Factors Associated with under nutrition among 6-59 Months Old Children in Rishikesh, Uttarakhand

Abu Rehan[1], Surekha Kishore[2], Mahendra Singh[3], Bhavna Jain[4], Rukhsar Parveen[5]

Author's Affiliation:
[1]Junior Resident; [2]Professor; [3]Assistant Professor; [4]Senior Resident, Community and Family Medicine, AIIMS Rishikesh, Rishikesh; [5]Medical Officer, CHC Jwalapur, Jwalapur

Correspondence
Dr. Abu Rehan
rehanabu975@gmail.com

ABSTRACT

Context: Under nutrition has long been a major public health concern in developing country like India as a leading cause of child morbidity and mortality. The study was aimed to assess the malnutrition and factors associated with it. The study was conducted to assess under nutrition in under five children and various associated factors affecting it.

Methodology A community based cross sectional study was conducted among 400 under five children of rural and urban Rishikesh. Multistage sampling method was used to select the areas and systematic random sampling was used to select households. A predesigned, pre tested & semi structured questionnaire was used to collect information on various associated factors and status of under nutrition in study participants. Data was entered into excel sheets and analyzed using SPSS utilizing appropriate statistical test.

Results: The prevalence of underweight was 37.3%, stunting was 43.3% and wasting was 24.5% respectively. Socio-demographic factors, child birth weight and birth order, hand washing practice by mother and common morbidity emerged as significant predictors of under nutrition.

Conclusion: The burden of common morbidities and prevalence of malnutrition among under-five children in this community is very high. Our policies should aim to improve child health nutrition and growth.

Key wards: Under nutrition, Socioeconomic factors, Diarrhea, ARI

INTRODUCTION

The World Health Organization (WHO) estimates that malnutrition causes 1 million child mortality which share 54 percent of total child mortality worldwide and childhood Under nutrition is the cause for about 35% of all deaths of children under the age of five years worldwide.[1] Deficiencies are not only the result of inadequate dietary intake but diseases can impair absorption of nutrients and reduce appetite. Around one third of deaths among under five children are related to under nutrition. Low birth weight is also associated with increased morbidity and mortality and about 60 to 80 per cent of neonatal deaths occur among low birth weight babies.[2] Short duration of intervals in between pregnancies and having so many children may cause nutrition deficits. Poor growth can be aggravated by increase in episode of infectious diseases like diarrhea, upper respiratory tract infection, fever and infestation with intestinal worms. Under nutrition weakens the immune system which leads to recurrent common childhood infections and put child on greater risk of death. A child who is severely underweight is 9.5 times and severely stunted 4.6 times are more likely to die due to diarrhea than a child who is not.[3] In Uttarakhand, as per National family health survey-4

(2015-16) the prevalence of underweight, stunting and wasting among the less than five year of age children are 26.6%, 33.5% and 19.5% respectively and these parameters are more prevalent in rural areas than urban areas. Children's nutritional status in Uttarakhand has improved but still the condition is unsatisfactory. very few studies have been conducted in Uttarakhand regarding Under nutrition thus this study was conducted to assess the prevalence of under nutrition and associated risk factors in under five children in rural and urban areas of Rishikesh, Uttarakhand.

SUBJECT AND METHODS

A community based cross-sectional study was conducted in urban and rural areas of Rishikesh, Uttarakhand, from June 2019 to October 2019. Study participants were all 6-59 months old children of Rishikesh, Uttarakhand. Stunting is an important indicator of chronic Under nutrition as it tells about growth restriction. It is more common than wasting and all the risk factors for wasting and underweight are also associated with it [4]. So, sample size was calculated taking prevalence of stunting in urban and rural areas. Assuming prevalence of stunting in urban area as 32.5% and rural area as 34% (NFHS-4 data of Uttarakhand) [5], 95% confidence interval (CI) and 10% absolute precision sample size was calculated as 168 for urban and 173 for rural areas. Considering 10% non-response rate the final sample size came out to be 200. As a result, 200 Children from urban areas and 200 children from rural areas of Rishikesh Uttarakhand were taken making a sample size of 400.

All children aged 6-59 months present at the time of study and whose parent guardians gave consent to participate in study were included in the study.

Children who had diagnosed/known case of congenital or metabolic abnormality or whose parents/guardians did not give consent to participate in study or showed hostile behaviour or those who were not present at the time of visit were excluded from the study.

A predesigned, pretested, semi structured questionnaire was used to collect data on socio demographic and various other factors of the study participants followed by anthropometric measurement.

Anthropometric measurements were done using anthropometric calculator provided by the Department of Nutrition, World Health Organization Geneva, Switzerland. The weight and height were calculated and converted into weight for age, height for age and weight for height which were calculated in standard deviation values (trans-formed as Z – scores) using reference median as recommended by WHO (2006). Children whose Z score were less than two standard deviation (<-2 SD) on the basis of weight for age, height for age and weight for height nutritional indices were considered to be underweight, stunted and wasted respectively.

Data Analysis: Data was entered into excel sheet and analysed using SPSS version 23. For continuous variable mean and SD was calculated and t test was applied to compare mean and chi square test was applied to test proportions. P value <0.05 was considered significant.

Sampling Technique: The study sample is obtained by multistage sampling method. Total population of Rishikesh is 260343 people, 52.9% population (137943) residing in urban area and 47.1% population (122400) residing in rural area. It has 26 wards in urban area and 87 villages in rural area. According to 2011 census total household in India is 24.84 crore and total 0-6 years children is 16.45 crore. Hence probability of under five children per households is = 16.45 Cr/24.84 Cr = 0.66 (among 3 households there is chances of 2 under five children). Hence, we covered 300 households in urban and 300 household in rural areas. In urban area five wards (ward 1, 3, 4, 10, 13) were selected by simple random sampling (18.5% of total urban population). In rural areas five villages (Shyampur, Shiddar wala, Sahab nagar, Raiwala, Garhi maychak) were selected by simple random sampling (19.5% of total rural population). Systematic random sampling was used to find out the households for survey for equal probability chance. House to house survey was conducted if any household was found closed or there were no children under five age group, then the next household was selected for the survey. A landmark in centre of the locality such as a temple, market place for selection of first house was considered.

RESULTS

Table 1 depicts prevalence of underweight, stunting and wasting as 37.3%, 43.3% and 24.5% respectively in under five children. Underweight and stunting was more prevalent in urban areas than rural areas being 40.5% V/s 35.0% and 46.5% V/s 40.0% respectively. Whereas wasting was more prevalent in urban areas (27% V/s 22.0%) as compared to rural areas and these differences were not statistically significant.

Table 1: Distribution of under five children according to prevalence of Under nutrition in urban and rural areas of Rishikesh

Variables	Urban (N=200)(%)	Rural (N=200)(%)	Total (N=400)(%)	P value
Underweight				
Underweight (< -2 SD)	81 (53.6)	70 (46.4)	151 (37.7)	0.25
Normal	119 (47.8)	130 (52.2)	249 (62.3)	
Stunting				
Stunting (< -2 SD)	93 (53.8)	80 (46.2)	173 (43.3)	0.189
Normal	107 (47.1	120 (52.9)	227 (56.7)	
Wasting				
Wasting (< -2 SD)	54 (55.1)	44 (44.9)	98 (24.5)	0.24
Normal	146 (48.3)	156 (51.7)	302 (75.5)	

Table 2: Association of stunting and wasting with socio demographic characters of under five children.

Variables	Total (N=400) (%)	Height for age		Weight for height	
		Stunting (N=173) (%)	Normal (N= 227) (%)	Wasting (N=98) (%)	Normal (N=302) (%)
Age groups (in months)					
6-23	149 (37.3)	72(51.8)	67(48.2)	29(19.5)	120(80.5)
24-59	251 (62.7)	101(40.2)	150(59.8)	69(27.5)	182(72.5)
		P value:0.02		P value: 0.071	
Religion*					
Hindu	390 (97.5)	166 (42.5)	224 (57.5)	95 (24.3)	295 (75.7)
Muslims	4 (1.0)	4 (100.0)	0 (0.0)	1 (25.0)	3 (75.0)
Sikh	6 (1.5)	3 (50.0)	3 (50.0)	2 (33.3)	4 (66.7)
		P value: 0.15		P value: 0.97	
Caste					
General	128 (32.0)	51(39.8)	77 (60.2)	31(24.0)	97 (76.0)
OBC	205 (51.3)	93 (45.3)	112 (54.7)	48 (24.0)	157 (76.0)
SC	50 (25.0)	22 (44.0)	28 (56.0)	16 (32.0)	34 (68.0)
ST	17 (4.25)	7 (41.2)	10 (58.8)	3 (17.6)	14 (82.4)
		P value: 0.796		P value: 0.554	
Type of Family					
Nuclear	243 (60.7)	104 (42.7)	139 (57.3)	64 (26.3)	179 (73.7)
Joint	156 (39.3)	69 (44.2)	88 (55.8)	34 (21.7)	123 (78.3)
		P value: 0.820		P value: 0.28	
Socioeconomic status					
Upper class	28 (7.0)	11 (39.2)	17 (60.8)	4 (14.2)	24 (85.8)
Upper middle class	42 (10.5)	17 (40.4)	25 (59.6)	9 (21.4)	33 (78.6)
Middle class	105 (26.3)	47 (44.7)	58 (55.3)	23 (21.9)	82 (78.1)
Lower middle class	187 (46.7)	81 (43.3)	106 (56.3)	50 (26.7)	137 (73.3)
Lower class	38 (9.5)	144.7)	21 (55.3)	12 (31.5)	26 (68.5)
		P value: 0.979		P value: 0.446	
Educational status of mother					
Illiterate	71 (17.7)	37 (52.1)	34 (47.9)	25 (35.2)	46 (64.8)
Literate	329 (82.3)	136 (41.3)	193 (58.7)	73 (23.0)	256 (77.0)
		P value: 0.024		P value: 0.003	
Educational status of father					
Illiterate	43 (10.7)	27 (62.7)	16 (37.3)	17 (39.5)	26 (60.5)
Literate	357 (89.3)	146 (40.9)	211 (59.1)	81 (22.7)	276 (77.3)
		P value: 0.006		P value: 0.01	
Occupation of father					
Professional/Semi professional	164 (41.0)	60 (36.6)	104 (63.4)	28 (17.0)	136 (83.0)
Skilled / Semi-skilled worker	236 (59.0)	113 (47.9)	123 (52.1)	70 (29.7)	166 (70.3)
		P value: 0.024		P value: 0.003	

*Cells of Muslims and Sikhs combined for chi square

Table 3: stunting and wasting in relation to various birth related events in under five children.

<24 months	87(45.7)	103(54.3)	53(27.9)	137(72.1)	190(47.5)
24-35 months	46(43.0)	61(57.0)	25(23.4)	82(76.6)	107(26.7)
36+ months	40(39.3)	62(60.7)	20(19.7)	82(80.3)	102(25.5)
Don't know#	0(0.0)	1(100.0)	0(0.0)	1(100.0)	1(0.3)
Total	173(43.3)	227(56.7)	98(24.5)	302(75.5)	400(100.0)
Chi-square-1.176, **Df-2, Sig.-**0.555			**Chi-square-**2.573, **df-2, Sig.-**0.276		
Stunting wasting and Birth order					
1st	88(39.8)	133(60.2)	42(19.0)	179(81.0)	221(55.2)
2-3rd	77(46.6)	88(53.4)	48(29.0)	117(71.0)	165(41.2)
4-5th	7(58.3)	5(41.7)	6 (50.0)	6(50.0)	12(3.0)
6+#	1(50.0)	1(50.0)	2 (100.0)	0(0.0)	2(0.5)
Total	173(43.3)	227(56.7)	98(24.5)	302(75.5)	400(100.0)
Chi-square-2.95, **Df-2, Sig.-**0.227			**Chi-square-**9.77, **df-2, Sig.-0.007**		
Stunting wasting and Birth weight of child					
<2500 gm	45(51.7)	42(48.3)	31(35.6)	56(64.3)	87(21.8)
≥2500 gm	128(40.9)	185(59.1)	67(21.5)	246(78.5)	313(78.2)
Total	173(43.3)	227(56.7)	98(24.5)	302(75.5)	400(100.0)
Chi-square-3.253, Df-1, Sig.-0.071			**Chi-square-7.449, Df-1, Sig.-0.006**		

Table 4: stunting and wasting in relation to common morbidities in under five children.

Stunting and wasting in under five children in relation to vaccination status					
Not vaccinated	5(55.5%)	4(44.5%)	3(33.3%)	6(66.7%)	9(2.3)
Partially vaccinated	9(47.3%)	10(52.7%)	6(31.5%)	13(68.5%)	19(4.8)
Fully vaccinated	159(42.7%)	213(57.3%)	89(23.9%)	283(76.1%)	372(93.0)
Total	173(43.3%)	227(56.7%)	98(24.5%)	302(75.5%)	400(100.0)
Chi-square-.726, df-2, Sig.-.696			**Chi-square-**0.961, **Df-2, Sig.-**0.618		
Stunting and wasting in under five children in relation to episode of diarrhea in last year					
Yes	159(43.8)	204(56.1)	95(26.1)	268(73.9)	363(90.7)
No	14(37.8)	23(62.2)	3(08.1)	34(91.9)	37(9.3)
Total	173(43.3)	227(56.7)	98(24.5)	302(75.5)	400(100.0)
Chi-square-0.487, Df-1, Sig-0.485			**Chi-square-**5.922, **df-1, Sig.-0.015**		
Stunting and wasting in under five children in relation to episode of fever in last year					
None	3(30.0)	7(70.0)	1(10.0)	9(90.0)	10(2.5)
1 episode	18(40.9)	26(59.1)	10(22.7)	34(77.3)	44(11.0)
2-3 episodes	89(41.3)	126(58.7)	50 (23.2)	165(54.6)	215(53.8)
>3 episodes	63(48.0)	68(52.0)	37(28.2)	94 (71.8)	131(32.8)
Total	173(43.3)	227(56.7)	98(24.5)	302(75.5)	400(100.0)
Chi-square-2.366, **df-3, Sig-**0.500			**Chi-square-**2.384, **Df-3, Sig.-**.497		
Stunting and wasting in under five children in relation to episode of cough/cold in last year					
None	2(20.0)	8(80.0)	1(10.0)	9(90.0)	10(2.5)
1 episode	16(40.0)	24(60.0)	8(20.0)	32(80.0)	40(10.0)
2-3 episodes	94(43.3)	123(56.7)	51 (23.5)	166(76.5)	217(54.3)
>3 episodes	61(45.8)	72(54.2)	38(28.5)	95 (71.5)	133(33.2)
Total	173(43.3)	227(56.7)	98(24.5)	302(75.5)	400(100.0)
Chi-square-2.745, **Df-3, Sig.-**0.432			**Chi-square-**2.883, **Df-3, Sig.-**.410		
Stunting and wasting in under five children in relation to worm infestation					
Yes	27(47.3)	30(52.7)	15(26.3)	42(73.7)	57(14.2)
No	146(42.5)	197(57.5)	83(24.1)	260(75.9)	343(85.8)
Total	173(43.3)	227(56.7)	98(24.5)	302(75.5)	400(100.0)
Chi-square-.459, **df-1, Sig.-**.498			**Chi-square-**0.118, **Df-1, Sig.-**0.730		

Table 2 shows majority of children belonged to 24-59 months age group (62.7%). Mean age of children was 31.96(+-17.89) months. 97.5% of children belonged to Hindu religion, 51.3% to OBC category, 60.7% to nuclear family and 46.7% to lower middle socioeconomic status. When educational status of

parents was seen 82.3% of mothers and 89.3% of fathers were literate. 59.0% of fathers were Skilled/Semi-skilled workers by occupation. Stunting was significantly more in children belonging to age group 6-23 months, whose mothers (52.1%) and fathers (62.7%) were illiterate by education and whose fathers (47.9%) were skilled and semi-skilled workers by occupation. Wasting was significantly more in children whose mothers (35.2%) and fathers (39.5%) were illiterate by education and whose fathers (29.7%) were skilled and semi-skilled workers by occupation.

In table 3 it was disappointing to observe that 47.5 % children had been born with the birth interval of less than 24 months. 55.2% children were the first born baby and wasting was significantly higher in children who had birth order of 4th-5th (50.0%). Majority of children i.e. 78.2% were born with normal birth weight and wasting was significantly high in low birth weight children (35.6%).

Table 4 depicts that stunting and wasting was more in children who were not vaccinated (55.5% & 33.3%) respectively. Wasting was significantly more in children who had episode of diarrhea in last year (26.1%). Stunting and wasting was more prevalent in children who had more than three episodes of fever in last year (48.0% & 28.2%) respectively. Stunting and wasting was also high in children who had more than three episodes of cough and cold in a year (45.8% & 28.5%) respectively. Stunting and wasting was more prevalent (47.3% & 26.3%) respectively in children who had history of worm infestation.

DISCUSSION

In present study, prevalence of underweight was 37.3%, stunting 43.3% and wasting 24.5% respectively. This data was found to be comparable with the data of NFHS 4[5] in India, according to which prevalence of underweight, stunting and wasting were 36%, 38%, and 21% respectively but was high if compared with the findings of Uttarakhand NFHS 4 data where underweight, stunting and wasting were found to be 26.35%, 33.5% and 19.5% respectively. Similar findings were shown by Meshram II et al[6] (2016) from Surat, being prevalence of underweight, stunting, wasting to be 35.2%, 43.1%, 31.5% and 44%, 39% and 22.5% respectively. Present study reported prevalence of Under nutrition was more in under five children of urban areas than rural areas in being underweight (40.5% v/s 35.0%), stunting (46.5% v/s 40.0%) and wasting (27.0% v/s 22.0%). Similar findings were shown by Navya N et al[7] (2017) in coastal district in Karnataka. In present study, stunting was significantly high in 6-23 months age group (51.8%)

while wasting was present more in 24-59 months age group (27.5%). Similar findings were reported by Rao S et al[8] in Pune. In the present study stunting (52.1%,) and wasting (35.2%) was significantly high in children of illiterate mothers as compared to children of literate mothers. Similar results were reported by Meshram II et al[9] in tribal areas of nine state, Shaili Vyas et al[10] in Uttarakhand. In the present study stunting (62.7%,) and wasting (39.5%) were significantly high in children whose father were illiterate. Similar findings were shown by Shaili Vyas et al[10] in Uttarakhand. Also, in the present study, stunting (47.9%) and wasting (29.7%) was significantly high in children whose fathers were skilled/semi-skilled workers as compared to children whose fathers were Professional/Semi-professional/Arithmetic skilled worker. Similar findings were shown by Shaili Vyas et al[10] (2016) in Uttarakhand.

Children who were high in birth order had significantly higher chance of developing wasting. Similar to this finding, Titaley C R et al[11] in Indonesia, Chaudhary P et al[12] in Jaipur found that a significantly higher proportion of malnutrition present in children of higher birth order and increase number of siblings and higher in birth order were related to higher odds of wasting.

In present study, wasting was significantly high among low birth weight children (35.6%). This could be because children of low birth weight are at a risk of recurrent infection and low immunity hence are more prone to develop undernutrition. Similar to this finding, Titaley C R et al[11] in Indonesia and Chaudhary P et al[12] in Jaipur their study found that malnutrition was positively associated with low birth weight and children who born with low birth weight had a 2.5-fold higher odds of being stunted.

Vaccination is very crucial for preventing infectious diseases, which can lead to Under nutrition in under five children. Similarly in present study, 93.0% children were fully vaccinated. Stunting and wasting were more in children who were not vaccinated (55.5%, 33.3%) as compared to those who were fully vaccinated (42.7%, 23.9%). Similar to this finding, Ray SK et al[13] in Kolkata found that proper implementation of UIP immunization was associated with decrease prevalence of malnutrition.

In present study, history of common childhood illnesses (diarrhea, ARI, fever)[14] were very high in under five children and it is well known that recurrent infection can lead to Under nutrition among children. 90.7% children suffered from diarrhea in last year. Present study also revealed that stunting and wasting were more prevalent in children who had more than three episodes of fever, cough and

cold in past one year from study period. Similar to these findings, Meshram I et al[14] (2012) in tribal areas of India, revealed that fever and ARI were most common morbidity among the children followed by diarrhea and these morbidity had 1.3 times higher risk of underweight and wasting. Ramachandran P et al[15] analyzed data from NFHS-3 and reported that children who had stunting with wasting, had the highest relative risk of morbidity due to infection. Ray SK et al[13] in Kolkata observed that standard case management of diarrhea and ARI may reduce malnutrition of under-five children. In present study, 14.2% children had worm infestations in past and stunting as well as wasting were more prevalent (47.3%, 26.3%) in these children with a history of worm infestations. Ray SK et al[13] in Kolkata revealed that periodic deworming may reduce risk of developing Under nutrition in under five children.

CONCLUSION AND RECOMMENDATIONS

Present study shows that almost half of under five children had chronic malnutrition and one fourth had acute malnutrition. Underweight, stunting and wasting were found to be more than national figures. For better nutritional status of under five children improving education and empowerment of mothers is the need of hour, as this will influence the nutrition and wellbeing of family and children in particular. The study documents that there was significantly increased risk of under nutrition if child has low birth weight, high birth order. Primary immunization was satisfactory in the study areas and majority of children were completely immunized. This study also documents that there was high burden of communicable diseases like ARI, Diarrheal diseases and worm infestation. Majority of children had symptom of fever in last year. Result of this study will be helpful for policy makers to plan for better health services for under five children to prevent the Under nutrition and their consequences so our nation can be more healthy, productive and strong.

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