) followed by 12-23 months (9.68%) age group. A study in rural areas of Allahabad by Harishankar et al maximum prevalence 33 (32.02%) of malnutrition was recorded in age group of 13-24 months followed by 43 (28.09%) in the age group 37-72 months, 18 (24.31%) in age group of 0-12 months and 23 (21.68%) in age group of 25-36 months.[16] Majority of children having grade II malnutrition were in age group of 13-24 months. While grade III malnutrition was recorded in age group of 0-12 months.

In the present study overall prevalence of Stunting according to the WHO classification was 64.5%. 70 (42.2%) children were mildly stunted, while 37 (22.3%) were severely stunted. A study by Emily et al, both underweight and stunting was maximum in 12-24 months age group children at 46.2% and 60.5% and it was found statistically significant.[17]

A study by Harishankar et al, Bhalani have shown the significant association of malnutrition with a female child.[16,18] In present study also the prevalence of malnutrition was more prevalent in female children (29.3%) than that in male children (24.8%) though not statistically significant. In Ray et al study, 64.74% of males and 61.58% of females were malnourished but statistically significant association was observed in prevalence of severe degree of malnutrition, which was almost double in female children (8.47%) in comparison to male children (4.3%).[15] The difference may be due to negligence of girls, more morbidity, less health care facilities and preferential treatment given to the male children who receive better nutrition and attention than the females. In contrast to this, a study conducted in Gond tribal community in Madhya Pradesh by Rao et al, prevalence of malnutrition was found to be similar among both males and females.[19]

In a study by Mittal et al, prevalence of malnutrition was highest where mothers were illiterate, i.e. 60.9% and it was 21.2% where mother had education more than high school.[20] Similarly, figures for stunting were 65.25% where mother was illiterate and 31.3% where education level was more than high school.[20] Chakraborthy et al study found the malnutrition prevalence to be higher among the children of illiterate mothers. Significant difference was found between the percent of malnutrition

in children of mother who were illiterate or having primary education in comparison to those of having education up to middle school and or above.[11] In a study by Lakshmi et al, it was observed that a significantly higher rate of malnutrition among under-fives was in children of illiterate mothers (53%), than the children of literate mothers (37% in 5-7 years of schooling and 27% in 8-10 years of schooling).[21] A study by Ray et al, also revealed that the prevalence of malnutrition among the children of literate mothers was comparatively lower (54.93%) than the illiterate mothers (69.55%) and the difference was also statistically significant.[15] In a study by Anoop et al, the proportion of moderately malnourished children has been noticed to be decreased with increasing maternal education.[22]

A large part of our population particularly the poor people suffers from serious deficiencies in their diet. Poor families with lack of purchasing power to meet the daily dietary requirements have a direct impact on nutritional status of their children. Like present study many studies have demonstrated direct association between low socio-economic status and malnutrition. In a study done by Harishankar et al, 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.[23] In high socioeconomic status, only grade I (9.61%) and grade II (3.8%) malnourished children were observed. No child of grade III and grade IV malnutrition was found in this socioeconomic group. Nutritional grade with economic status was found to be highly significant.[16] A study by Anoop et al, showed that 43.8% of the children of the poorest families (with monthly income of under Rs. 1000) were malnourished, while 32.6% of those with monthly family income of Rs. 1000-1999, and 16.9% of those with monthly family income of Rs. 2000 or more were suffering from PEM.[22] However, nutritional status with economic status was found to be statistically not significant.[22]

Low prevalence of malnutrition in the children of first and second birth order brings out the fact that children born earlier get more attention and care and hence have better health. In present study prevalence of malnutrition was found highest i.e. 27 (35.0%) in birth order one, 15 (21.7%) in birth order two and 13 (22.1%) in birth order three and above. NFHS 3 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.[10] The difference for present study for first birth order may have seen because maternal age at first delivery for most children was less than 20 or nutritional status of mothers may had effect on that of children. Also for further birth orders most of maternal age was found between 20-30 years.

Harishankar et al study in rural areas of Allahabad district, showed the prevalence of all grades of malnutrition increases with birth order, 20.38% in birth order one, 26.9% in birth order two and 43.5% in birth order three and above.[23] A study conducted by Sen et al; among 587 preschool children in rural areas of eastern U.P, showed that prevalence of PEM was more with birth order three or more.[24]

Immunization against vaccine preventable diseases like tuberculosis, measles prevents the child from later complications like malnutrition. Partially and non-immunized children are at higher risk of malnutrition as they are not protected against the vaccine preventable diseases and this contributes to the vicious cycle of malnutrition and infection. Present study has shown the higher prevalence of malnutrition among those with incomplete immunization as compared to those having complete immunization though the difference was not found statistically significant. A significantly higher prevalence of malnourished children was observed amongst partially immunized and non-immunized children (81.25% and 88.23% respectively) in comparison to fully immunized children (62.07%) in a study by Ray et al conducted in municipal area of Siliguri, North Bengal.[15] Similar results was shown in studies by Banerjee et al, Bloss Emily et al and Shally Awasthi et al.[25,17,26]

CONCLUSION

Thus we can conclude that, prevalence of malnutrition was 26.8% according to the WHO classification (Weight for height or length) in 0-6 years of children attending Anganwadi in adopted urban slum area of Government Medical College, Miraj, Maharashtra. Majority 32 (15.6%) children were underweight and 20 (9.8%) children were in MAM i.e. moderate acute malnutrition while very few 03 (1.4%) were in SAM i.e. severe acute malnutrition. Prevalence was highest in age group of 13-24 months, females, Hindus, class 4 SES, in those having illiterate mothers, in children having birth order one and those with incomplete immunization. Age was significantly associated with the prevalence of malnutrition.

Recommendations

In the study area, health education regarding nutrition should be given to the population. All the high risk groups should be given more attention and care so that the evil of malnutrition can be eradicated

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