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Research Article

A STUDY ON MALNUTRITION AMONG CHILDREN UNDER THE AGE OF 5 IN MANDLA DISTRICT OF MADHYA PRADESH

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ABSTRACT

Objectives: To determine the prevalence and socio-demographic determinants of malnutrition among under-5 years old children in Mandla district.

Methods: This cross-sectional study was conducted in three blocks (Bijadandi, Narayanganj, and Niwas) of Mandla district of M.P. For this study, the calculated sample size was 276 children under 5 years of age. Multistage Random sampling was used, and the required sample size was collected from 12 villages in these 3 blocks. A predesigned and pretested schedule was administered by asking for a history from the mother, and anthropometric measurements of the children were recorded.

Results: The overall prevalence of underweight (<median-2SD) was found to be 51.81%. Whereas 18.12% were severe underweight (<median-3SD) and 33.70% were moderate underweight (<median 3SD to-2SD). The prevalence of stunting among under-5-year-old children was found to be 46.74% (<median-2SD). The prevalence of severe stunting (<median-3SD) was 15.94%, while that of moderate stunting (<median 3SD to-2SD) was 30.80%. The overall prevalence of wasting was 24.72%. In which 21.01% were moderately wasted, and 4.71% were severely wasted.

Conclusion: The findings of the present study revealed the widespread prevalence of undernutrition among under-5-year-old children. Data show that 51.81% of children under 5 years of age are underweight, 46.74% are stunted, and 24.72% are wasted in our study area, which is much higher than national figures and highlights the need for an integrated approach toward improving child health as well as nutritional status in this area.

Keywords: Malnutrition, Under-5 children, Prevalence, PEM.

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INTRODUCTION

Protein-energy malnutrition (PEM) is a major public health problem in India. 1 out of 3 malnourished children lives in India. The prevalence of malnutrition varies across states, with Madhya Pradesh recording the highest rate (55%) [1]. Half of the children in Madhya Pradesh are malnourished, while one-fourth of them fall under the severe category of malnutrition. The tribal districts of Madhya Pradesh are the worst hit in the country because of their cultural, geographical, and economical isolation, with up to 100% malnutrition in some villages. PEM is also referred to as protein-calorie malnutrition. It develops in children and adults whose consumption of protein and energy (measured by calories) is insufficient to satisfy the body's nutritional needs. The World Health Organization (WHO) [1] defines malnutrition as "the cellular imbalance between the supply of nutrients and energy and the body's demand for them to ensure growth, maintenance, and specific functions."

PEM is measured in terms of underweight (low weight for age), stunting (low height for age), and wasting (low weight for height). The prevalence of stunting among underfives is 48% (moderate and severe), and wasting is 20% (moderate and severe), with an underweight prevalence of 43% (moderate and severe) [2]. The majority of children suffering from undernutrition (80%) have mild and moderate forms that go unnoticed [3]. It affects particularly preschool children (<6 years) with its direct consequences ranging from physical to cognitive growth and susceptibility to infection. This affects the child at the most crucial period of development, which can lead to permanent impairment in later life [3,4]. Undernutrition predisposes the child to infection and complements its effect in contributing to child mortality. Malnutrition in early childhood has serious, long-term consequences because it impedes motor, sensory, cognitive, social, and emotional development. Malnourished children are less likely to perform well in school and more likely to grow into malnourished adults, at greater risk of disease and early death. Around one-third of all adult women are underweight. Inadequate care for women and girls, especially during pregnancy, results in low-birth-weight babies. Nearly 30% of all newborns have a low birth weight, making them vulnerable to further malnutrition and disease [1]. The problems of malnutrition in tribal areas among underfive children can be used to determine the need for nutritional surveillance, nutritional care, or appropriate nutritional intervention programs in a community. Moreover, several studies have shown that the degree of undernutrition is higher among the underprivileged communities, which include the tribal population as well. In the last few years, the nutritional status of under-5 children has improved, but Madhya Pradesh is still lagging behind. Child malnutrition is related to breastfeeding and weaning practices as well. It is observed that in rural and tribal India, so many harmful child rearing practices are followed, which are responsible for the adverse health outcomes of children.

Objectives

To determine the prevalence and socio-demographic determinants of malnutrition among under-5–year-old children in Mandla district.

METHODS

The study has been carried out in Mandla district. The district has six tehshils: Bijadandi, Bichhiya, Mandla, Nainpur, Narayanganj, and Niwas.

Study population

Under-5–year-old children lived in the study area.

Study design

Observational cross-sectional study.

Study period
November 1, 2014-October 31, 2015.

Inclusion criteria
1. Children under 5 years of age
2. The caretaker must be present along with the child.

Exclusion criteria
1. Mother or caretaker who was not willing to participate in the study
2. The child was absent at the time of the survey at home

Sample size and sampling
The National Family Health Survey-3 in Madhya Pradesh reports that 60.4%of children under 5 years of age were underweight, 50% were stunted, and 35% were wasted.

The sample size was calculated by using the formula:

$$n=(Z^2PQ/d^2)$$

where, n=sample size,

Z=Confidence limit factor (this is taken as 1.96 for a 95% confidence interval).

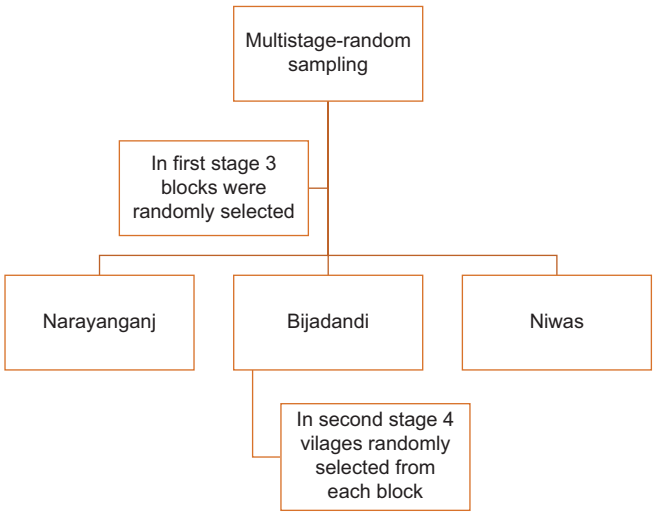
P=Prevalence of underweight (in our case, it was taken as 60%).

Q=1-P, which is 0.40,

d=relative precision, taken as 10% of P).

By applying formula n=256 which is rounded to 260 and 10% cases as non-responders were taken. Thereby, a total sample size of 276 was calculated.

A multi-stage random sampling technique was used for sample collection. There are a total of nine blocks in Mandla district. In the first stage, 3 out of 9 blocks were selected by a simple random technique. In the second stage, four villages were selected randomly from each block. A total of 12 villages were selected. In each village all the eligible children were included in the study. The three blocks selected are:
1. Narayanganj
2. Bijadandi
3. Niwas.



Data collection tools and techniques
A predesigned pretested semi-structured questionnaire was used for study. After piloting, the questionnaire was finalized with a slight modification. The technique used for data collection was survey method. A house-to-house survey was conducted, and informed consent was taken from the mother before conducting face-to-face interviews and recording anthropometric measurements of the children. The data were transformed into weight-for-age, height-for-age, and weight-for-height ratios. The WHO Child Growth Standards for children under 5 years (2006) were used as a reference median. Nutritional status of children were assessed according to weight for age, height for age, and weight for height by the standard deviation classification recommended by the WHO, as given below:

Cut-off level	Nutritional grade		
	Weight for Age	Height for Age	Weight for Height
≥Median-2SD	Normal	Normal	Normal
<Median-2SD to Median-3SD	Moderate underweight	Moderate Stunting	Moderate Wasting
<Median-3 SD	Severe underweight	Severe stunting	Severe wasting

The data thus obtained were coded and entered into a Microsoft Excel worksheet. This was analyzed using SPSS version 20 and WHO EPI INFO. The frequency distribution of the study subjects according to age, sex, religion, educational status, socioeconomic status, birth order, and feeding practices were analyzed. The prevalence of PEM was worked out along with a 95% confidence interval. In addition to the overall prevalence rate, the prevalence of PEM was also estimated in relation to certain selected factors such as age, sex, religion, educational status of the mother, percapita family income, birth order, and feeding practices. To find out the association of PEM with the above factors, the chi-square test and Fisher exact test were applied for each factor. The statistical significance was evaluated at the 5% level of significance. Microsoft Word and Microsoft Excel were used to generate graphs and tables.

Ethical consideration
Ethical clearance was obtained from the Institutional Ethics Committee, and permission for a survey from Sarpanch was taken before starting the study.

OBSERVATIONS AND RESULTS

The average age of the study population was 27.22 months (SD=17.62). The above table shows that the maximum number of study population (28.99%) belonged to those under 1 year of age, followed by those 1–2 year of age (20.65%). The under-5–year-old sex ratio in this study was found to be 943.

The above table shows that the average weight of the study population was 10.43 kg (SD=3.77), and its height and length were 83.47 cm (SD=17.77).

Table 1: Age- and gender-wise distribution of children

Age group (in months)	Male	Female	Total
0–12	38 (26.76)	42 (31.34)	80 (28.99)
13–24	29 (20.42)	28 (20.89)	57 (20.65)
25–36	31 (21.83)	21 (15.67)	52 (18.84)
37–48	22 (15.49))	22 (16.41)	44 (15.94)
49–59	22 (15.49)	21 (15.67)	43 (15.58)
Total	142 (100.00)	134 (100.00)	276 (100.00)

Mean age=27.22±17.62 months

Table 2: Weight- and height-/length-wise distribution of children

Age group (in months)	Mean weight (in Kg)	Mean height/ length (in cms)
0–12	6.45±1.87	65.13±11.07
13–24	9.66±2.19	77.32±10.35
25–36	11.94±2.95	89.31±8.99
37–48	12.55±1.93	96.09±10.55
49–59	14.87±2.65	105.81±8.46
Overall	10.43±3.77	83.47±17.77

Table 3: Age-wise distribution of nutrition status among children under 5 year of age

Age group (in months)	Weight for Age			Total
	Normal	Moderate under weight	Severe under-weight	
0–12	39 (14.13)	24 (8.70)	17 (6.16)	80 (28.99)
13–24	29 (10.51)	17 (6.16)	11 (3.99)	57 (20.65)
25–36	25 (9.06)	21 (7.16)	6 (2.17)	52 (18.84)
37–48	20 (7.25)	12 (4.35)	12 (4.35)	44 (15.94)
49–59	20 (7.25)	19 (6.88)	4 (1.45)	43 (15.58)
Total	133 (48.19)	93 (33.70)	50 (18.12)	276 (100)
Age group (in months)	**Height for Age**			**Total**
	Normal	**Moderate Stunting**	**Severe Stunting**	
0–12	55 (37.41)	16 (18.82)	9 (20.45)	80 (28.99)
13–24	28 (19.04)	22 (25.88)	7 (15.90)	57 (20.65)
25–36	24 (16.32)	17 (20)	11 (25)	52 (18.84)
37–48	22 (14.96)	13 (15.29)	9 (20.45)	44 (15.94)
49–60	18 (12.24)	17 (20)	8 (17.77)	43 (15.58)
Total	147 (100)	85 (100)	44 (100)	276 (100)
Age group (in months)	**Weight for Height**			**Total**
	Normal	**Moderate Wasting**	**Severe wasting**	
0–12	65 (31.70)	12 (20.68)	3 (23.07)	80 (28.99)
13–24	41 (20)	13 (22.41)	3 (23.07)	57 (20.65)
25–36	40 (19.51)	11 (18.96)	1 (7.63)	52 (18.84)
37–48	28 (13.65)	12 (20.68)	4 (30.76)	44 (15.94)
49–59	31 (15.12)	10 (17.24)	2 (15.38)	43 (15.58)
Total	205 (100)	58 (100)	13 (100)	276 (100)

Table 4: Gender-wise distribution of nutrition status among children under 5 year of age

Weight for age	Male (%)	Female (%)	Total (%)
Normal	63 (44.36)	70 (52.23)	133 (48.19)
Moderately Underweight	51 (35.91)	42 (31.34)	93 (33.7)
Severe Underweight	28 (19.71)	22 (16.41)	50 (18.12)
Total	142 (100)	134 (100)	276 (100.00)
Height for age			
Normal	72 (50.70)	75 (55.97)	147 (53.26)
Moderate stunting	46 (32.39)	39 (29.10)	85 (30.8)
Severe stunting	24 (16.90)	20 (14.92)	44 (15.94)
Total	142 (100)	134 (100)	276 (100)
Weight for height			
Normal	101 (71.12)	104 (77.61)	205 (74.28)
Moderate wasting	32 (22.53)	26 (19.40)	58 (21.01)
Severe wasting	9 (6.33)	4 (2.98)	13 (4.71)
Total	142 (100)	134 (100)	276 (100)

Table 5: Distribution of children according to complimentary feeding (0–12 months of children)

Feeding practices (n 40)	No. of children	%
Type of food		
Cereals and Millets	37	92.50
Pulses	32	80.00
Vegetables	28	70.00
Roots and Tubers	29	72.50
Fruits	21	52.50
Milk and milk products 69.8	17	42.50
Eggs	9	22.50
Meat and Chicken	3	7.50
Fats and Oils	32	80.00
Number of complementary feeds per day		
2	8	20.00
3	18	46.15
4	11	28.21
5	2	5.13
Not yet started	1	2.56
Mode of complementary feeding		
Mother with spoon	7	17.50
Mother with hand	28	70.00
Self with spoon	1	2.50
Self by hand	3	7.50
Not yet started	1	2.50

The foods generally included in the complementary feeds were cereals and millets (92.5%), pulses (80%), fruits (52.50%), roots and tubers (72.50%), fats and oils (80%), milk and milk products (42.50%), vegetables (70%), eggs (22.50%), and meats and chicken (7.50%). 46.15% of the children received at least 3 complementary feeds per day, while 20% received 2 feeds a day. 70% of mothers fed the infants with their hands, while 17.50% used spoons to feed the child. In 7.50% of cases, the infants consumed foods with their hands or with a spoon (2.5%).

In our study, 24.63% children belonged to low birth weight and 53.26% children belonged to the birth weight more than 2.50 kg. The record of birth weight was not found in 22.46% of children, as either the immunization card is missing or birth weight was not filled in the immunization card.

The prevalence of undernutrition among low birth weights was 66% as compared to normal birth weights (51%). Low birth weight children were 2.03 times more at risk for undernutrition as compared to birth weights greater than 2.5 kg, and the difference was statistically significant ($p<0.05$). The prevalence of undernutrition in higher birth orders (>3) was 79%, as compared to 50% in birth orders <3. The difference was found to be statistically significant ($p<0.05$). The risk of undernutrition among children with a higher birth order (>3) was 3.86 times higher as compared to children with a birth order <3. The prevalence of undernutrition among children with a birth interval <2 years (58.8%) was relatively high as compared to children with a birth interval greater than 2 years (51.25%).

DISCUSSION

A study done by Kurup and Khandekar found that low birth weight (odds ratio [OR] 2.32; confidence intervals [CI] 95% 1.61–3.33) was

Table 6: Distribution of Nutritional status of under 5 children according to birth-weight

Birth-weight (in Kg)	Normal	Moderate under nutrition	Severe under nutrition	Total
Unknown	35 (26.31)	18 (20)	9 (18)	62 (22.46)
<2.50	23 (17.29)	26 (28.88)	19 (38)	68 (24.63)
>2.50	75 (56.39)	49 (54.44)	23 (46)	147 (53.26)
Total	133 (100)	93 (100)	50 (100)	276 (100)

Table 7: Relation of birth weight , birth order and birth interval with nutritional status of children

S. No.	Variables	Attributes	Nutrition		$\chi 2$	p-value	OR
			Normal	Under nutrition			
1	Birth weight (in Kg) (n=214; as 62 birth weight was not known)	<2.5	23 (34)	45 (66)	4.87	<0.05	2.03 (1.12–3.70)
		>2.5	75 (49)	76 (51)			
2	Birth order (n=276)	≤3	124 (50)	123 (50)	7.9	<0.05	3.86 (1.52–9.81)
		>3	6 (21)	23 (79)			
3	Birth interval (n=228)	<2 year	28 (41)	40 (59)	0.81	0.36	1.35 (0.76–2.41)
		>2 year	78 (49)	82 (51)			

a significant predictor of PEM [5]. The birth weight of an infant is the single most important determinant of new-born survival, and in developing countries, low-birth-weight infants are at increased risk of being malnourished at 1 year of age, become victims of the "infection-malnutrition cycle," which leads to further stunting and impaired growth and development [6]. A study done by Harishankar *et al.* found that the proportion of undernutrition in higher birth order (>3) was more at risk of undernutrition than those with first birth order [7]. NFHS II observed that lower birth orders were an advantage [8]. Bhutia (2014) found that a decrease in the prevalence of underweight is seen when the birth interval widens from 24 months (52.2%) to 47 months (45.1%) [9]. Frequent childbirth at short intervals does not allow the mother to regain her health for the next pregnancy, resulting in a low-birth-weight child, and short intervals of childbirth result in the early weaning of the earlier child from breast milk. The overall prevalence of underweight was 51.81%. 18.12% were severe underweight, and 33.70% were moderate underweight. The prevalence of underweight was higher among boys as compared to girls. The overall prevalence of underweight among <5–year-old children in the district (51.81%) was relatively lower when compared to the figures reported for the State of Madhya Pradesh by NFHS-3 [10] (60%) and the NIN (ICMR) Hyderabad survey report, 2011 [11] (57%), while this was higher when compared to the NNMB report 20064 for Madhya Pradesh (46%). 46.74% of <5–year-old children were stunted. The prevalence of severe stunting was 15.94%, while that of moderate stunting was 30.80%. The prevalence of stunting was marginally higher among boys as compared to girls. The overall prevalence of stunting in our study was 46.74%, found to be almost equal to the NIN (ICMR) Hyderabad survey report [11], In 2011, ie., 47%, it was found to be marginally lower when compared to that reported for the State of Madhya Pradesh by NFHS-3 [10] (50%), whereas the prevalence was about 12% lower when compared to NNMB 2006 for Madhya Pradesh (59%). [4] The prevalence of stunting increased with age ie., 31.25 % in under 1 year of age, 53.8% in 2–3 years of age, and58.1% in 4–5 years of age. The overall prevalence of wasting was 24.72%, in which 4.71% were severe. The overall prevalence of wasting among <5 year children in our study (24.72%) was found to be lower when compared to that reported for the State of Madhya Pradesh by NFHS-3 (35%) [10] and NIN (ICMR) Hyderabad survey report, 2011 [11] (30%), but the prevalence was almost equal to when compared to the figure reported by NNMB 2006 (24%) [4]. The prevalence of wasting was more among boys as compared to girls. There was no age-wise distinctive pattern observed for wasting, like stunting. The maximum wasting was observed in 3–4-year-old children.

CONCLUSION

The findings of the present study revealed the widespread prevalence of under-nutrition among under-5–year-old children. Data show that 51.81% of children under 5 years of age are underweight, 46.74% are stunted, and 24.72% are wasted in our study area, which is much higher than national figures and highlights the need for an integrated approach toward improving child health as well as nutritional status in this area. These observations reemphasize the need for education of mothers, delaying the age of marriage for females, and awareness programs regarding the right breast-feeding practices and weaning practices targeting mothers. Needless to say, to make a significant dent in child nutrition, holistic programs need to be designed for different sections of the population, taking their socio-demographic and cultural specificities into account. In this endeavor, cooperation is necessary among the government, nongovernmental organizations, medical personnel, and local people.

AUTHORS CONTRIBUTION

SS- Definition of intellectual content, literature survey, prepared first draft of manuscript, implementation of study protocol, data collection, data analysis; RS- Concept, design, clinical protocol, manuscript preparation, editing, and manuscript revision; GA- Design of study, statistical Analysis and Interpretation; SSR- Manuscript preparation, literature survey and preparation of figures and submission of article.

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CONFLICT OF INTEREST

None declared.

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