Prevalence of Under Nutrition and Its Risk Factors among Children below Two Years of Age in a Tertiary Health Centre in West Bengal

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ABSTRACT

Background: Malnutrition in under five children is prevalent widely. It affects growth as well as development; also causes higher morbidity and mortality among children significantly. This public health problem is multi-factorial. This study was conducted to estimate the prevalence of under nutrition and its risk factors among children up to 2 years of age attending a tertiary health care institution of Kolkata.

Material and methods: This cross-sectional study was conducted among children aged 0 – 23 months, attending the immunization clinic of CMSDH, Kolkata, during December, 2019 –January, 2020. Data were collected by interviewing the accompanying caregivers, anthropometric measurements of the study subjects and review of records.

Results: Among 135 children studied, the prevalence of stunting was 14.1% (5.8% severely stunted), underweight was 9.7% (3.8% severely underweight), wasting was 18.5% (8.1% were SAM). Younger age group (0-6 months), boys and children having inappropriate feeding for age were at increased risk of under nutrition. Children having working mothers, birth spacing of <3 years, LBW and delayed initiation of breastfeeding (>1hour) were at higher risk of stunting and underweight. Incorrect age of introduction of complementary feeding had higher risk of wasting.

Conclusion: Several risk factors for malnutrition were found which are amenable to prevention.

Keywords: Children aged 0-23 months, under nutrition, Risk factors

INTRODUCTION

Malnutrition refers to deficiencies, excesses, or imbalances in a person's intake of energy and/or nutrients.[1] The term malnutrition addresses 3 broad groups of conditions--under-nutrition (wasting, stunting, underweight), micronutrient-related malnutrition and over-nutrition (overweight, obesity).[1] Malnutrition has several adverse consequences on health of the children. It may lead to permanent impairment of physical growth and cognitive development.[2]

Under nutrition and infections/diseases occur in vicious cycle, one precipitates the other[2]. Thus, under nutrition contributes directly or indirectly to increased morbidity as well as mortality among the under 5 children. Globally, 47 million children under 5 are wasted, of which 14.3 million are severely wasted and 144 million are stunted.[3] About two-fifth of stunted and more than half of wasted under-5 children are in Southern Asia.[3] Around 45% of deaths among children under-5 are linked to under nutrition, most of the deaths occur in low and middle-

income countries.[1] According to NFHS-4(2015-16), the prevalence of underweight, stunting and wasting among under five children in India was 35.7%, 38.4% and 21% respectively; Severe Acute Malnutrition(SAM) was prevalent in 7.5% of the above children.[4] In India, 68% of deaths among under 5 children contributed by maternal and childhood malnutrition.[5] In West Bengal, the prevalence of underweight, stunting and wasting among children under 5 years of age was 31.6%, 32.5% and 20.3% respectively in 2015-16.[6] Much of the under nutrition in under 5 children is preventable if proper care is taken of both the mother as well as the child.

Various studies have revealed that under nutrition among under-five children is multi-factorial which are amenable to prevention.[7,8] Not many studies have been done on this topic in this part of the country. Thus, this study was conducted to estimate the prevalence of under nutrition and its risk factors in children up to 2 years of age attending immunization clinic, College of Medicine & Sagore Dutta Hospital (CMSDH), Kolkata.

MATERIALS & METHODS

It was an institution based analytical study, cross-sectional in design, conducted on children aged 0 – 23 months attending the immunization clinic of CMSDH, Kolkata, during December, 2019 –January, 2020.The immunization clinic of CMSDH, Kolkata remains open three days in a week (Monday, Wednesday and Friday). Caregivers accompanying the children who did not give consent for participation, were excluded.

Sample size was calculated by applying formula-- n= Z^2PQ/d^2, where P=prevalence of under nutrition, Q=1-P, d= Precision. Taking reference from NFHS 4, which reported prevalence of Stunting in under 5 children as 32.5% in West Bengal[6] i.e.P=.325,Q= .675, & taking Precision(d)= 8% i.e. .08, Sample size(n) was 132.Final sample size for this study was chosen as 135. Simple random method was used to select children, every odd numbered caregiver accompanying children (e.g.1st, 3rd, 5th…..), until a total of 145, were approached when 135 study subjects were included as 10 caregivers refused to participate.

Data were collected by interviewing the accompanying caregivers with the help of a pre-designed, pre-tested structured schedule in local language (Bengali and Hindi), anthropometric measurements [Weight, Length, Mid Upper Arm Circumference (MUAC)] of the study subjects and review of records from Mother and Child Protection cards.

Digital bathroom scale with precision of 10 gm was used for measuring weight using 'tared weighing' approach. Length was measured using infantometer. MUAC was measured on non-dominant i.e., left arm for 6--23-month age-group children using non-stretchable plastic tape. Standard Operating Procedures (SOP) were followed while measuring these anthropometric dimensions.

Ethical clearance for the study was obtained from Institutional Ethics Committee (IEC) of CMSDH. Before enrolling participants for the study, informed written consent from caregivers accompanying the children were taken.

The data were entered in MS Excel spreadsheet. Then it was analysed using SPSS version 20.0 with appropriate statistical tests viz. Odds Ratio (OR) and Chi square test.

RESULTS

About three-fourth of the study subjects were 0-6 months old, rest were of 6-23 months of age. Among the study subjects, boys outnumbered girls (52.6% v/s 47.4% respectively). Regarding education level, 11.9% mothers and 6.6% fathers were illiterate. Majority of the mothers were homemakers (88.2%), rest were working. Regarding Socio-economic status of the study subjects, 39.3% were in Lower Middle class, while 16.3% were in Lower class (Table 1).

Most of the mothers (83.7%) were in 20-30 years of age during birth of the study subjects. More than half (60%) of the study subjects were first child of their parents, while 8.9% were of birth order of 3 or more. Inadequate spacing (<3 years) were found in one-third (32.1%) of the study subjects. About one-third (34.8%) mothers were anaemic during pregnancy, among those who could show records of Hb%. More than one-fourth (27.4%) of the mothers did not take IFA tablets at all while only about one-fifth (21.5%) took IFA adequately i.e., as per Govt. recommendations (Table 2).

About one-fifth of the study subjects had low birth weight (LBW) and were pre-term (18.7% & 22.2% respectively). More than one-fourth (28.9%) of the children had late initiation of breastfeeding i.e., after one hour of birth though most of them (94.8%) were fed colostrums. Majority (71.7%) of the children were given Exclusive Breast Feeding (EBF) for six months while about one-fourth (23.7%) were not given EBF at all. Only about half of the children (55.6%) were initiated on complementary feeding at recommended age i.e., six months. Complementary feeding (CF) was acceptable (w.r.t. amount of food per meal, frequency/day and food diversity) in only two-third (62.5%) of 6-23 months old children who were put on CF. Only 7.4% children discontinued breastfeeding, all of them were in 6-23 months age-group (Table 3).

The prevalence of stunting was 14.1% and severely stunted was 5.8%. Underweight was 9.7% while severely underweight was 3.8%. Wasting was found among 18.5% study subjects, while8.1% were severely wasted i.e., Severe Acute Malnutrition (SAM). Boys were more undernourished compared to girls – in all types of malnutrition i.e., underweight, stunted and wasted (Table 4).

Table 1: Distribution of children according to their socio-demographic characteristics (n=135)

Characteristics	Children (%)
Age (Months)	
0-6	99(73.4)
12-Jun	15(11.1)
23-Dec	21(15.5)
Gender	
Boy	71(52.6)
Girl	64(47.4)
Religion	
Hindu	76(56.3)
Muslim	59(43.7)
Community	
General	66(48.9)
SC	19(14.1)
ST	7(5.2)
OBC	43(31.9)
Total Family members	
3—5	94(69.7)
6—8	23(17.0)
≥9	18(13.3)
Education of father	
Illiterate	9(6.6)
Below primary	17(12.7)
Primary completed	28(20.7)
Secondary completed	37(27.4)
Higher secondary completed	17(12.6)
Graduate and above	27(20.0)
Education of mother	
Illiterate	16(11.9)
Below primary	13(9.6)
Primary completed	39(29.0)
Secondary completed	26(19.2)
Higher secondary completed	28(20.7)
Graduate and above	13(9.6)
Father's occupation	
Service	36(26.7)
Business	43(31.8)
Labour	48(35.6)
Unemployed	8(5.9)
Mother's occupation	
Service	2(1.5)
Business	13(9.6)
Labour	1(0.7)
Home-maker	119(88.2)
Socio-economic status (Modified B.G. Prasad Scale Jan,2019) (PCI in Rs)	
Upper (≥7008)	8(5.9)
Upper middle (3504-7007)	21(15.6)
Middle (2102-3503)	31(22.9)
Lower middle (1051-2101)	53(39.3)
Lower (≤1050)	22(16.3)

Table 2: Distribution of study subjects according to maternal characteristics (n=135)

Characteristics	Children (%)
Age of the mother at last pregnancy (Years)	
<20	13(9.6)
20-30	113(83.7)
>20	9(6.7)
Birth order	
1st	81 (60.0)
2nd	42 (3.1)
≥3rd	12 (8.9)
Birth spacing in years*	
<3	17 (32.1)
≥3	36 (67.9)
Mode of delivery	
Normal	58 (42.9)
Caesarean section	77 (57.1)
Place of delivery	
Home	5 (3.7)
Institutional	130 (96.3)
Anaemic status**	
Normal	16 (34.8)
Anaemic	30 (65.2)
IFA tablet consumption status	
Adequate	29 (21.5)
Inadequate	69 (51.1)
Not taken	37 (27.4)
Maternal weight gain during pregnancy***	
Adequate	30(65.2)
Inadequate	16(34.8)
Complications during pregnancy#	
Anaemia	16(11.9)
PIH	3(2.2)
Gestational Diabetes	2(1.5)
Hypothyroidism	2(1.5)
APH	1(0.7)
Others	3(2.2)
No complication	123(91.1)

*n=53, **n=46, ***n=46, #multiple responses

Incorrect age of introduction of CF (i.e., on completion of 6 months) also had higher risk of wasting (OR 4.38,.41-46.93).

DISCUSSION

Under nutrition prevalence: In the current study the prevalence of underweight, stunting and wasting was 9.7%, 14.1% and 18.5% respectively which was comparable to a study from Bhutan.[9] Other studies reported higher prevalence of under nutrition among under five children, with a range of 30.8%-39% (for stunting), 28.4%-63.2% (for underweight) and 16%-29.3% (for wasting).[10-15] The present study setting being Immunization clinic of a tertiary health institution, compared to the above studies which were community-based, may result in missing severely undernourished children and hence found lower prevalence of under nutrition. Malnutrition was higher among boys in the current study compared to study from Bhutan and Mangalore, which found girls more vulnerable for undernutrition.[9,15]

In bivariate analysis (Table 5 and Table 6), 0-6 months age-group, boys as gender and Hinduism as religion were at increased risk of under nutrition. Children having working mothers, spacing of <3 years, LBW and delayed initiation of breastfeeding (>1hour) were at higher risk of stunting and underweight. Pre-term birth was associated with higher risk of stunting (OR 2.36,.83-6.66). Among 0-6 months old infants not on EBF and for older children (6-23 months) not on age-appropriate feeding (Breast feeding (BF) and Complementary feeding (CF)) were at higher risk of under nutrition.

Table 3: Distribution of study subjects according to individual characteristics (n=135)

Characteristics	Children (%)
Birth weight in Kg. (n=128)	
Normal (≥2.5)	104(81.3)
Low birth weight (<2.5)	24(18.7)
Gestational age at delivery (weeks)	
Pre term (<37)	30 (22.2)
Term (≥37)	105 (77.8)
Time of initiation of breast feeding (hour)	
≤1	96(71.1)
>1	39(28.9)
Pre lacteal feed	
Given	14 (10.4)
Not given	121 (89.6)
Colostrum feeding	
Given	128 (94.8)
Not given	7 (5.2)
EBF status	
EBF of any duration	103 (76.3)
No EBF	32 (23.7)
Type of feeding	
0-5 months*	
EBF	71(71.7)
BF+IMS	23(23.2)
BF+CF	5(5.1)
6-23 months**	
BF+IMS	4(11.1)
BF+CF	22(61.1)
CF	10(27.8)
Current practice of complementary feeding**	
Acceptable	20(62.5)
Not acceptable	12(37.5)
Breast feeding continuation status	
Continuing breastfeeding	125 (92.6)
Discontinued breastfeeding	10 (7.4)
Immunisation status	
Children (0-11 months)***	
Up to date	95(83.3)
Not up to date	19(16.7)
Children (12-23 months)#	
Fully immunised	18(85.7)
Partially immunised	3(14.3)
Morbidity in last one month##	
URTI/LRTI	37(27.4)
Fever	9(6.7)
Diarrhoea	2(1.4)
Others	13
No morbidity	81(60.0)

'*n=99, **n=36, ***n=32, ****n=114, #n= 114,
##multiple responses

Stunting: Risk factors: In the current study the risk of stunting was higher among 0-6 months old infants, boys, Hindu by religion, working mothers, Lower socio-economic status, inadequate spacing, LBW, pre-term, late initiation of breastfeeding, inappropriate feeding for age i.e., not on EBF for 0-6 months and BF plus CF for 6-23 months old children and those who discontinued breastfeeding. Similar findings were reported in other studies, which found Lower socio-economic status[9,11], LBW[9], inappropriate feeding for age[11,14] as risk factors for stunting.

Underweight: Risk factors: The risk of underweight as found in the present study, was higher among 0-6 months old infants, boys, small family, working mothers, inadequate spacing, higher birth order (2nd or more), LBW, late initiation of breastfeeding, inappropriate feeding for age and those who discontinued breastfeeding. The risk factors for underweight as found by other studies were Lower socio-economic status[9,14], higher birth order[14], LBW[9,14,15], pre-term[14,15], inappropriate feeding for age.[14,15]

Wasting: Risk factors: In the current study the risk of wasting was higher among 0-6 months old infants, boys, inadequate spacing, inappropriate feeding for age incorrect age of introduction of complementary feeding and those who discontinued breastfeeding. Studies from other parts of the world found Lower socio-economic status[16], inadequate spacing[17], higher birth order[15], smaller family members[15], inappropriate feeding practices[16,17]as risk factors for wasting, whereas another study from Mysore[18] reported low birth order(i.e.,1st) and homemaker mothers having more risk of acute malnutrition.

Thus, the current study pointed out high prevalence of malnutrition and multiple risk factors among young children consistent with findings of several other studies reaffirming existence of this public health problem having multi-factorial and modifiable causation. The study was not without limitations though, viz. larger sample size and Multivariate analysis would make the study more robust. Selection bias can't be ruled out due to Immunization clinic as study setting instead of community.

Table 4: Distribution of study subjects according to nutritional status

Indicators	Nutritional status	Boys (%) (n=71)	Girls (%) (n=64)	Frequency (%) (n=135)
Length-for-Age	Normal (+2SD to -2SD)	56(78.9)	60(93.8)	116(85.9)
	Moderately stunted (<-2SD to -3SD)	8(11.3)	3(4.7)	11(8.3)
	Severely stunted(<-3SD)	7(9.9)	1(1.6)	8(5.8)
Weight-for-Age	Normal (+2SD to -2SD)	60(84.5)	62(96.9)	122(90.3)
	Moderately underweight (<-2SD to -3SD)	6(8.5)	2(3.1)	8(5.9)
	Severely underweight(<-3SD)	5(7.0)	0(0.0)	5(3.8)
Weight-for-Length	Normal (+2SD to -2SD)	55(77.5)	55(85.9)	110(81.5)
	Moderately wasted (<-2SD to -3SD)	9(12.7)	5(7.8)	14(10.4)
	Severely wasted(<-3SD)	7(9.9)	4(6.2)	11(8.1)
MUAC (cm)*	≥12.5(Normal)	14(93.3)	18(85.7)	32(88.9)
	11.5--12.49(Moderate acute malnutrition)	1(6.7)	3(14.3)	4(11.1)

*n=36

Table 5: Bivariate analysis to identify association among selected socio-demographic and maternal factors of the study subjects with under nutrition (n=135)

Characteristics	n	Stunting		Underweight		Wasting	
		OR (95%CI)	P value	OR (95%CI)	P value	OR (95%CI)	P value
Age (months)							
6-23	36	1	0.09	1	0.33	1	0.22
0-6	99	3.52(0.77-16.09)		2.12(0.45-10.09)		2.15(0.68-6.77)	
Gender							
Girl	64	1	0.01	1	0.01	1	0.21
Boy	71	4.02(1.26-12.84)		5.68(1.21-26.72)		1.78(0.72-4.36)	
Religion							
Muslim	59	1	0.03	1	0.69	1	0.97
Hindu	76	3.38(1.06-10.80)		1.27(0.39-4.11)		0.98(0.41-2.36)	
Caste							
General	66	1	0.72	1	0.84	1	0.92
Others	69	0.84(0.32-2.22)		1.13(0.36-3.55)		1.04(0.44-2.49)	
Mother's education							
≥Primary	106	1	0.96	1	0.57	1	0.73
<Primary	29	0.97(0.30-3.19)		0.64(0.13-3.06)		1.19(0.43-3.33)	
Mother's occupation							
Homemaker	119	1	0.18	1	0.68	1	0.98
Working	16	2.31(0.66-8.10)		1.40(0.28-6.99)		1.02(0.27-3.88)	
SE status							
Above lower	113	1	0.54	1	0.92	1	0.37
Lower	22	1.45(0.43-4.88)		0.93(0.19-4.51)		0.39(0.08-1.80)	
Age (years) of mother at last pregnancy							
20-30	113	1	0.46	1	0.38	1	1.00
<20 or >30	22	0.56(0.12-2.64)		0.40 (0.05-3.25)		0.97(0.30-3.18)	
Birth spacing*							
≥ 3 years	36	1	0.51	1	0.51	1	0.71
<3 years	17	1.71(0.34-8.69)		1.71(0.34-8.69)		1.54(0.37-6.38)	

OR=Odds Ration; CI= Confidence Interval; *n =53

Table 6: Bivariate analysis to identify association among selected variables related to birth history and feeding practices of the study subjects with under nutrition (n=135)

Characteristics	Frequency	Stunting		Underweight		Wasting	
		OR (95%CI)	P value	OR (95%CI)	P value	OR (95%CI)	P value
Birth order							
1st	81	1	0.76	1	0.28	1	1.00
≥2nd	54	0.86(0.31-2.33)		1.86(0.59-5.88)_		1.00(0.41-2.43)	
Birth weight*							
Normal	104	1	0.29	1	0.56	1	1.00
Low birth weight	24	1.84(0.59-5.87)		1.51(0.38-6.05)		0.84(0.26-2.73)	
Gestational age at delivery							
Term	105	1	0.09	1	0.94	1	0.77
Preterm	30	2.36(0.83-6.66)		1.06(0.27-4.11)		0.85 (0.29-2.49)	
Time of initiation of breastfeeding							
≤ 1 hour	96	1	0.17	1	0.15	1	0.14
>1 hour	39	1.99(0.73-5.42)		2.31(0.72-7.38)		0.41(0.13-1.28)	
Type of feeding							
0-5 months#							
EBF	71	1	0.06	1	0.18	1	0.26
Others	28	2.76(0.94-8.09)		2.35(0.66-8.46)		1.78(0.65-4.93)	
6-23 months**							
Age appropriate	22	1	0.74	1	0.74	1	0.63
Inappropriate for age	14	1.61(0.09-28.12)		1.61(0.09-28.12)		1.67(0.21-13.43)	
Introduction of complementary feeding**							
Correct age	20	1	0.87	1	0.19	1	0.30
Incorrect age	16	1.27(0.07-21.97)		1.14(0.95-1.37)		4.38(0.41-46.93)	
Breastfeeding							
Continuing	123	1	0.25	1	0.39	1	0.70
Discontinued	12	2.23(0.54-9.11)		2.04 (0.39-10.49)		1.53(0.38-6.12)	

OR=Odds Ration; CI= Confidence Interval; *n=128, #n=99,**n=36,***n=36

CONCLUSION

Under nutrition is quite prevalent in young children attending this tertiary health centre. Multiple risk factors, mostly preventable, also identified behind different forms of under nutrition i.e., underweight, stunting and wasting. Thus, this study reaffirmed the presence of this public health menace which should be eliminated by short-term and long-term remedial measures.

ACKNOWLEDGEMENT

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