

ORIGINAL ARTICLE

A study of malnutrition and associated risk factors among children of age 06-59 months in rural area of Jabalpur district, Madhya Pradesh

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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. **Aims & Objectives:** To determine the prevalence of malnutrition and association with various risk factors among children of age 06-59 months in rural area of Jabalpur district Madhya Pradesh. **Material and Methods:** Study was conducted among 517 children of age group 06-59 months in two randomly selected blocks of Jabalpur District. Multistage random sampling technique was used. Predesigned questionnaire was used to collect data and anthropometric measurements were done. Data analysis was done using Epi Info™ 7.1.5 and SPSS 20.0 (free trial version). **Result:** The prevalence of underweight, stunting and wasting were found to be 35.8%, 41.4% and 19.7% respectively while the prevalence of obese and overweight was 2.7% & 5.6% respectively. Children born with low birth weight, having higher birth order, more number of siblings, those with incomplete immunization status and inappropriate feeding practices were associated with malnutrition. **Conclusion:** The present study demonstrates the multiple risk factors for childhood malnutrition requiring multisectoral approach to fight against this silent killer.

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 (4). 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 (under nutrition and over nutrition) and associated risk factors in children aged 06-59 months in rural 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

Aims & Objectives

1. To determine the prevalence of malnutrition among children of age 06-59 months in rural areas of Jabalpur district Madhya Pradesh.
2. To assess the association between various risk factors and malnutrition among children of age 06-59 months.

Material & Methods

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

Sample size was calculated according to the formula: $N = Z^2pq/d^2$. According to NFHS-4 Madhya Pradesh (5), the prevalence of malnutrition among children under five years of age in rural area of Madhya Pradesh is 45%, taking it as prevalence, with the relative error (d) as 10% of Prevalence (P) and Z as 1.96, the sample size for rural area was calculated as 470. After adding 10% non-respondents, the final sample size came out to be 517.

Multistage random sampling technique was used for the selection of study subjects. There are seven blocks in Jabalpur district. In the first stage two blocks out of seven were randomly selected. From each block five gram panchayats were selected using random table. From each of the gram panchayat two anganwadi centres were selected randomly then all the children in the age group 06-59 months from each anganwadi centre were enlisted and 26 children were randomly selected from the list by lottery method. Predesigned and pretested questionnaire was used for interview. All the

children of age group 06-59 months were included in the study while the children who were terminally ill and whose parent's were not willing to participate in the study were excluded.

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 (6). 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 (6). 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 (6). 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 (7).

Ethical consent was taken from the Institutional ethical committee of Netaji Subhash Chandra Bose Medical College Jabalpur. 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 517 children aged 06-59 months, 273 (52.8%) were males and 244 (47.2%) were female children. With regards to age distribution it was observed that highest children were found in 25-36 months (24.4%). Majority of the children were Hindu by religion i.e. 96.7% followed

by Muslims (3.3%). With regards to socio-economic status, majority 228 (44.1%) of children belonged to Class IV according to modified B.G. Prasad's classification (8).

In this study, the prevalence of obese (≥ 95 th Percentile) and overweight (85th - < 95 th Percentile) was found to be 14 (2.7%) & 29 (5.6%) respectively. Findings in [table 3](#) reveal that the prevalence of malnutrition was found to be more in the children of 13-24 months age group. Prevalence of underweight and wasting was higher in female affecting 36% and 20.1% children respectively whereas stunting was higher in male (44.7%) but these differences were not statistically significant. The prevalence of malnutrition was higher among Hindus. This difference in case of underweight and stunting was found to be statistically significant. The higher proportion of malnutrition were also seen among children whose mothers were illiterate as compared to those with educated mothers. The difference in case of wasting was found to be statistically significant.

Discussion

This study shows high prevalence of stunting among children (41.4%) indicating chronic malnutrition, which is supported by the finding reported by NFHS - 4 (6), for the state of Madhya Pradesh (42%). Prevalence of malnutrition was found to be more in the children of 13-24 months age group which was supported by the study carried out by Yadav *et al* (9) who also found underweight was more prevalent in age group of 12-23 months. 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" (10) who reported that the stunting rates were higher among boys in almost all countries.

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. Study done by Prasot RM *et al* (11) also found Hindu children were significantly more malnourished than the Muslim children. This study also identifies maternal

education as a significant determinant of child nutrition with illiterate mothers having more malnourished children. Similar findings were observed by Chetan N Popat *et al* (12). Proportion of malnutrition was found to be significantly higher among children with low birth weight. Our results were in concordance with the study done by Chetan N Popat *et al* (12). 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. A study by Kirti A Patel *et al* (13) also found birth order ($P < 0.05$) to be significantly associated with malnutrition.

The risk of being underweight, stunting and wasting is all directly proportional to the number of siblings and is statistically significant for underweight ($p=0.035$) and stunting (0.036). This could be because families with more children gets less attention and care as needed. A study by Asfaw *et al* (14) also found the similar findings. The proportion of malnutrition were also significantly higher among children who were not exclusively breast fed. Similar findings were reported by Mishra K *et al* (15). 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 significantly higher among children in whom weaning was started either very early or very late. 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. A study by Asfaw *et al* (14) found age at initiation of complementary feed significantly associated with being wasted. The proportion of children with partial immunization were also found to be more malnourished. Mishra K *et al* (15) also found incomplete immunization were significant risk factors for malnutrition.

Conclusion

Although there is a declining trend of under-nutrition in the last decades, yet malnutrition is a major health problem. In the present study the prevalence of underweight, stunting and wasting were found to be 35.8%, 41.4% and 19.7% respectively. Malnutrition was found to be higher among the children of

illiterate parents, children belonged to Hindu religion, born with low birth weight, having higher birth order, more number of siblings, those with incomplete immunization status and inappropriate feeding practices.

Recommendation

- Maternal education had significant effect on child's nutritional status. So, there is a strong need for their formal and informal education regarding available services for their children and make those services acceptable too.
- The compromised nutritional status of the mother is a direct determinant in producing a low birth weight baby, thus encouraging the improvement in the nutritional status of women during ANC period is essential. So, the Ante Natal Period should be best utilized by all health care providers at all level of services being provided.
- Faulty feeding practices worsens the nutritional status of children. Therefore, mothers need to be educated regarding the benefits of exclusive breast feeding during initial 6 months of life and the importance of initiation of complementary feeding at 6 months of age.
- Health workers should ensure the complete vaccination of all under five children in their respective areas.

Relevance of the study

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. Thus, this study will help the policy makers to formulate the nutritional intervention and promotion programs to reduce the prevalence of malnutrition.

Authors Contribution

All authors have contributed equally in this manuscript.

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References

1. Pulfrey S. Malnutrition: a silent emergency. *CMAJ*. 2006 Jun 20;174(13):1837. PubMed PMID: 16785456; PubMed Central PMCID: PMC1475915. [PubMed]
2. Park K. Park's textbook of preventive and social medicine. 23rd ed. Jabalpur: BanarsidasBhanot Publishers; 2015
3. Facilitator's Guide ; Facility-based management of Children with Severe Acute Malnutrition by National Health Mission ,Madhya Pradesh.
4. Bryce J, Coitinho D, Darnton-Hill I, Pelletier D, Pinstrup-Andersen P; Maternal and Child Undernutrition Study Group.. Maternal and child undernutrition: effective action at national level. *Lancet*. 2008 Feb 9;371(9611):510-26. doi: 10.1016/S0140-6736(07)61694-8. PubMed PMID: 18206224. [PubMed].
5. Mumbai: International Institute of Population Science; 2015-16. National Family Health Survey-4.
6. WHO multicentre growth reference study group."WHO child growth standards based on length/height, weight and age". *Acta Paediatrica* (Oslo, Norway:1992). Supplement 450 (2006):76
7. Kumar HN, Mohanan P, Kotian S, Sajjan BS, Kumar SG. Prevalence of overweight and obesity among preschool children in semi urban South India. *Indian Pediatr*. 2008 Jun;45(6):497-49. PubMed PMID: 18599938. [PubMed] [PubMed]
8. Zakirhusain Shaikh*, Rambha Pathak. Revised Kuppaswamy and BG Prasad socio-economic scales for 2016: *International Journal of Community Medicine and Public Health* 2017 Apr;4(4):997-999
9. Yadav SS, Yadav ST, Mishra P, Mittal A, Kumar R, Singh J. An Epidemiological Study of Malnutrition Among Under Five Children of Rural and Urban Haryana. *Journal of clinical and diagnostic research: JCDR*. 2016 Feb;10(2):LC07.
10. UNICEF/WHO/World Bank Group - Joint Child Malnutrition Estimates 2016 edition
11. Prasot RM, Verma SK, Kashyap S, Kanaujiya MK. An epidemiological study of Protein Energy Malnutrition (PEM) among 1-6 years children in rural Lucknow, Uttar Pradesh, India. *IOSR Journal of Dental and Medical Sciences*. 2014 Mar;13(3):10-4.
12. Popat CN, Chaudhari AI, Mazumdar VS, Patel SV. 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. *Journal of Research in Medical and Dental Science*. 2017 Mar 25;2(3):59-64.
13. Patel KA, Langare SD, Naik JD, Rajderkar SS. Gender inequality and bio-social factors in nutritional status among under five children attending anganwadis in an urban slum of a town in Western Maharashtra, India. *Journal of research in medical sciences: the official journal of Isfahan University of Medical Sciences*. 2013 Apr;18(4):341.
14. Asfaw M, Wondaferash M, Taha M, Dube L. Prevalence of undernutrition and associated factors among children aged between six to fifty nine months in Bule Hora district, South Ethiopia. *BMC Public Health*. 2015 Jan 31;15:41. doi: 10.1186/s12889-015-1370-9. PubMed PMID: 25636688; PubMed Central PMCID: PMC4314803. [PubMed].
15. Mishra K, Kumar P, Basu S, Rai K, Aneja S. Risk factors for severe acute malnutrition in children below 5 y of age in India: a case-control study. *Indian J Pediatr*. 2014 Aug;81(8):762-5. doi: 10.1007/s12098-013-1127-3. Epub 2013 Jul 20. PubMed PMID: 23873300. [PubMed].

Tables

TABLE 1 DISTRIBUTION OF STUDY POPULATION ACCORDING TO WHO CLASSIFICATION OF MALNUTRITION (N= 517) [6]

Indices	Undernourished (<-2 SD to -3 SD score) N (%)	Severe undernourished (< -3SD score) N (%)	Total N (%)
Underweight (Weight For Age)	143 (27.7%)	42 (8.1%)	185 (35.8%)
Stunting (Height For Age)	125 (24.2%)	89 (17.2%)	214 (41.4%)
Wasting (Weight For Height)	70 (13.5%)	32 (6.2%)	102 (19.7%)

TABLE 2 NUTRITIONAL STATUS OF CHILDREN BY SOME SOCIO-DEMOGRAPHIC FACTORS

Factors	Underweight No. (%)	Stunting No. (%)	Wasting No. (%)	Total
Sex				
Male	97 (35.5%)	122 (44.7%)	52 (19%)	273
Female	88 (36%)	92 (37.7%)	50 (20.1%)	244
p value	0.89	0.10	0.68	
Age group				
06-12	18 (29.5%)	24(39.3%)	5 (8.2%)	61
13-24	41 (40.2%)	43(42.2%)	24(23.5%)	102
25-36	40 (31.7%)	52(41.3%)	29 (23%)	126
37-48	47 (38.2%)	52(42.2%)	21(17.1%)	123
49-59	39 (37.1%)	43 (41%)	23(21.9%)	105
p value	0.52	0.99	0.10	
Religion				
Hindu	183 (36.6%)	214 (42.8%)	101 (20.2%)	500
Muslim & Christian	2 (11.8%)	0	1 (5.9%)	17
p value	0.035	<0.001	0.14	
Mother's literacy status				
Illiterate	25(48.1%)	26 (50%)	20 (38.5%)	52
Upto middle	134(34.6%)	157 (40.6%)	67 (17.3%)	387
High school & above	26 (33.3%)	31 (39.7%)	15 (19.2%)	78
p value	0.05	0.18	0.0003	
Father's literacy status				
Illiterate	30 (50.8%)	30 (50.8%)	22 (37.3%)	59
Upto middle	118 (35.1%)	142 (42.3%)	61 (18.1%)	336
High school & above	37 (30.3%)	42 (34.4%)	19 (15.6%)	122
p value	0.01	0.12	0.0003	
Socioeconomic status				
≤951	88(38.6%)	89(39%)	46(20.8%)	228
Above 951	97(33.6%)	125(54.8%)	56(19.3%)	289
p value	0.24	0.33	0.82	

TABLE 3 NUTRITIONAL STATUS OF CHILDREN BY SOME MCH FACTORS

Birth weight				
<2.5	56 (65.95%)	44 (51.8%)	46 (54.1%)	85
≥2.5	129 (29.9%)	170 (39.4%)	56 (13%)	432
p value	<0.000	0.03	<0.000	
Birth Order				
1	63(30.6%)	86(41.7%)	38(18.4%)	206
2	77(33.8%)	91(39.9%)	35(15.3%)	228
3	27(49.1%)	26(47.3%)	14(25.4%)	55
≥4	18(64.3%)	11(39.3%)	15(53.6%)	28
p value	0.0007	0.78	0.000	
No. of sibling				
None to 1	132(33.3%)	154(38.9%)	79(19.9%)	396
≥2	53(43.8%)	60(49.6%)	23(19%)	121
p value	0.035	0.036	0.82	
Exclusive breast feeding status				
Yes	92(25.8%)	139(39%)	46(12.9%)	356
No	93(57.8%)	75(46.6%)	56(34.8%)	161
p value	<0.000	0.10	<0.000	
Age of initiation of complementary feed				
Before 6 months	26 (40%)	28 (43%)	12 (18.5%)	65
During 6 months	15 (23.8%)	22 (34.9%)	5 (7.9%)	63
After 6 months	144 (37%)	164 (42.2%)	85 (21.9%)	389
p value	0.035	0.27	0.012	
Immunization status				
Fully/complete/immunized as per age	103 (31.7%)	128 (39.4%)	57 (17.5%)	325
Partial/no immunization	82 (42.7%)	86 (44.8%)	45 (23.4%)	192
p value	0.011	0.23	0.10	
History of illness within last month				
Yes	73(39.9%)	73(39.9%)	43(23.5%)	183
No	112(33.5%)	141(42.2%)	59(17.6%)	334
p value	0.149	0.608	0.11	