

Original Research Article

Socio-epidemiological study of malnutrition and associated risk factors among under five children in rural Rajasthan

Anjana Verma^{1*}, Dhriti Chugh¹, Ashish Patyal², Jitendra Kumar Meena³, Medha Mathur¹

¹Department of Community Medicine, Geetanjali Medical College, Udaipur, Rajasthan, India

²Neuroanaesthesia, Walton Centre, Liverpool, United Kingdom

³Department of Preventive Oncology, NCI, Jhajjar, AIIMS, New Delhi, India

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*Correspondence:

Dr. Anjana Verma,

E-mail: anjanaverma504@gmail.com

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ABSTRACT

Background: Malnutrition continues to be a major problem in India and is rightfully described as “the silent emergency.” Sociocultural factors and rural urban disparity in health services in our country further impact the health outcomes. The effects of malnutrition are long-term and trap generations in the vicious circle of poverty. Improving nutrition is therefore essential to accelerate economic growth and development of the country.

Methods: It was a community-based cross-sectional study conducted among 200 under five children residing in rural Udaipur, Rajasthan. Random sampling technique was used to select the study participants. A structured validated questionnaire was used to collect socio demographic data, birth history, Anganwadi beneficiary status etc. Mid upper arm circumference (MUAC), weight and heights were recorded and classified as underweight, wasted and stunted, using standard World Health Organization (WHO) guidelines.

Results: This study revealed that 58% of the study population was stunted, 45% was wasted, 54% was underweight and 5% was overweight of the study population was overweight. Regarding the association of malnutrition parameters with other factors, it was found that malnutrition was high among female children, lower socioeconomic class, children of low educated mothers and children who were not exclusively breast fed.

Conclusions: To combat malnutrition in India, there is need of multifaceted approach, taking into account the sociocultural determinants, demographic variables, especially in rural areas. In addition to providing supplementary nutrition, innovations regarding specific interventions targeted towards vulnerable population is necessary.

Keywords: Malnutrition, Risk factors, Rural, Under five children

INTRODUCTION

Nutrition is an issue of health, survival and development for current and succeeding generations. Improving the nutritional status of the population is imperative for national development. Malnutrition affects child's immune function, cognitive ability and is one of the most important causes of infant and child mortality.¹ As per the National Family Health Survey (NFHS)-4 (2015-16), 35.8 per cent children below five years are underweight, 38.4 per cent are stunted and 21 per cent are wasted in India.² In the district of Udaipur, Rajasthan 52 per cent

children below five years are underweight, 47.5 per cent are stunted and 29.9 per cent are wasted.³ Stunting results due to chronic or recurrent undernutrition in-utero and early childhood and it affects child's full possible height as well as their full cognitive potential. It can considerably lower their mental capacity and physical growth and can lead to learning disabilities and increased risk of diabetes and hypertension in future. Numerically, it is calculated as the percentage of children below 60 months of age whose height is two or more standard deviations lower than the median for WHO Child Growth Standards.⁴ India has almost 50 million children under the

age of 5 who are moderately or severely stunted.⁵ Wasting is a life-threatening condition ascribable to poor nutrition and/or disease. It is characterized by a rapid decline in nutritional status over a short period of time. Children suffering from wasting have weak immunity, which increases their risk of death due to greater severity and frequency of common infection, specifically when severe.⁴ India's food habits with heavy dependence on a carbohydrate-based diet means that we show less interest to proteins and fat, essential for early child growth and proper development. Though access to toilets has been improving, but still a major proportion of rural population defecate in the open. This leads to young children contracting chronic infections which in turn can decrease their appetite and cause malnutrition.⁴

Although malnutrition indices have shown a decline as per National Family Health Survey (NFHS) - 4, the overall malnutrition scenario continue to look bleak across the country. It has also been observed that the malnutrition problem in India is a concentrated phenomenon; a relatively small number of states, districts, and villages account for a substantial share of the malnutrition burden - only 5 states and 50% of villages account for about 80% of the malnutrition burden.⁵ The state of Rajasthan reels under poverty and backward tag and most of its rural population depend upon food entitlements mandated under various schemes. As per NFHS-4, the proportion of stunted and underweight children in Rajasthan has shown a decline. However, wasting among children increased from 20% to 23%.² Despite the gains in stunting and underweight, child malnutrition is still a major problem in Rajasthan. It has not shown much improvement in health and nutrition indicators and continues to be one of the bottom five states of the country, with rural children being affected most. This could be due to numerous reasons: limited access to education, low status of women, poor child feeding practices etc.⁷ It has been observed that universalized interventions which are not customized to local dynamics can significantly fail to control malnutrition. Studies have shown that high impact interventions in this sector should be based on a deep appreciation of socioeconomic attributes of the community and region involved. In this paper we draw the attention to identify context specific solutions to control child malnutrition in rural Rajasthan by studying the associated socio epidemiological factors.

METHODS

This was a community-based cross-sectional study conducted in villages, in the field practice area of Community Medicine department of a tertiary care hospital in Udaipur, Rajasthan. Taking the prevalence of wasting (low weight for height) among under five children in Udaipur district as 31%, 3 as per NFHS-4, the sample size was calculated using the standard formula,

$n = z^2 \frac{pq}{d^2}$.⁸ Where, n=Sample size, z=1.96, p=prevalence (31%), q=100-p, d=7%, absolute error. After taking the non-response rate of 10%, the final sample size was rounded up to 200. The study was carried out in villages, with the help of medical social worker working in the area. Random sampling technique was used to select the villages and study participants. A structured questionnaire was designed, according to the objectives of the study with the opinion of experts from departments of Paediatrics and Community Medicine. The questionnaire was translated into Hindi language, pilot tested and validated.

The questionnaire had sections on socio demographic data, birth history, obstetric history of mother, dietary habits, Anganwadi beneficiary status etc. The age of child was recorded using birth/delivery records or Anganwadi records. Socioeconomic status was assessed using B G Prasad's scale.⁹ It was followed by anthropometric measurements of child i.e, weight, height and mid upper arm circumference (MUAC) taking into account WHO standards and precautions. Weight of children was taken using an infant weighing machine and a stand-on scale. Height of children was measured to the nearest millimetre using infantometer (2 years old child). MUAC was measured to the nearest millimetre at the exact midpoint of the left arm using a narrow, flexible, and non-stretchable tape. All measurements were taken twice and average value was compared with the World Health Organization (WHO) growth standard tables for weight for age, height for age and weight for height. A value of mean -2SD was taken as the cut-off point for detection of underweight, stunting and wasting.^{10,11} The confidentiality of the study was assured and informed written consent was obtained from parents. Data entry and statistical analysis was done using SPSS (Statistical Package of Social Sciences) Version 21. Chi square tests were used to assess associations between the categorical variables and statistical significance was considered present if the p-value was less than 0.05. Prior permission was taken from the Institutional Ethics Committee.

RESULTS

Most of the study participants were males (53%) and of age group 2 to 5 years (44.3%) followed by six months to 2 years and (41.8%) and lowest were of age group 0 to 6 months (13.4%). Table 1 shows sociodemographic distribution of study population. Table 2 shows the mid upper arm circumference of children of age 6 months to 5 years. Majority (78.7%) of children of age group 2 to 5 years were having normal mid upper arm circumference (MUAC) as compared to younger children (6 months to 2 years), out of which only 59.5% had normal MUAC. The same age group (6 months to 2 years), had almost twice number (8.3%) of severely malnourished children according to MUAC measurement as compared to 2 to 5 years old children (4.5%).

Table 1: Sociodemographic variables of the participants

Variable		Male	Female	Total
Age	0-6mnths	13 (12.2%)	14 (14.9%)	27
	6 month-2 years	47 (44.3%)	37 (39.3%)	84
	2-5 years	46 (43.4%)	43 (45.7%)	89
Socioeconomic status	I	14 (13.2%)	13 (13.8%)	27
	II	17 (16%)	17 (18.1%)	34
	III	34 (32%)	31 (32.9%)	65
	IV	29 (27.3%)	25 (26.6%)	54
	V	12 (11.3%)	8 (8.5%)	20
Age		Father	Mother	Total
	<20	3 (.01%)	10 (5%)	13
	20-30	99 (49.5%)	147 (74%)	246
	>30	98 (49%)	43 (21%)	141
Education	Illiterate	26 (13%)	48 (24%)	74
	Primary	49 (24.5%)	44 (22%)	93
	Secondary	52 (26%)	48 (24%)	100
	Senior Secondary	27 (13.5%)	23 (11.5%)	50
	Graduate	46 (23%)	37 (18.5%)	83

Table 2: Mid upper arm circumference of study population.

MUAC	6months to 2 years	2 to 5 years
Normal	50 (59.5%)	70 (78.7%)
Mild to moderate	27 (32.1%)	15 (16.9%)
Severe malnutrition	7 (8.3%)	4 (4.5%)
Total	84	89

Table 3 shows the association of underweight, wasting and stunting with gender and socioeconomic status of

study population. The female children had higher proportion of underweight (59.6%), wasted (45.7%) and stunted children (57%), however this difference was not found to be statistically significant.

Maximum underweight children belonged to social class 5 (70%). Maximum proportion of wasted children belonged to social class 5 (55%) and majority of overweight children belonged to social class 4 (7.4%). Maximum stunted children belonged to social class 5 (70%) than other categories and this difference was found to be statistically significant with p value of 0.02.

Table 3: Association of underweight, wasting and stunting with gender and socioeconomic class.

		Male	Female	P value	Social class I	Social class II	Social class III	Social class IV	Social class V	P value
Weight for age	Normal	47 (44.3%)	38 (40.4%)	0.57	17 (63%)	15 (44%)	24 (36.9%)	24 (44.4%)	8 (30%)	0.24
	Underweight	59 (55.7%)	56 (59.6%)		10 (37%)	19 (56%)	41 (63.1%)	30 (55.6%)	12 (70%)	
	Total	106	104	27	34	65	54	20		
Weight for height	Normal	56 (52.8%)	44 (46.8%)	0.28	17 (63%)	22 (64.7%)	34 (52.3%)	29 (53.7%)	8 (40%)	0.23
	Wasted	47 (44.3%)	43 (45.7%)		9 (33.3%)	12 (35.2%)	27 (41.5%)	21 (38.8%)	11 (55%)	
	Overweight	3 (2.8%)	7 (7.4%)	1 (3.7%)	0	4 (6.1%)	4 (7.4%)	1 (5%)		
Total	106	104	27	34	65	54	20			
Height for age	Normal	53 (50%)	40 (43%)	0.29	17 (63%)	22 (64.7%)	25 (38.4%)	25 (46.3%)	6 (30%)	0.02
	Stunted	53 (50%)	54 (57%)		10 (37%)	12 (35.3%)	40 (61.6%)	29 (53.7%)	14 (70%)	
	Total	106	104	27	34	65	54	20		

Table 4: Association of underweight, wasting and stunting with mother's education and exclusive breast feeding.

Parameters		Mother's education			Exclusive breast feeding		
		Upto primary	>Primary	P value	Yes	No	P value
Weight for age	Normal	31 (33.7%)	54 (50%)	0.02	81 (45%)	4 (20%)	0.03
	Underweight	61 (66.3%)	54 (50%)		99 (55%)	16 (80%)	
	Total	92	108		180	20	
Weight for height	Normal	43 (46.7%)	57 (52.7%)	0.69	94 (52.2%)	6 (30%)	0.018
	Wasted	44 (47.8%)	46 (42.6%)		79 (43.9%)	11 (55%)	
	Overweight	5 (5.4%)	5 (4.5%)		7 (3.9%)	3 (15%)	
Total		92	108		180	20	
Height for age	Normal	38 (41.3%)	55 (50.9%)	0.17	86 (47.8%)	7 (35%)	0.28
	Stunted	54 (58.6%)	53 (49.1%)		103 (57.2%)	13 (65%)	
	Total	92	108		180	20	

Table 4 shows that maximum underweight study population were children of illiterate or primary educated mothers (66.3%) as compared to higher educated mothers and this difference was statistically significant with p value=0.02. Majority of wasted and stunted children had either illiterate or primary educated mothers. Table 4 also shows that proportion of underweight (80%), wasted (55%) and stunted (65%) children was higher in the group who were not exclusively breast fed as compared to exclusively breast fed. Being underweight and wasted was significantly associated with the absence of exclusive breast-feeding practices.

DISCUSSION

This study, conducted among 200 under five children living in rural area of Udaipur, it was found that 57.5% were underweight, 45% were wasted, 53.5% were stunted and 5% were overweight. These findings are comparable to NFHS 4 data of rural Udaipur, according to which, 54.8% of under five children were underweight, 31.1% were wasted and 49.5% were stunted.³ The findings in our study are higher than state level NFHS 4 data of Rajasthan, which shows that 38.4% of rural Rajasthan children were underweight, 23.4% were wasted and 40.8% were stunted.² This considerable difference in prevalence in our study and rest of Rajasthan is due to the fact that Udaipur is one of the remote parts of southern Rajasthan and is characterized by a predominance of tribal groups and a high prevalence of unskilled population and male seasonal outmigration. A study conducted in these parts in 2014 showed high levels of malnutrition among children in this region.¹² A study conducted in rural Varanasi by Anwar et al in 2013 revealed that prevalence of stunting, underweight and wasting were 43.1%, 35.2% and 31.5%, respectively among 0 to 36 months age group of children.¹³ The prevalence in this study is lower than our study's findings because of different study settings and methodology. Bhimiseti conducted study to assess nutritional status of under 5 children belonging to tribal population living in Visakhapatnam District, Andhra Pradesh in 2015, and found the prevalence of underweight children to be around 60%.¹⁴ Similar to

prevalence of underweight children in our study, around 57.8% of under five children were underweight according to study done by Davey et al in Delhi in 2014.¹⁵

In our study we assessed the association of malnutrition parameters with various factors. This study revealed that the female children constituted higher proportion of underweight (59.6%), wasted (45.7%) and stunted children (57%) as compared to male children who had prevalence of underweight- 55.7%, wasting- 44.3% and stunting- 50%. This observation is comparable to a study done by Yadav et al, according to which, prevalence of underweight was higher in females compared to male children (42.9% Vs 40%, p value=0.417) respectively. The prevalence of severe underweight among males and females were 13.4% and 14.7% respectively.¹⁶ Our study shows that maximum underweight children belonged to social class V (70%). Maximum wasted children belonged to social class V being 55% and majority of overweight children belonged to social class IV (7.4%). Maximum stunted children belonged to social class V (70%) than other categories and this difference was found to be statistically significant with p value of 0.02. This finding is similar to that found in another study which found that significantly higher ($p=0.0001$) number of children were underweight in lower socioeconomic status (52.5 and 55.4% respectively in class IV and V).¹⁶

Another association we studied was between malnutrition parameters and mother's education. It was found that maximum underweight children were of mothers who were either illiterate or primary educated mothers (66.3%) as compared to higher educated mothers and this difference was statistically significant with p value<0.05. Majority of wasted (47.8%) and stunted (58.6%) children were of the mothers who were not educated. This finding is similar to that revealed by Fred et al, that undernutrition has a strong negative relationship with the mother's education. The percentage of children who were severely underweight was almost five times as high for children whose mothers do not have education as for children whose mothers have 12 or more years of education.¹⁷ Other studies also support the same observation. According to Menezes et al, maternal

schooling has been found to be an important factor associated with child growth.¹⁸ Another study done by Rijal et al, education of parents has significant effect on the nutritional status of their children.¹⁹ A study done by Yadav et al in the state of Haryana, revealed that 41.6% mothers and 32.2% fathers were illiterate out of which 53.9% and 40.6% children had malnutrition. Our study shows that proportion of underweight (75%), wasted (50%) and stunted (65%) children was higher in children who were not exclusively breast fed as compared to exclusively breast fed. This finding is comparable to a case control study done by Mishra K- in which a total of 76 cases and 115 controls were enrolled. Among the 14 factors compared, maternal illiteracy, large family size, daily family income less than Rs. 200, lack of exclusive breast feeding in first 6 months, bottle feeding, deprivation of colostrum, administration of pre-lacteals, and incomplete immunization were significant risk factors for malnutrition. It also revealed that the risk of severe acute malnutrition was independently associated with these factors- illiteracy among mothers, practice of bottle feeding, incomplete immunization, consistency of complementary feeding, deprivation of colostrum and receipt of pre- lacteals at birth.²⁰

Integrated Child Development Services (ICDS) in India is the world's largest integrated early childhood programme with centres all over country. Since its inception in 1975, the programme has expanded, despite difficulties in adapting to the vastly different local circumstances. In India, lack of community ownership continues to plague various national programs. Due to deficient support systems and non-transparency, there is ineffective utilization of services leading to poor program performance.²¹ To address the problem of malnutrition holistically, POSHAN (Proactive and Optimum care of children through Social-Household Approach for Nutrition) Abhiyaan was launched by the government of India in 2018.²² Our socio-cultural study findings suggest that maternal education, exclusive breast feeding may be key drivers of malnutrition in the state. Findings indicate an urgent need for multiple strategies to address the causes of child undernutrition, including social behaviour change communication (SBCC) at the household level, because mother is not always the decision maker in the house and is influenced by cultural beliefs or misconceptions. Issues related to the social determinants of childhood undernutrition should also be addressed. POSHAN abhiyan needs to be implemented successfully at scale in Rajasthan and it should be integrated within primary healthcare services.

CONCLUSION

The present study was a community-based study among under five children of rural area in Rajasthan for the assessment of malnutrition. It revealed that 58% of the study population was stunted, 45% was wasted, 54% was underweight and 5% of the study population was overweight. This shows that there is considerably high

prevalence of malnutrition in rural areas. The association of malnutrition parameters with other factors was also studied, and it was found that malnutrition was high among female children, lower socioeconomic class, children of low educated mothers and children who were not exclusively breast fed. Tackling malnutrition in India is difficult because of the disparity in terms of rural urban health infrastructure, varying social determinants, different health indices with in states etc. Ironically, in India we have both forms of malnutrition undernutrition and overweight and as per experts both these forms co-exist with micronutrient deficiencies. India with a large population that still lives in acute poverty or rural inaccessible areas, needs a multi-pronged approach to tackle malnutrition.

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