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Correlation of Malnutrition with Birthweight and Maternal Education

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Abstract
Children of below five years of age are at risk of malnutrition due to various determinants apart from calorie intake. Their susceptibility to malnutrition is more severe and compounded due to factors like low birth weight and level of maternal education. This study was conducted to assess the nutritional status of underfive children in correlation with their birthweight and level of maternal education. The present cross sectional observational study included 315 children of under five age attending the paediatric outpatient department of our institute. Anthropometric assessment for undernutrition, wasting and stunting based on age, weight and height measurements.

As per WHO classification, moderate underweight (weight for age) was present in 74(23.49%) and severe underweight in 38(18.71%).Wasting in the form of moderate acute malnutrition (MAM) was noted in 64(20.32%) and severe acute malnutrition (SAM) in 42(13.33%). Height for age revealed moderate stunting was noted in 37(11.75%) and severe stunting in 5(1.59%).

To conclude, Malnutrition was common in age of 12 to 24 months. Underweight was the commonest type of malnutrition in low birth weight and babies of mother with secondary and higher secondary education. Wasting appeared to be common in normal weight and children of illiterate mothers or with primary education. Stunting was least common in both determinants and no patient was overweight.

Keywords: *Malnutrition, wasting, stunting, underweight, birthweight, maternal education.*

Introduction

Nutritional status of under five children is a significant and persistent public health problem. Malnutrition in under five age group is the reason for high childhood morbidity and mortality, especially in developing countries. Nutritional status of under five children is affected by multiple determinants like food intake, birthweight, maternal education, socioeconomic status etc.

Nearly two third of childhood mortality is associated with malnutrition. UNICEF has reported that 53% of Indian children are malnourished.[1,2,3,4] Assessment of growth and nutritional status of children with help of anthropometric parameters is a widely recognised and accepted technique. Weight for age (W/A), height for age (H/A),and weight for height(W/H) are the indices by WHO to assess the nutritional status of children. The present study was

conducted with an aim to assess the nutritional status of children aged 1 to 5 years of age, in correlation with birth weight and level of maternal education.[5,6,7,8]

Material and Methods

This prospective crossectional observational study enrolled 315 under five children attending medical services in paediatric outpatient department of a reference hospital in Mumbai. After obtaining approval from the Institutional Ethics Committee the study was conducted from March 2014 to October 2015. Children of age 1 to 5 years were included after obtaining an informed consent from the parents. Children suffering from chronic illnesses like congenital heart disease, haemolytic anaemias, nephrotic syndrome, cerebral palsy, children on steroid therapy were not included in the study. Demographic details like name, age, sex, address, contact number, chief complaints, past medical illness, steroid therapy, birth weight and socioeconomic details relevant to maternal education based on modified Kuppuswamy's scale were noted. Anthropometric measurement of the child included weight, height required for WHO classification. Child was weighed with minimal clothing on a digital weighing scale and reading to the nearest 0.01 Kg. Recumbent length for children less than 24 months was measured by infantometer. Height for children more than 24 months of age was measured against a non-stretchable measuring tape fixed vertically to a wall, with the participant standing on a firm level surface with head in Frankfurt plane, calf touching the wall and reading rounded to nearest 0.5 cm. Operational definitions for classifying the malnutrition was based on WHO classification according to Z score, weight for height (wasting), height for age (stunting) and for weight for age (underweight) are as follows. Definitions for classifying the malnutrition was based on WHO classification according to Z score, weight for height (wasting), height for age (stunting) and for weight for age (underweight) are as follows.

- (<-2 Z score) was Acute malnutrition (wasting)/underweight/Stunting.
- (<-2 Z score and $>= -3$ z score) Moderate acute malnutrition (wasting)/Underweight/Stunting.
- (<-3 Z score) Severe acute malnutrition (wasting)/Underweight/Stunting.

Qualitative data from excel sheet was analysed and results are presented in frequency and percentage table. Association among the study parameters was assessed with Chi square and Pearson Chi square test (Fisher exact test for 2*2 tables). P value of less than 0.05 was taken as significant level. The complete statistical analysis was performed by SPSS version 15 for windows.

Results

A total of 315 children of under five age group enrolled for the study, 166 (52.70%) were of 12 to 24 months, 61 (19.37%) of 25 to 36 months and 88 (27.94%) of 37 to 60 months. The study included 194 (61.59%) males and 121 (38.41%) females; sex ratio was 1.6:1. (Table 1,2)

Birthweight

Out of 315 children, 241 (76.51%) had birth weight >2.5 kg and 74 (23.49%) had low birth weight (LBW ie <2.5 kg). Of 241normal birth weight, 176 (73%) had normal W/H, 39 (16.2%) had MAM, 26 (10.8%) had SAM. Two hundred twenty (91.3%) had normal H/A, 19 (7.9%) had moderate stunting, 2 (0.8%) had severe stunting. One hundred and seventy seven (73.4%) had normal W/A, 45 (18.7%) were moderate under-weight and 19 (7.9%) were severely underweight. From 74 LBW 33(44.6%) had normal W/H, 25 (33.8%) had MAM, 16 (21.6%) had SAM, 53(71.6%) had normal W/H, 18 (24.3%) had moderate stunting, 3 (4.1%) had severe stunting, 26(35.1%) had normal W/A 29 (39.2%) had moderate underweight, 19 (25.7%) had severe underweight. The association of birthweight with wasting, stunting and underweight individually is statistically significant with p value 0.000. Underweight and wasting was common, followed

by stunting in both normal and low birth weight. (Table 3)

Maternal education

Out of 315 children, mothers of 80 (25.40%) children were educated above secondary education, 84 (26.67%) up to secondary education, 103 (32.70%) to primary education and 48 (15.24%) were illiterate.

Among children of 80 mothers with above secondary education, 79(98.8%) had normal W/H, 1(1.3%) had MAM while none had SAM. Seventy seven (96.3%) children had normal H/A, 1(1.3%) had moderate stunting and 2(2.5%) had severe stunting. Seventy five 75(93.0%) children had normal W/A, and 5(6.3%) had moderate underweight while zero had severe underweight.

Among children of 84 mothers with up to secondary education 78(92.9%) normal W/H, 5(6%) had MAM and 1(1.2%) had SAM. Seventy eight (92.9%) children had normal, H/A, 5 (6%) had moderate stunting and 1(1.2 %%) had severe stunting. Sixty nine (82.1%) children had normal W/A, 12(14.3%) had moderate underweight and 3(3.6%) had severe underweight.

Among children of 103 mothers with primary education 49(47.6%) had normal W/H, 38(36.9%) were MAM and 16(15.5%) were SAM. Eighty six (83.5%) children had normal H/A, 17(16.5%) had

moderate stunting and 0(0%) had severe stunting. Fifty two (50.5%) had normal W/A, 36(35%) had moderate underweight,15(14.6%) had severe underweight.

Among children of 48 illiterate mothers, only 3(6.3%) had normal W/H, 20(41.7%) had MAM and 25(52.1%) had SAM, Thirty two (6.3%) had normal H/A, 14(41.7%) had moderate stunting and 2(4.2%) had severe stunting. Seven (14.6%) had normal W/A, 21(43.8%) had moderate underweight and 20(41.7%) had severe underweight.

The association of maternal level of education with wasting stunting and underweight is statistically significant with p value of 0.000 for each. Underweight was common followed by wasting and stunting among children of illiterate mothers who are illiterate and upto primary educated. (Table 3)

Table 1: Age wise distribution of cases

Age (Months)	Frequency	Percent (%)
12 to 24	166	52.70%
25 to 36	61	19.37%
37 to 60	88	27.94%
Total	315	100.00%

Table: 2 Gender wise distribution of cases.

Sex	Frequency	Percent (%)
Male	194	61.59%
Female	121	38.41%
Total	315	100.00%

Table 3 : Correlation of birthweight and maternal education with nutritional status

Determinant		W/H (wasting)			H/A (stunting)			W/A (underweight)		
		Normal W/H	mod	sev	Normal H/A	mod	sev	Normal W/A	mod	sev
Birth Weight n=315	Normal 241	176 (73%)	39 (16.2%)	26 (10.8%)	220 (91.3%)	19 (7.9%)	02 (0.8%)	177 (73.4%)	45 (18.7%)	19 (7.9%)
	LBW 74	33 (44.6%)	25 (33.8%)	16 (21.6%))	53 (71.6%)	18 (24.3%)	3 (4.1%)	26 (35.1%)	29 (39.2%)	19 (25.7%)
		P value = 0.000			P value = 0.000			P value = 0.000		
Maternal education n=315	Above Secondary 80	79 (98.8%)	1 (1.3%)	0 (0%)	77 (96.3%)	1 (1.3%)	2 (2.5%)	75 (93%)	5 (6.3%)	0 (0%)
	Secondary 84	78 (92.9%)	5 (6%)	1 (1.2%)	78 (92.9%)	5 (6%)	1 (1.2%)	69 (82.1%)	12 (14.3%)	3 (3.6%)
	Primary 103	49 (47.6%)	38 (36.9%)	16 (15.5%)	86 (83.5%)	17 (16.5%)	0 (0%)	52 (50.5%)	36 (35%)	15 (14.6%)
	Illiterate 48	3 (6.3%)	20 (41.7%)	25 (52.1%)	32 (66.7%)	14 (29.2%)	2 (4.2%)	7 (14.6%)	21 (43.8%)	20 (41.7%)
		P value = 0.000			P value = 0.000			P value = 0,000		

Discussion

This study was conducted in a upcoming tertiary care hospital in Mumbai. The study assessed the nutritional status of urban children aged 1 to 5 years as per WHO growth standards. The association of nutritional status with birth weight and maternal education was analyzed.

Total of 315 children were enrolled, 166 (52.70%) were of 12 to 24 months, 61 (19.37%) of 25 to 36 months, 88 (27.94%) of 37 to 60 months. Similar observations are reported by Mittal et al[8], Megha et al[9], Narkhade et al[10]. Accoring to National Family Health Survey data the critical period when growth faltering occurs was noted to be six months to 2 years.[3] (Table 1)

In this study, 194 (61.59%) were males and 121 (38.41%) were females with sex ratio estimated of 1.6:1. Similar distribution of cases correlates with the studies by Bhawana et al[11], Goel et al[12], Megha et al[9], Mittal et al[8], Narkhade et al[10], Sengupta et al[13] and Poonam et al[14]. However, Badami et al[15], Avisek et al[16] and Bhatia et al[17] noted higher female preponderance. (Table 2)

In this study 241 (76.51%) had normal birth weight (>2.5 kgs) and 74 (23.49%) children had low birth weight. Underweight and wasting were more among those born low birth weight. However normal birthweight children had more wasting followed by underweight. Stunting was least in both normal and low birthweight. The correlation of birth weight with wasting, stunting, and underweight had significant statistical correlation with p value of 0.000, 0.000, and 0.000 respectively. Sengupta et al[13] found that all the three indices of malnutrition were higher in those with LBW, and the differences were statistically significant for underweight (p=0.024). Rayhan and Khan et al[18] by bi-variate and multivariate analysis indicated size of the baby at birth as an important risk factor for all these three indices of malnutrition. Poonam et al[14] found that 18 (85.71%) low birth weight children were found to be malnourished and showed significant statistical association (p<0.05). Megha et al[9], Saiprasad et al[19] also reported significant statistical association

of low birth weight with malnutrition (p<0.01). (Table 3)

In the present study, mothers of 80 (25.40%) children had above secondary education, 84 (26.67%) had up to secondary education, 103 (32.70%) had primary education and 48 (15.24%) were illiterate. Wasting and underweight were found to be more common among mothers who were illiterate and educated up to primary level. Underweight followed by stunting was common in children of mothers with education upto secondary or beyond secondary level. The correlation of maternal education with wasting, stunting, and underweight had significant statistical correlation with p value of 0.000, 0.000, and 0.000 respectively. Poonam et al[14] found that prevalence of malnutrition was 56(77.78%) in children having their mothers literacy below S.S.C with a statistically significant association (p value<0.001). Sengupta et al[13] found that 46.3 per cent children of illiterate mothers had wasting and 77.8 per cent had stunting. Mittal et al[8] found that the education of mother significantly influenced the nutritional status of under-fives as the prevalence of undernutrition was 60.9% where mother was illiterate and it was only 21.2% where education level was more than high school. Bhawana et al[11] found that 154(39.28%) children of PEM belong to illiterate mothers and has got statistically significant influence on mothers education. However Harishankar et al[20], Srivastava et al[21] observed no statistically significant association between mothers literacy and malnutrition (p>0.01). (Table 3) Thus lower maternal education and birthweight had significant correlation with the malnutrition in underfive children.

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