



THE PREVALENCE OF MALNUTRITION AMONG PRESCHOOL CHILDREN IN THE RURAL AREAS OF HAZARIBAGH DISTRICT OF JHARKHAND

Physiology

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ABSTRACT

Background: Malnutrition is a pathological condition resulting from the relative or absolute deficiency or excess of one or more essential nutrients. It poses a public health problem in the world and especially in developing countries. Malnutrition among under-five children is a major public health problem in India reflected by the fact that the prevalence of under-weight children in India is among the highest in the world, is nearly double that of Sub-Saharan Africa. **Methods:** A Descriptive Research among preschool children from rural (gramin) areas of 4 Blocks (Tehsils) in Hazaribagh District of Jharkhand. The study was conducted among selected government Anganwadi centres during January to June 2023. The investigator adopted Probability Sampling. A simple questionnaire was given to the parents to get the socio-demographic information from the parents. **Results:** Among 4560 child cases surveyed, 400 cases of malnutrition were found and remaining 4160 child cases were found normal. Prevalence of malnutrition was found 8.77% in Rural Areas of Western Chotanagpur Plateau of Hazaribagh District (Jharkhand). The study revealed BMI was directly proportional to the family income whereas BMI decreased with the increase of family size with increased number of children. BMI increased with respect to the increase of parental education and BMI was increasing with increasing number of meals per day among the children and children from nuclear family were more prone to malnutrition. **Conclusion:** Malnutrition is a multi-dimensional entity. The nutritional status of children under the age of five is affected by different factors. Malnutrition is a fairly wide-spread and complex problem that poses a serious threat to life and India is home to the largest number of underweight and stunted children in the world. As the quality of the future human resources depends on the children of today, improvement of their nutritional level should be given top priority.

KEYWORDS

Malnutrition, Preschool Children, Hazaribagh District Jharkhand

INTRODUCTION

Globally 52 million children under 5 years are wasted and 70 percent of them are in Asia.¹ Worldwide, 5 million children die every year due to malnutrition, of which 2 million are from India.²

Malnutrition is a pathological condition resulting from the relative or absolute deficiency or excess of one or more essential nutrients. It poses a public health problem in the world and especially in developing countries.³ Malnutrition among under-five children is a major public health problem in India. 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. It is also observed that the malnutrition problem in India is a concentrated phenomenon that is, a relatively small number of states, districts, and villages account for a large share of the malnutrition burden — only 5 states and 50% of villages account for about 80% of the malnutrition burden.⁴ Eighty percent of the world's undernourished children live in 20 countries, with India being home to nearly 60 million children who are underweight.⁵ The National Family Health Survey (NFHS) in India reported the prevalence of underweight among children younger than 3 years in 2005–2006 to be nearly 46%, a figure representing only a marginal decline rates recorded in 1992–1993 (51%) and 1998–1999 (47%).^{6,9} Each year approximately 2.3 million deaths among 6–60 months aged children in developing countries are associated with malnutrition, which is about 41% of the total deaths in this age group.¹⁰ Persistence of childhood under-nutrition in India despite the economic growth and general development is a complex public health riddle that keeps challenging analysts, program managers and implementers at all levels. The modest decline of under-nutrition levels between the last two rounds of the National Family Health Survey (NFHS) is well known and India continues to remain off-track from the Millennium Development Goal (MDG-1) target.^{11,12} Prevalence of underweight children increased in nine states (Assam, Arunachal Pradesh, Bihar, Haryana, Jharkhand, Madhya Pradesh, Rajasthan and Mizoram) between the last two rounds of NFHS, and remained stagnant in another seven states; the national level prevalence of underweight and

stunting was 42 and 48 %, respectively.¹² The concern and urgency for under-nutrition was rooted in the fact that while gross domestic production (GDP) in India grew at an average of 3.95 % per capita per year between 1980 and 2005, almost half of the under five years population in India continued to be undernourished.¹³ The proportionate share of consumer expenditure on non-food items increased during last decade while the share of expenditure on food items especially cereals, pulses and oils decreased both in urban and rural India (66th Round of National Sample Survey, 2009–2010).¹⁴ With increasing household income, children from better off families and with educated mothers had greater nutritional advantages compared to those from less privileged classes.¹⁵ Women in developing countries are rapidly entering the formal and informal job markets in addition to accomplishing their domestic responsibilities.¹⁶ A significant proportion of Indian women in both rural and urban areas are engaged in income generating activities and employment, marked by rapid feminization of farming and labour.^{12,17} Women from households in the bottom quintiles in least developed villages are more likely to work outside their homes for extended periods of time than those in higher income scale.¹⁷ Poverty and resource availability at household level, and mothers' preoccupation with household and out of home activities influence the timing, quality and quantity of child's food and childcare in general.^{18,19} A recent study, among children aged between 3 months and 3 years of age conducted in 130 districts through Demographic and Health Surveys in 53 countries over a period from 1986 to 2006 found that — variance in mild under-weight has a larger and more robust correlation with child mortality than the variance in severe under-weight.²⁰

The Ministry of Women and Child Development in India has been running the Integrated Child Development Services (ICDS) since 1975 to address child malnutrition. ICDS tracks the underweight or weight-for-age status of children up to 6 years of age through a network of informal preschools called Anganwadi centers. Each center is staffed with a community-based worker and helper who provide nutritional supplementation to children and pregnant women, basic

informal education to children, and health education to mothers. While there are currently around 1.3 million Anganwadi centers functioning across local communities in India, the current policy focus for wasted children has been on hospital-based management through nutrition rehabilitation centers.²¹ Limitations of hospital-based treatment include poor cultural acceptance, hospital-acquired infections, and high relapse rates, which highlight the need for community-based therapeutic care for acute malnutrition in India.²²⁻²⁴

MATERIALS AND METHODS

A Descriptive Research design was used among the preschool children from the selected government Anganwadi centres in the rural (gramin) areas of 4 Blocks (Tehsils) in Hazaribagh District of Jharkhand in Chotanagpur Plateau region. The study was conducted among selected government Anganwadi centres during January to June 2023. The rationale for the selection of those selected government Anganwadi centres were that the investigator was familiar with the setting and convenience in getting cooperation from the concerned authorities for conducting the study. The investigator adopted Probability Sampling Technique to select a sample of 400 malnourished preschool children from 80 Government Anganwadi centres in the rural areas of 4 Blocks (Tehsils) in Hazaribagh District were selected randomly among 968 operational Government Anganwadi centres²⁵⁻²⁶. 400 malnutrition children were found out of 4560 children. A simple questionnaire was given to the parents to get the socio-demographic information and concern form were taken from the parents. Data were collected and were recorded in Microsoft excel sheet and SPSS Statistical software (SPSS) version 21.0 was used for analyzing and interpretation of the data according to WHO Growth Chart 2006.

RESULTS

Table 1, showed the socio-demographic characteristics of the study population. A total of 4560 child cases were surveyed, out of which 400 cases of malnutrition were found and the remaining 4160 child cases were found normal (or control). Prevalence of malnutrition in this study was found 8.77% around Rural Areas of Western Chotanagpur Plateau of Hazaribagh District (Jharkhand). Among total study cases (N=4560), the gender wise distribution depicted that 2312 (50.7%) were male and 2248 (49.3%) were female respectively within the age group from 2 to 5 years. Among 400 cases of malnutrition, it was found that 50 (50%) were male and 50 (50%) were female and among 4160 normal case, the gender-wise distribution were found 2112 (50.8%) male and 2048 (49.2%) female respectively. The data presented in Table 1, also showed that, there was an almost equal distribution among the malnourished cases and the normal cases (controls), with regard to characteristics such as gender, age and family type. It was found 20% children in malnourished condition where as 21.5% were in normal category within the age group of 2-3 years. 28% were in malnourished category and 32.3% were in normal category within the age group of 3-4 years and 52% children in malnourished category and 46.2% normal were found in the age group of 4-5 years respectively.

Depending on the type of family, it was found that 11% malnourished children came from joint family and 13.8% of normal children belonged to the same type, whereas 89% malnourished and 86.2% normal were from nuclear family respectively.

In regards to the occurrence of recurrent diseases (cold & cough, diarrhea and parasite infection), the frequency of malnourished children were suffering from higher percentage (42%) as compared to the normal cases (10.8%).

Among malnourished cases, the family income of 16% were below Rs. 2000 per month, 40% were having in the range of Rs. 2001 to Rs.5000 and 33% had Rs. 5001 to Rs. 10000 monthly income. Only 11% had monthly income more than Rs. 10000. In case of normal 19.2% had monthly income of Rs. 5001 to Rs. 10000 and 80.8% had family income more than Rs.10001.

Depending on the number of child, among 400 samples of malnourished cases 8% had single child, 53% had 2 children, 33% had 3 children and 7% had 4 or more children where as normal cases among 4160 samples, 41.5% had single child, 56.2% had 2 children, 2.3% had 3 children respectively. There was no incidence of 4 or more children among the normal category.

Depending upon availability of having proper nutritional meal, 15% of

malnourished children got 2 times meal per day, 53% had 3 times meal per day and 32% got 4 times meal per day as compare to the normal children 13.8% had taken 3 times meal per day and 86.2% usually got 4 times meal per day.

Depending on parental education status, 8% parents of the malnourished category were illiterate, 23% were 8th pass, 36% had passed school final, 22% graduate and 11% were post graduate and above whereas among the normal category 2.3% parents had passed school final, 53.8% had graduate and 43.9% were post graduate. There was no incidence of illiterate and 8th passed parents in this category.

Table 2, showed the gender wise distribution with respect to BMI of the study groups. Among the malnutrition group (N=400), 23% had BMI<12, 25% had BMI in the range 12 -12.4 and remaining 52% had BMI in the range 12.5 – 13. There was no case in this category which showed BMI>13.1.

Among the normal group (N=4160), 60.7% had BMI in the range 13.1 -15.7, 24.7% had BMI range of 15.8 -17.4 and the remaining 14.6% had BMI>17.5. There was no case in this category which showed BMI ≤13.

Overall, in the total study group (N=4560), 0.7% of female and 1.3% of male were in the BMI range<12. 1.2% female and 1% male had BMI range 12- 12.4, 2.5% female and 2.1% male had BMI range 12.5 -13, 13.7% female and 21.7% had BMI range 13.1 -15.7. 7.7% female and 14.8% male had BMI range of 15.8 -17.4, while remaining 3.5% female and 9.8% male had BMI range≥ 17.5.

Table 3, showed the comparison between BMI and family income distribution among the malnutrition and normal category. Among 400 malnutrition cases 16% cases (64 cases) had family income below Rs.2000 per month. 160 cases in range between Rs.2001-Rs.5000, 132 cases in the range between Rs.5001-Rs.10000 per month and 44 cases had income≥Rs.10001.

Whereas among the normal 4160 cases, 800 cases had family income in the range between Rs.5001-Rs.10000 per month and remaining 3360 cases had family income ≥ Rs.10001. From this study, it was noted that BMI was directly proportional to the family income.

Table 4, showed the comparison between BMI and family size distribution among the both groups of malnutrition and normal cases. Among malnutrition cases (N=400), 32 cases had single child, 212 cases had 2 children, 128 case had 3 children and 28 cases had ≥ 4 children.

Whereas among the normal (N=4160) cases, there were 2528 cases had single child, 1024 cases had 2 children and 608 case had 3 children. There was no incidence having ≥ 4 children in this group. From this study, it was noted that BMI decreased with the increase of family size with increase number of children.

Table 5, showed comparison between BMI and distribution of parental education among the both groups of malnutrition and normal cases. In the malnutrition category, it was observed that parents were illiterate 32 cases, 8th standard pass among 92 cases, school final passed in 144 cases, graduate among 88 cases and 44 cases showed parental qualification having post graduate and more.

Whereas among normal category, there was no illiterate and 8th standard passed parent. In 96 cases the parental education were school final in nature, 2240 cases graduate and 1824 cases exhibited parental qualification having post graduate and more. From this study, it was noted that BMI increased with respect to the increase of parental education.

Table 6, showed the comparison between BMI and intake of nutritious meals per day among the both groups of malnutrition and normal cases. Among malnutrition cases, 60 cases had BMI<13 were having 2 proper nutritious meals per day, while 212 and 128 case had 3 and 4 meals per day respectively.

While, among normal group, 576 children had 3 meals per day and 3584 children had 4 meals per day. In this category BMI was usually ≥ 13.1. This group had no incidence of having 2 meals per day. From this table, it had been revealed that BMI was increasing with increasing

number of meals per day among the children.

Table 7, showed comparison between BMI and family types among the both groups of malnutrition and normal cases. Among malnutrition cases, 44 children and 356 children were from joint family and nuclear family respectively.

While, among normal group, 576 and 3584 children belonged to joint family and nuclear family respectively. From this table, it had been revealed that children from nuclear family were more prone to malnutrition.

DISCUSSION

Malnutrition is a multi-dimensional entity. The nutritional status of children under the age of five is affected by different factors. Malnutrition is a fairly wide-spread and complex problem that poses a serious threat to life and India is home to the largest number of underweight and stunted children in the world. The current nutritional status of children not only reflects their well-being of the present time but also reflects future outcomes in terms of their health and development. Undernutrition is closely associated with a large proportion of child deaths. The present study identifies certain risk factors which were found to be significantly higher in children with malnutrition compared to normal children. In the present study, it found that the educational status of the parents, was associated with the nutritional status of the child, these findings are consistent with earlier reports (Ansuya et al. 2018).²⁷ The socio-economic status of the family was independently associated with under-nutrition as the study population were from rural areas, a supportive study done in India, reveals that families with low economic status have significant association with under nutrition (Ansuya et al. 2018, Jeyaseelan L et al. 1997).^{27,28} This study also reported that children who are underweight are at an increased risk of infectious illnesses such as diarrhea. Infections play a major etiological role in under nutrition because they result in increased needs and high energy expenditure, lower appetite, nutrient loss due to vomiting, diarrhea, poor digestion, malabsorption and the utilization of nutrients and disruption of metabolic equilibrium. In this study, association was found between children suffering from current or chronic infections (such as recurrent cold and cough, diarrhea, parasite infections etc.) in the past and the nutritional status. The study showed the high prevalence of current infection among those who were malnourished, and it was suggested that the malnourished children had a higher incidence of infections due to poor immune factors as a result of inadequate nutrition. This is consistent with findings of a study done in Karnataka, India (Basit A et al. 2012).²⁹ Being underweight increases the likelihood of illness because malnutrition suppresses immunity (Gulati J 2010).³⁰ Conversely, an acute infection can lead to weight loss through the increase in metabolic demand, impaired nutrient absorption or anorexia (Unicef report 2013, Weisz A et al. 2011).^{31,32}

The current study also revealed that families with more number of children were more prone to malnourished. The frequency of malnutrition was higher among the nuclear families than that of the joint families. Studies also reported that poor sanitation status, lack of personal hygiene and low socioeconomic status have an impact on malnutrition. It revealed that poor environmental conditions may increase the risk of acquiring an infectious disease, which in turn may lead to malnutrition. Present study showed number of nutritious meal per day given to the young children also highly influenced the nutritional status of the children.

This present study was done in rural area of 4 Blocks (Tehsils) in Hazaribagh District of Jharkhand. This study provides the snapshot of the prevalent nutrition related abnormalities in preschool age children in rural population of Hazaribagh District. Nutritional abnormalities levels are higher in Rajasthan, as per National family health survey-3 (2005-06) the prevalence of the stunting and wasting among the less than 3 year of age children is 33.7% and 19.7% (for rural this is 36.4% and 19.9%)⁵⁶ whereas in the present study 31% was found moderately under-weight and 5% was found severely under-weight among (N=100) malnutrition cases, whereas overall (N=1140) result depicted that 17% were mildly underweight, 2.7% were moderately underweight and 0.4% were severely underweight.³³ A similar previous study by M. S. Tripathi and V. Sharma, done at slum population of Udaipur in pre-school age children found that 42% children were stunted and 30% were found wasted and 66% were found to be underweight whereas this study showed that 11% belong to

the stunted category among malnourished children.³⁴ An article on nutrition country profile states that nutritional abnormalities varies in different states from 13%-55% from Meghalaya to Madhya Pradesh accordingly. In reference to these studies, overall stunting in our study found to be 15.7% but the proportion of wasted children in present study (30.5%) (S P Sharma et al. 2014) and overall mildly obese was found (16.8%) (S K Sharma et al. 2015).^{35,36}

Nutritional deficiency is prone to be seen more in children of rural and low socio-economic status families but now changing scenario of economic development or even the adequacies of food at household levels are now not the only parameters for a stable and satisfactory for minimizing the nutritional abnormalities, which also improved by parental education.

CONCLUSION

As the quality of the future human resources depends on the children of today, improvement of their nutritional level should be given top priority. Being underweight is associated with many factors which at times modifiable and at times non-modifiable. Considering the modifiable factors, the nutritional level can be improved. There should be some training or education about nutritional knowledge, environmental sanitation and personal hygiene, and nutritional deficiency diseases, the nutritional value of food and dietary practices to increase the awareness of rural parents to feed their children with a balanced diet, so that they can easily overcome the problems of malnutrition. The present study provides a brief glimpse of nutritional abnormalities in pre-school age children. It also indicates that there is need of more elaborative education and medical care about nutrition and dietary habits to population including proper antenatal care and postnatal care of mother and child to reduce the prevalence of nutrition related diseases in children along with proper counselling of parents by administrative, doctors and health care workers.

Conflict of Interest: Nil

Tables

Table 1: Gender wise frequency distribution of the study cases						
Parameters	Malnourished Cases (N = 400)		Normal Cases (N = 4160)		Total Study Cases (N = 4560)	
Gender	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Male	200	50	2112	50.8	2312	50.7
Female	200	50	2048	49.2	2248	49.3
Age in Years						
2-3	80	20	896	21.5	976	21.4
3-4	112	28	1344	32.3	1456	31.9
4-5	208	52	1920	46.2	2128	46.7
Family Type						
Joint family	44	11	576	13.8	620	13.6
Nuclear family	356	89	3584	86.2	3940	86.4
Recurrent Diseases						
Cold & Cough	60	15	192	4.6	252	5.5
Diarrhea	64	16	192	4.6	256	5.6
No	232	58	3712	89.2	3944	86.5
Parasite Infection	44	11	64	1.6	108	2.4
Family Income						
< Rs. 2000	64	16	0	0	64	1.4
Rs. 2001 - 5000	160	40	0	0	160	3.5
Rs. 5001 - 10000	132	33	800	19.2	932	20.4
≥ Rs. 10001	44	11	3360	80.8	3404	74.6
Family size						
Having 1 child	32	8	1728	41.5	1760	38.6
Having 2 child	212	53	2336	56.2	2548	55.9
Having 3 child	128	32	96	2.3	224	4.9
Having 4 child/ more	28	7	0	0	28	0.6
No. of meals / day						
2 times	60	15	0	0	60	1.3
3 times	212	53	576	13.8	788	17.3
4 times	128	32	3584	86.2	3712	81.4
Parental Education						
Illiterate	32	8	0	0	32	0.7
8th pass	92	23	0	0	92	2
School final	144	36	96	2.3	240	5.3

Graduate	88	22	2240	53.8	2328	51.1
Post Graduate & more	44	11	1824	43.9	1868	41
Total	400	100	4160	100	4560	100

Table 2: Gender wise distribution with BMI of the study groups**Total Study cases (N = 4560)**

BMI	Sex		Total	Percent age (%)
	F	M		
<12	32 (0.7%)	60 (1.3%)	92	2
12-12.4	56 (1.2%)	44 (1%)	100	2.2
12.5 - 13	112 (2.5%)	96 (2.1%)	208	4.6
13.1- 15.7	1536 (33.7%)	992 (21.7%)	2528	55.4
15.8 - 17.4	352 (7.7%)	672 (14.8%)	1024	22.5
17.5+	160 (3.5%)	448 (9.8%)	608	13.3
Grand Total	2248 (49.3%)	2312 (50.7%)	4560	100

Normal cases**(N = 4160)**

<12	0 (0%)	0 (0%)	0	0
12-12.4	0 (0%)	0 (0%)	0	0
12.5 - 13	0 (0%)	0 (0%)	0	0
13.1- 15.7	1536 (36.9%)	992 (23.8%)	2528	60.7
15.8 - 17.4	352 (8.5%)	672 (16.2%)	1024	24.7
17.5+	160 (3.8%)	448 (10.8%)	608	14.6
Grand Total	2048 (49.2)	2112 (50.8)	4160	100

Malnutrition cases (N = 400)

<12	32 (8%)	60 (15%)	92	23
12-12.4	56 (14%)	44 (11%)	100	25
12.5 - 13	112 (28%)	96 (24%)	208	52
13.1- 15.7	0 (0%)	0 (0%)	0	0
15.8 - 17.4	0 (0%)	0 (0%)	0	0
17.5+	0 (0%)	0 (0%)	0	0
Grand Total	200 (50.0%)	200 (50.0%)	400	100

Table 3: Comparison between BMI and Family Income distribution

Variables	BMI	< Rs. 2000	Rs. 2000 - 5000	Rs. 5000 - 10000	≥ Rs. 10000	Grand Total	Total (%)
Malnutrition (N = 400)	<12	20	36	24	12	92	23.0
	12-12.4	4	56	32	8	100	25.0
	12.5 - 13	40	68	76	24	208	52.0
	Total	64	160	132	44	400	100.0
Normal (N = 4160)	13.1- 15.7	0	0	800	1728	2528	60.8
	15.8 - 17.4	0	0	0	1024	1024	24.6
	≥17.5	0	0	0	608	608	14.6
	Total	0	0	800	3360	4160	100.0

Table 4: Comparison between BMI and Family Size distribution

Variables	BMI	Having 1 child	Having 2 child	Having 3 child	Having 4 child / more	Grand Total	Total (%)
Malnutrition (N = 400)	<12	8	56	24	4	92	23.0
	12-12.4	20	52	24	4	100	25.0
	12.5 - 13	4	104	80	20	208	52.0
	Total	32	212	128	28	400	100.0
Normal (N = 4160)	13.1- 15.7	576	672	480	0	1728	41.5
	15.8 - 17.4	1856	352	128	0	2336	56.2
	≥17.5	96	0	0	0	96	2.3
	Total	2528	1024	608	0	4160	100.0

Table 5: Comparison between BMI and Parental Education distribution

Variables	BMI	Illiterate	8th pass	School final	Graduate	Post Graduate & more	Grand Total	Total (%)
Malnutrition (N = 400)	<12	12	12	44	20	4	92	23.0
	12-12.4	12	32	24	28	4	100	25.0
	12.5 - 13	8	48	76	40	36	208	52.0
	Total	32	92	144	88	44	400	100.0
Normal (N = 4160)	13.1- 15.7	0	0	96	1952	480	2528	60.8
	15.8 - 17.4	0	0	0	192	832	1024	24.6
	≥17.5	0	0	0	96	512	608	14.6
	Total	0	0	96	2040	1424	4160	100.0

4160	Total	0	0	96	2240	1824	4160	100.0
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Table 6: Comparison between BMI and Meals per Day distribution

Variables	BMI	Having 2 meals/day	Having 3 meals/day	Having 4 meals/day	Grand Total	Total (%)
Malnutrition (N = 400)	<12	24	48	20	92	23.0
	12-12.4	0	76	24	100	25.0
	12.5 - 13	36	88	84	208	52.0
	Total	60	212	128	400	100.0
Normal (N = 4160)	13.1- 15.7	0	576	1952	2528	60.8
	15.8 - 17.4	0	0	1024	1024	24.6
	≥17.5	0	0	608	608	14.6
	Total	0	576	3584	4160	100.0

Table 7: Comparison between BMI and Family Type distribution

Variables	BMI	Joint Family	Nuclear family	Grand Total	Total (%)
Malnutrition (N = 400)	<12	20	72	92	23.0
	12-12.4	16	84	100	25.0
	12.5 - 13	8	200	208	52.0
	Total	44	356	400	100.0
Normal (N = 4160)	13.1- 15.7	192	2336	2528	60.8
	15.8 - 17.4	288	736	1024	24.6
	≥17.5	96	512	608	14.6
	Total	576	3584	4160	100.0

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