Original Research Article

A study of malnutrition and associated risk factors among children of age 06-59 months in urban area of Jabalpur district (M.P.)

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ABSTRACT

Background: "Malnutrition is a silent emergency". Malnutrition is not only an important cause of childhood mortality and morbidity, but also leads to permanent impairment of both physical and mental growth of those who survive.
Methods: Cross sectional study was conducted among 720 children of age group 06-59 months in randomly selected eight wards of Jabalpur District. Multistage random sampling technique was used for the selection of study subjects. Predesigned questionnaire was used to collect data and anthropometric measurements were done. Data entry and analysis was done using Epi Info™ 7.1.5 and SPSS 20.0 (free trial version).
Results: The prevalence of underweight, stunting and wasting were found to be 34.3%, 41.5% and 18.9% respectively while the prevalence of obese and overweight was 3.1% and 7.4% respectively. Malnutrition was found to be higher among the children born with low birth weight, having higher birth order, more number of siblings, those with incomplete immunization status and inappropriate feeding practices i.e. lack of exclusive breast feeding and improper weaning.
Conclusions: The present study demonstrates the multiple risk factors for childhood malnutrition, encompassing sectors other than health alone like social and economic sectors, requiring multisectoral approach to fight against the silent killer of childhood malnutrition.

Keywords: Malnutrition, Wasting, Stunting, Underweight

INTRODUCTION

"Malnutrition is a silent emergency".[1] Malnutrition is defined as pathological state resulting from a relative or absolute deficiency or excess of one or more essential nutrients. It comprises of– under nutrition, over nutrition, imbalance and specific deficiency.[2] Malnutrition is broadly divided into three types – underweight, stunting and wasting.[3] Malnutrition is not only an important cause of childhood mortality and morbidity, but also leads to permanent impairment of both physical and mental growth of those who survive. Inadequate intake of food, both in quality and quantity, infection, poor environmental condition, poor mental health, inadequate health services and large family size, are the major contributory factors. Eighty percent of the world's undernourished children live in 20 countries, with India being home to nearly 60 million children who are underweight.[4] Malnutrition is widely recognized as a major health problem in developing countries and specially among under-five children of India and Madhya Pradesh. This is reflected by the fact that the prevalence of under-weight children in India is among the highest in the world, and is nearly double that of Sub-Saharan Africa. As per World Bank, India is one of the highest countries in ranking for the number of children suffering from malnutrition.[5]

Not only that, in the current scenario, the trends of rise in overweight is increasing, which is leading double burden of malnutrition. Therefore, this study will be useful in determining the burden of malnutrition (undernutrition and overnutrition) and associated risk factors in children aged 06-59 months in urban area of Jabalpur district. It is expected that the result of this study will help to understand the actual requirements in the area for such children and will help policy makers to take specific interventional measures.

Objectives

1. To determine the prevalence of malnutrition among children of age 06-59 months in urban areas of Jabalpur district (M.P.).
2. To assess the association between various risk factors and malnutrition among children of age 06-59 months.

METHODS

It was a cross sectional study conducted among children of age group 06-59 months in urban areas of Jabalpur district from 1st April 2016 to 31st March 2017.

Sample size was calculated according to the formula: $N = Z^2 pq/d^2$ where; P= Prevalence, q = (100-P), d = Margin of error, Z = Confidence level (for 95% confidence level it is 1.96).

According to NFHS-4 M.P, the prevalence of malnutrition among children under five years of age in urban area of Madhya Pradesh was 37%, taking it as prevalence, with the relative error (d) as 10% of Prevalence (P) and Z as 1.96, the sample size for urban area was calculated as 654.[6] After adding 10% non-respondents, the final sample size came out to be 720. Multistage random sampling technique was used for the selection of study subjects. In the first stage 79 wards under the Jabalpur Municipal Corporation were listed. 8 out of the total 79 wards were randomly selected. From each of the 8 wards three anganwadi centres were selected randomly. All the children in the age group 06-59 months from each anganwadi centre were enlisted. Using lottery method 30 children were selected randomly from each anganwadi centre. Predesigned and pretested questionnaire was used for interview.

Face to face interview of the mothers or the primary care giver of the child was conducted after explaining the objectives of the study and obtaining the informed consent. Height and weight measurements were recorded following the standard techniques. The weight was measured using Salter's scale with light clothing and without shoes. Zero error was checked and adjusted before measurements.

The height of the child was recorded with the help of non stretchable measuring tape.

The new WHO Child Growth Standards for children under 5 years (2006) were used as reference for median.[7] Nutritional status of children were assessed according to weight for age, height for age, weight for height and BMI for age and sex by Standard Deviation classification recommended by WHO.[7] 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.[7] All the children whose weights were more than 85th percentiles (BMI) for the age and sex were considered as overweight and more than 95th percentiles (BMI) for the age and sex were considered obese.[8] The mid upper arm circumference (MUAC) was recorded using Shakir"s Tape. Children with MUAC 11.5 cm to 12.5 cm were considered as mildly malnourished and those less than 11.5 cms were considered as severely malnourished.[9]

Ethical consent was taken from the Institutional ethical committee of Netaji Subhash Chandra Bose Medical College Jabalpur, M.P. Before starting the study, informed consent was taken from mother or primary caregiver of the child after explaining the purpose of study. Severely ill children and whose parents were not willing to participate in the study were excluded from the study.

Data thus obtained was coded and entered into Microsoft excel worksheet. This was analyzed using *Epi Info™* 7.1.5 and SPSS 20.0 (free trial version). For determining the association of malnutrition Chi-square test, odds ratio were applied for each of the factor. The statistical significance was evaluated at 5% level of significance. *p* value less than 0.05 was considered as statistically significant. Microsoft Office Word 2007 and Microsoft Office Excel 2007 were used to generate tables.

RESULTS

In the present study comprising of 720 children aged 06-59 months, 351 (48.7%) were males and 369 (51.3%) were female children. With regards to age distribution it was observed that highest children were found in 25-36 months (26.6%). Majority of the children were Hindu by religion i.e. 96% followed by Muslims (3.9%) and Christians (0.1%). With regards to socio-economic status, majority 228 (44.1%) of children belonged to Class IV according to modified B.G. Prasad's classification.[10]

As shown in Table 1, According to WHO growth standard (2006) out of total 720 children involved in the study, percentage of underweight (low weight-for-age) was 34.3% and percentage of severe underweight was 7.7%. The prevalence of Stunting (low height-for-age) and severe Stunting was 41.5% and 13.1% which reflected the problem of chronic malnutrition. Wasting (low weight-for-height) was present in 18.9% of children and proportion of severe wasting was 5.1%. Number of children found to be obese (≥95th percentile) and overweight (85th - <95th Percentile) in the present study was 22 (3.1%) and 53 (7.4%) respectively.

Table 1: Distribution of study population according to who classification of malnutrition (N=720).

Indices	Undernourished (<-2 SD to -3 SD score) N (%)	Severe undernourished (< -3SD score) N (%)	Total N (%)
Underweight (weight for age)	191 (26.5)	56 (7.7)	247 (34.3)
Stunting (height for age)	205 (28.5)	94 (13.1)	299 (41.5)
Wasting (weight for height)	99 (13.7)	37 (5.1)	136 (18.9)

Table 2: Nutritional status of children by some socio-demographic factors.

Factors	Underweight No. (%)	Stunting No. (%)	Wasting No. (%)	Total
Sex				
Male	119 (33.9)	150 (42.7)	62 (17.7)	351`
Female	128 (34.7)	149 (40.4)	74 (20)	369
p value	0.82	0.52	0.41	
Age group				
06-12	27 (28.4)	37 (38.9)	14 (14.7)	95
13-24	48 (32.2)	56 (37.6)	27 (18.1)	149
25-36	72 (37.7)	89 (46.6)	32 (16.8)	191
37-48	53 (33.5)	67 (42.4)	33 (20.9)	158
49-59	47 (37)	50 (39.4)	30 (23.6)	127
p value	0.53	0.47	0.41	
Religion				
Hindu	243 (35.2)	292 (42.3)	131 (18.9)	691
Muslim and Christian	4 (13.8)	7 (24.1)	5 (17.2)	29
p value	0.017	0.05	0.81	
Mother's literacy status				
Illiterate	22 (44)	26 (52)	13 (26)	50
Upto middle	142 (33.6)	168 (39.8)	82 (19.4)	422
High school and above	83 (33.5)	105 (42.3)	41 (16.5)	248
p value	0.13	0.12	0.18	
Father's literacy status				
Illiterate	10 (34.5)	15 (51.7)	7 (24.1)	29
Upto middle	145 (36.7)	153 (38.7)	81 (20.5)	395
High school and above	92 (31.1)	131 (44.3)	48 (16.2)	296
p value	0.98	0.25	0.46	
Socioeconomic status				
≤951	84 (40.8)	96 (46.6)	36 (17.5)	206
Above 951	163 (31.7)	203 (39.5)	100 (19.4)	514
p value	0.02	0.08	0.54	

According to age group, prevalence of underweight and stunting was found to be more among 25-36 months children while wasting was more in age group 49-59 months.

The prevalence of underweight and wasting was more among female (34.7% and 20% respectively) than male (33.9% and 17.7% respectively). While the prevalence of stunting was more among male (42.7%) than female (40.4%). However, these differences were not statistically significant.

It was also observed that the prevalence of malnutrition was higher among Hindus in all the three indices i.e. underweight, stunting and wasting as compared to other religion. This difference in case of underweight (p=0.017) was found to be statistically significant.

The highest proportion of underweight (44%), stunted (52%) as well as wasted (26%) children were found in illiterate mothers. Hence, higher maternal education appears to be associated with better child nutrition. However, these differences were not found to be statistically significant.

Above table also reveals that the percentage of underweight and stunting was higher among lower class. This difference was found to be statistically significant for underweight (p=0.02).

Table 3: Nutritional status of under-fives by some MCH factors.

| Birth weight	Underweight No. (%)	Stunting No. (%)	Wasting No. (%)	Total
<2.5	58 (47.9)	54 (47)	32 (27.8)	115
≥2.5	189 (31.5)	245 (40.5)	104 (17.2)	605
P value	0.0005	0.19	0.0076	
Birth Order				
1	103 (34.4)	118 (39.5)	54 (18.1)	299
2	100 (31)	130 (40.4)	56 (17.4)	322
3	26 (36.6)	34 (47.9)	14 (19.7)	71
≥4	18 (64.3)	17 (60.7)	12 (42.8)	28
P value	0.0049	0.10	0.011	
No. of sibling				
None to 1	175 (31.6)	216 (39)	91 (16.4)	553
≥2	72 (43.1)	83 (49.7)	45 (26.9)	167
P value	0.006	0.014	0.002	
Exclusive breast feeding status				
Yes	169 (28.8)	229 (39)	82 (13.9)	587
No	78 (58.6)	70 (52.6)	54 (40.6)	133
P value	<0.000	0.004	<0.000	
Age of initiation of complementary feed				
Before 6 months	19 (55.9)	15 (44.1)	12 (35.3)	34
During 6 months	22 (12.3)	26 (14.5)	11 (6.1)	179
After 6 months	206 (40.6)	258 (50.9)	113 (22.3)	507
P value	<0.000	<0.000	0.000	
Immunization status				
Fully/complete/immunized as per age	187 (34.1)	222 (40.5)	108 (19.7)	548
Partial/no immunization	60 (34.9)	77 (44.8)	28 (16.3)	172
P value	0.85	0.32	0.32	
History of illness within last month				
YES	58 (36.9)	74 (47.1)	32 (20.4)	157
NO	189 (33.6)	225 (40)	104 (18.5)	563
P value	0.43	0.10	0.58	
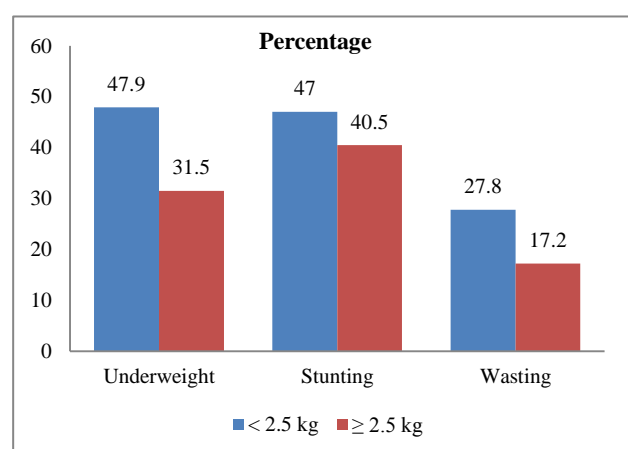
Figure 1: Distribution of nutritional status of the study population according to their birth weight.
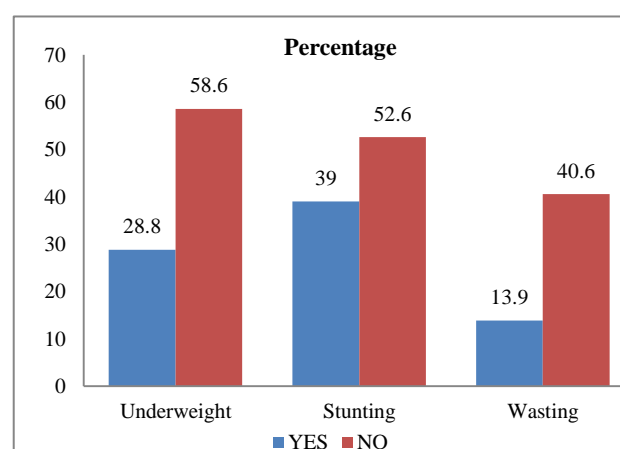

Figure 2: Distribution of nutritional status of study population according to exclusive breast feeding.

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 (47.9%), stunting (47%) and wasting (27.8%) was found to be significantly higher among children with low birth weight. Above table demonstrates that the prevalence of underweight and wasting was significantly higher among children belonging to higher birth order i.e. ≥4. Children who were having two or more than two siblings were found to be significantly malnourished.

All three indices of malnutrition were also found to be higher among children who were not exclusively breast fed (p≤0.000, p=0.004, p≤0.000).

In present study, the prevalence of underweight, stunting and wasting were higher among children in whom weaning was started either very early or very late. This difference was found to be statistically significant. The above table also reveals that the proportion of children with partial immunization was found to be more malnourished. It was also observed that the percentage of malnutrition was higher among children with illness within last month.

DISCUSSION

This study shows high prevalence of stunting among children (41.5%) indicating chronic malnutrition, which is supported by the finding reported by National Family Health Survey (NFHS - 4) 2015-16, for the state of Madhya Pradesh (42%).[6]

In this study, the highest prevalence of malnutrition was found in children aged 25-36 months. Studies conducted by Chakraborti et al and Arshadfarooq et al also found the prevalence of malnutrition to be high among children of 1 to 3 years of age group.[11,12]

Prevalence of underweight and wasting was higher among females which may be a reflection of preferential treatment of males and provision of better quality food and health care for them, and negligence towards the female child.

On the contrary it was observed that stunting was more prevalent among males. The result thus found were similar to that of the data released by "UNICEF/WHO/ World Bank group joint on child malnutrition estimates in September 2016" who reported that the stunting rates were higher among boys in almost all countries.[13] Malnutrition was higher among Hindus, differences in the dietary habits of Hindu and Muslims is one of the most important factor which affects the nutritional status of the child, as Muslims are predominantly non-vegetarian having nutrients rich diet. Study done by Prasot et al also found Hindu children (62.4%) were more malnourished than the Muslim children (36.4%) and the difference was statistically significant.[14] This study also identifies

maternal education as a significant determinant of child nutrition with illiterate mothers having more malnourished children. Sengupta et al also observed a highly significant inverse relationship between higher maternal education and childhood malnutrition.[15]

Proportion of malnutrition in all three indices i.e. underweight, stunting and wasting was found to be significantly higher among children with low birth weight. Sengupta et al also found that all the three indices of under-nutrition were higher in those with LBW, and the differences was statistically significant for underweight (p=0.024).[15] Prevalence of underweight and wasting was also significantly higher among children belonging to higher birth order i.e. ≥4. This might be because of lack of care of the child with higher birth order.

Our findings were similar to the study done by Farooq et al who found the prevalence of malnutrition increased with birth order.[12]

The risk of being underweight, stunting and wasting is all directly proportional to the number of siblings with maximum proportions in all categories being found in children with ≥2 siblings and is statistically significant for all the three indices i.e. underweight (p=0.006), stunting (0.014) and wasting (p=0.002). This could be because families with more children gets less attention and care as needed. Similar findings were reported by Sengupta et al in her study who found that the risk of being underweight, stunted and wasted is all directly proportionate to the number of siblings.[15] This is statistically significant for underweight (p=0.001) and for wasting (p=0.028). The proportion of malnutrition in all the three indices i.e. underweight, stunting and wasting were significantly higher among children who were not exclusively breast fed. Similar findings were reported by Mishra et al who found the lack of exclusive breast feeding in first 6 months were significant risk factors for malnutrition.[16]

Exclusive breast feeding protects the child from infection because it is rich in anti-infective factors which protects the baby against respiratory infections and diarrhoeal diseases and enhance the immune system of child. The proportion of malnutrition were higher among children in whom weaning was started either very early or very late. This difference was found to be statistically significant.

This might be due to the fact that the time of weaning has a major impact on health of the child as introduction of other diet before the age of six months increased the prevalence of infection i.e. pneumonia and diarrhoeal diseases which leads to malnutrition. Sengupta et al also found that starting supplementation too early (before 4 months of age) or too late (later than 6 months of age) both carry a higher risk of malnutrition.[15]

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