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Undernutrition Among Under Five Children Of Rural and Hilly areas of Khag, Kashmir, India: A Community Based Cross-Sectional Study

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Abstract
Background: *Undernutrition among under five is one of the greatest public health problems in developing countries particularly in those residing in rural and hilly areas. This study aimed to assess the prevalence of under nutrition in rural and hilly area Khag with objectives to find out prevalence of undernutrition and its severity among the under five children.*
Methods: *A community based cross-sectional study was conducted in Rural and hilly areas of Khag, Kashmir. A simple random sampling technique was used and house to house survey was conducted till a required number of the children aged 1-5 years were included in the study. A pre-tested semi structured questionnaires was used and age, weight, height and MUAC of the children were measured.*
Results: *Out of 300 children studied, 141 (47%) were having malnutrition in the form of underweight, 130 (43.3%) wasting and 101 (33.7%) stunting, showing overlapping in most of the cases. In 101 stunted children 44.4% were among females and 25.1% among males (χ^2=12.116, df=1, p value=0.000). Among 141 underweight children 82% were among females and 19.2% among males and difference was again statistically significant (χ^2=117.192, df=1, p value=0.000).70.3.% children were having MUAC more than 13.5 cm and 28.7% children were having Malnutrition and 1% Severe Malnutrition. Gender analysis revealed statistically significant difference in MUAC (p valve= 0.000 by Fisher's Exact test)*
Conclusions: *Malnutrition is more prevalent among study population than expected and itseems that gender related bias is one of the main causes of malnutrition besides increasing family size. Implementation of the National Nutritional Programmes in these areas is a matter of concern and need to be addressed.*
Keywords: *Under five children, Malnutrition, Stunting, Underweight, Wasting.*

Introduction

Undernutrition accounts for nearly half of all deaths in children under five, resulting in loss of about 3 million lives a year. Children with Undernutrition are at greater risk of mortality from common infections, increasing the frequency and severity of infections, and delayed recovery[1]. NFHS-4 data has revealed that the under-five

mortality rates (U5MR) at national level is 50 per 1000 live births, with 34 in urban and 56 in rural area[2]. In Jammu and Kashmir the U5MR is estimated to be 48 per 1000 live births with 41 in Rural and 38 in urban areas[3]. Malnutrition impairs growth and development of the child and also increases susceptibility to infections like diarrhoea and pneumonia. Nutritional status of the rural population is essential to monitor the ongoing nutrition transition so that an appropriate interventions in initiated at proper time. Under nutrition among under 5 is one of the greatest public health problems in developing countries particularly in those residing in rural and hilly areas. As per NFHS-4 data there are 35.7% underweight, 21% wasted and 38.4% stunted children in India[4]. At State level the figures are 16.6% underweight, 12.1% shows wasting and 27.4% stunting[3]. As per (UNICEF-WHO, 2014) 48 % of the children under age of five years are malnourished in India among them female children are more vulnerable due to socio-economic status. Although administration is working in this direction but this stigma still prevails. With this background this study aimed to assess the prevalence of under nutrition in rural and hilly area Khag which is the rural field practice area of Department of Community Medicine Government Medical College Srinagar. Objectives of current study were to find out prevalence of undernutrition and its severity among the under five children of the study population.

Methods

A community based cross sectional study was conducted in the Month of March 2018 in the Rural hilly area of Khag which is located about 35 km West from State summer capital Srinagar[5]. Medical block Khag is divided into three zones, Zone Khag, Zone Breng and Zone Poshkar. Zone Khag has one Primary Health Centre and four Subcentres which caters to a population of about 19000.

Sample Size Estimation

Sample size was calculated by using WHO statistical formula for sample size determination: $n=Z^2 P (1 – P)/ d^2$, where n=sample size, Z=Z statistic for a level of confidence (1.96), P=prevalence of Undernutrion (25%, P=0.25), and d= allowable error (if 5%, d=0.05) [6]. The sample size of 288 was calculated and Informed/ verbal consent was taken prior to anthropometric measurement and interviews.

Sampling Method

A simple random sampling technique was used and house to house survey was conducted and required number of the children aged 1-5 years were included in the study as per inclusion and exclusion criteria. If any household has 2 or more under five children then the youngest was included in the study. The survey was continued until the required sample size was achieved. Data was collected using a pretested semi structured questionnaires and age (date of birth) was recorded which was confirmed by the records (Immunisation cards or other relevant documents).

Inclusion Criteria

- Those children present at the time of household visit.

Exclusion Criteria

- Children <1 year and>5 years of age
- Children having cerebral palsy, congenital malformation, or any other chronic morbidity or serious illness.
- Those families not willing to participate in the study.

Weight was measured using electronic digital weight scale with minimum/lightly/clothing and no shoes. Before measurement calibration was done for every child by setting it to zero. In case of children below 2 years length was measured by infant meter in supine position and height for those who can stand. Children were made to stand against the wall with buttocks and shoulder touching the wall. The mark at the head level was given on the wall and length from the wall to

bottom was measured using measuring tape, which gave the approximate height of the child and was recorded in centimetres. Z- scores mentioned for both male and female children by WHO was used for reporting system . As approved by Indian association of paediatrics (IAP) in 2008, Z-score technique (a statistical measure of the distance from the median expressed as a proportion of the standard deviation.) was used. The cut-off point of – 2 Z-score, i.e.; two standard deviations below the median values of the international reference was usedand level below it differentiate malnourished children from adequately nourished. Nutritional Status was assessed using WHO criteria andChildren whose W/A (weight for age) , H/A (height for age) and W/H (weight for height) scores fall below this point were considered as underweight, stunted and wasted respectively. Mid Upper Arm Circumference (MUAC) was measured with a non-stretchable measuring tape.

Statistical Methods

Data compilation and its analysis were done using MicrosoftExcel 2016, WHO Anthro Plus and IBM SPSS Version 23.0.

Results

In this study a total of 300 children were included and among them 167 (55.6%) were males and 133 (44.3%) were females. Out of total 300 children studied, 141 (47%) children were having malnutrition in the form of underweight, 130 (43.3%) wasting and 101 (33.7%) stunting showing overlapping in most of the cases (Table 1). Malnutrition classification were based on WHO Z-score system i.e.; Adequate -2<Z score + 2, Moderate -3<=Z score<-2 and Severe Z score < -3 as shown in (Table 2).Out of total 130wasted children, 72.9% were among female and 19.8% among male, difference was statistically significant (χ^2=85.243, df=1, p value=0.000) . In 101 stunted children 44.4% were among females and 25.1% among males (χ^2=12.116, df=1, p value=0.000) and among 141 underweight children 82% were among females and 19.2% among males and difference was again statistically significant (χ^2=117.192, df=1, p value=0.000) as shown in (Table 3). The mean birth order among the studied children was 2.79 ± 1.58. As shown in Bar chart (a) of Figure 1 as the birth order increases the number of children with wasting increases and the difference was statistically significant (χ^2=111.679, df=1, p value=0.000). Same results were obtained in case of Stunting and Underweight forms of Malnutrition as shown in Bar charts (b) and (c) of Figure 1 and the difference was again statistically significant (χ^2=43.487, df=1, p value=0.000, χ^2=152.915, df=1, p value=0.000) respectively. Maximum number of children who were wasted, stunted or underweight belong to age group of24-47 months and the difference was statistically significant as shown in (Table 4).

In this study population 70.3.% children were having MUAC more than 13.5 cm and 28.7% children were having Malnutrition and 1% Severe Malnutrition. Gender analysis revealed statistically significant difference in MUAC (p valve= 0.000 by Fisher's Exact test) as shown in (Table 5).

Table 1: Distribution of various forms of Malnutrition among Study population

	Underweight		Wasting		Stunting	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Normal	159	53.0	170	56.7	199	66.3
Malnutrition	141	47.0	130	43.3	101	33.7
Total	300	100.0	300	100.0	300	100.0

Table 2: Malnutrition classification based on WHO Z-score among Study population, Males and Female

Age groups	N	Weight-for-age %				Length/height-for-age %				Weight-for-length/height %						
		% < -3SD	% < -2SD	Mean	SD	% < -3SD	% < -2SD	Mean	SD	% < -3SD	% < -2SD	% < +1SD	% < +2SD	% < +3SD	Mean	SD
Total (0-60)	300	35.7	47	-2.26	1.52	13.8	33.2	-1.6	1.35	23.3	39.1	1.4	0	0	-1.75	1.59
(12-23)	61	16.4	34.4	-1.54	1.26	13.1	32.8	-1.67	1.18	6.8	18.6	3.4	0	0	-0.84	1.2
(24-35)	74	37.8	59.5	-2.51	1.58	29.2	43.1	-2.2	1.72	20.8	37.5	1.4	0	0	-1.69	1.68
(36-47)	84	46.4	48.8	-2.46	1.55	2.4	29.8	-1.18	1.1	36.5	50	1.4	0	0	-2.25	1.62
(48-60)	81	37	43.2	-2.38	1.49	12.3	28.4	-1.46	1.15	25.7	45.9	0	0	0	-2.02	1.45

Age groups Males	N	Weight-for-age %				Length/height-for-age %				Weight-for-length/height %						
		% < -3SD	% < -2SD	Mean	SD	% < -3SD	% < -2SD	Mean	SD	% < -3SD	% < -2SD	% < +1SD	% < +2SD	% < +3SD	Mean	SD
Total (0-60)	167	6	19.2	-1.38	0.9	4.8	24.2	-1.19	1.16	5.5	18.8	2.4	0	0	-1.02	1.17
(12-23)	35	0	17.1	-1.11	0.89	11.4	40	-1.7	1.09	0	5.7	5.7	0	0	-0.38	0.8
(24-35)	41	9.8	31.7	-1.52	0.99	10.3	25.6	-1.46	1.41	4.9	14.6	2.4	0	0	-0.89	1.37
(36-47)	42	14.3	19	-1.56	1.15	0	23.8	-0.91	1.16	15	30	2.5	0	0	-1.43	1.32
(48-60)	49	0	10.2	-1.31	0.47	0	12.2	-0.85	0.76	2	22.4	0	0	0	-1.25	0.87

Age groups Females	N	Weight-for-age %				Length/height-for-age %				Weight-for-length/height %						
		% < -3SD	% < -2SD	Mean	SD	% < -3SD	% < -2SD	Mean	SD	% < -3SD	% < -2SD	% < +1SD	% < +2SD	% < +3SD	Mean	SD
Total (0-60)	133	72.9	82	-3.37	1.42	24.8	44.4	-2.12	1.41	49.1	68.4	0	0	0	-2.8	1.53
(12-23)	26	38.5	57.7	-2.12	1.47	15.4	23.1	-1.64	1.32	16.7	37.5	0	0	0	-1.51	1.37
(24-35)	33	72.7	93.9	-3.74	1.27	51.5	63.6	-3.08	1.67	41.9	67.7	0	0	0	-2.73	1.48
(36-47)	42	78.6	78.6	-3.36	1.37	4.8	35.7	-1.45	0.97	61.8	73.5	0	0	0	-3.22	1.4
(48-60)	32	93.8	93.8	-4.01	0.9	31.3	53.1	-2.4	1.02	72	92	0	0	0	-3.53	1.14

Table 3: Gender distribution of Malnutrition in Study population

Sex	**Normal (N/%)**	**Wasting (N/%)**	**Total**	**Statistical analysis**
Female	36 (27.1%)	97 (72.9%)	133	χ^2=85.243
Male	134 (80.2%)	33 (19.8%)	167	df=1
Total	170 (56.7%)	130 (43.3%)	300	p value=0.000
Sex	**Normal (N/%)**	**Stunting (N/%)**	**Total**	**Statistical analysis**
Female	74 (55.6%)	59 (44.4%)	133	χ^2=12.116
Male	125 (74.9%)	42 (25.1%)	167	df=1
Total	199 (66.3%)	101 (33.7%)	300	p value=0.000
Sex	**Normal (N/%)**	**Underweight (N/%)**	**Total**	**Statistical analysis**
Female	24 (18.0%)	109 (82.0%)	133	χ^2=117.192
Male	135 (80.8%)	32 (19.2%)	167	df=1
Total	135 (80.8%)	141 (47.0%)	300	p value=0.000

Table 4: Distribution of Malnutrition among Age groups of Study Population

Age Group (Months)	**Normal (N/%)**	**Underweight (N/%)**	**Total**	**Statistical analysis**
12-23	40 (65.6%)	21 (34.4%)	61	
24-35	30 (40.5%)	44 (59.5%)	74	χ^2=9.061.243
36-47	43 (56.8%)	41 (48.8%)	84	df=3
48-60	46 (56.8%)	35 (43.2%)	**81**	p value=0.028
Total	159 (53.0%)	141 (47.0%)	**300**	
Age Group (Months)	**Normal (N/%)**	**Wasting (N/%)**	**Total**	**Statistical analysis**
12-23	48 (78.7%)	13 (21.3%)	61	
24-35	45 (60.8%)	29 (39.2%)	74	χ^2=19.762
36-47	37 (44.0%)	47 (56.0%)	84	df=3
48-60	40 (49.4%)	41 (50.6%)	**81**	p value=0.000
Total	170 (56.7%)	130 (43.3%)	**300**	
Age Group (Months)	**Normal (N/%)**	**Stunting (N/%)**	**Total**	**Statistical analysis**
12-23	41 (67.2%)	20 (32.8%)	61	
24-35	41 (55.4%)	33 (44.6%)	74	χ^2=5.560
36-47	59 (70.2%)	25 (29.8%)	84	df=3
48-60	58 (71.6%)	23 (28.4%)	**81**	p value=0.135
Total	199 (66.3%)	101 (33.7%)	**300**	

Mid Upper Arm Circumference					
Sex	**Normal N/%**	**Malnutrition N/%**	**Severe Malnutrition N/%**	**Total N**	**Statistical Test**
Female	46 (34.6%)	84 (63.2%)	3 (2.3%)	133	P value 0.000 by FET
Male	165 (98.8%)	2)1.2%)	0 (0.0%)	167	
Total	211 (70.3%)	86 (28.7%)	3 (1.0%)	300	

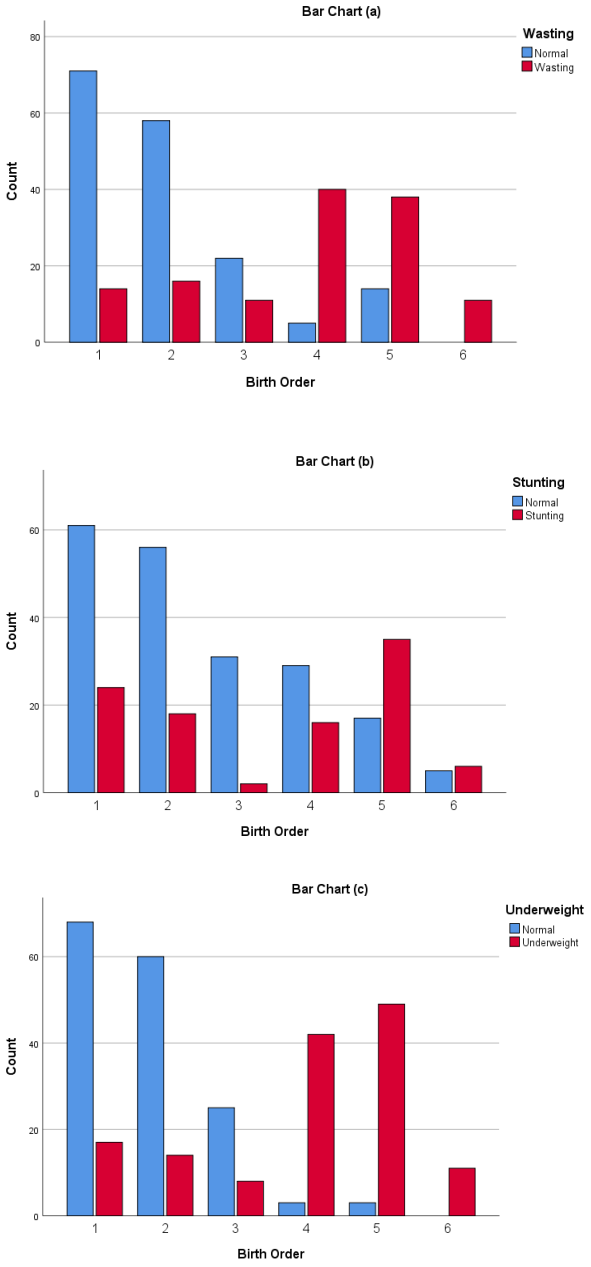

Figure 1: Bar charts Showing Distribution of Various forms of Malnutrition as per Birth Order of Study Population.

Discussion

In current study the Prevalence of Malnutrition among these 300 children studied were 141 (47%) in the form of underweight, 130 (43.3%) wasting and 101 (33.7%) as shown in (Table 1) which is very high as far as National and State figures as depicted by NFHS-4[3,4]. Gaurav K et al. conducted a study in 2014 in hilly areas of Nepal and found 17% under five children were moderately and 10.4 % were severely underweight and 17.5% to 22.9% stunted, and less than 10% wasted[7]. Sharma K et al. found in their study conducted in rural Rajasthan India in 2015 that 54%, 84% and 63% of children were stunted, underweight and wasted[8] respectively. These stats in these difficult areas including our study area definitely put the implementation of nutritional services like ICDS, mid-day meal scheme and other nutritional programmes into question mark although other factors like cultural habits, socioeconomic and environmental conditions etcdo play a role.

WHOZ-score technique which categorise the children into three

classes of adequate, moderate and severe as shown in (Table 2) for both male and female children revealed that overall about 35.7% fall in the severe (Z- score<-3) category of Under-nutrition among which6% were males and 72.9% were females as compared to 13.8% in overall of Stunting category and 4.8% males and 24.8% females. The overall percentage in Wasting category was 23.3% and 5.5% were among males and 49.1% among females. So among different forms of Malnutrition, most of them were females and the difference was statistically significant as shown in (Table 3). Sethy G et al. in Odisha in 2017found the gender differences, 28% males while 27.6% females were underweight. 23.5% males and 21.5% females are stunted while 26.5% males and 26.9% females are wasted. However, there was no significant gender wise difference statistically[9]. The gender difference in Malnutrition is a matter of concern in present

study and the overall less head to head count of female under five children shows the that the Government's policies regarding saving girl child seems to have no effect in these areas.

It was found that the birth order (family size) has statistically significant association with undernutrition and most of the malnourished were found in families with higher size (4 or above) as shown in (Figure 1). Similar results were obtained by Manjunath R et al. and Mengistu K et al. in their studies in India Kadukurubatribe and Ethiopia respectively. Although unfavourable environment caused by unsafe water supply and bad sanitation and hygiene which increases the probability of infectious diseases and indirectly leads to malnutrition also have a role in these areas but overall the environmental factors were found to be satisfactory in current study population.

Most of the children who were wasted, stunted or underweight belong to age group of 24-47 months and the difference was statistically significant as shown in (Table 4). Almost similar results were obtained by Gopaldas T et al. who found infants with better nutritional status than toddlers (1-3 years)[12] and Sethy G et al. found maximum number of malnutrition in the age group of 37-48 months [9].

In this study population MAUC showed that 70.3.% children were having Malnutrition and 1% Severe Malnutrition (SAM) and the difference was statistically significant as shown in (Table 5). Dairo MD et al got almost similar results [13]

Conclusion

Malnutrition is more prevalent among study population than expected and it seems that gender related bias is one of the main causes of malnutrition besides increasing family size. Although faulty feeding practice and hygienic practice are contributory factor of this high prevalence of disease but the implementation of the National Nutritional Programmes in these areas is a matter of concern and need to be addressed.

Recommendations

Although Government of India is having full proof policies for tackling Malnutrition but the implementation in these vulnerable areas has to be looked upon with full sprit. Strengthening of ICDS program and other Nutritional programmes should be carried out with continuous monitoring and timely evaluation in Urban and hilly areas too. Community awareness through ASHA, AWW and other agencies working in these areas for appropriate child feeding practices, sanitary disposal of excreta, exclusive breast feeding in child upto six months of age, age specific nutritional requirements in terms of quality and quantity should be promoted.

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