

SOCIAL AND ENVIRONMENTAL RISK FACTORS FOR SEVERE ACUTE MALNUTRITION IN CHILDREN UNDER 5 YEARS OF AGE PRESENTING TO A TERTIARY CARE HOSPITAL OF PESHAWAR

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ABSTRACT

Objective: To identify the social and environmental risks factors of severe acute malnutrition (SAM) in children of less than 5 years of age.

Methodology: This cross sectional study was conducted at nutrition rehabilitation unit of pediatric ward, Lady Reading Hospital, Peshawar from January 2018 to July 2018. A total of 400 children having SAM of both genders and age range of 6 month to 5 years were included in the study. Children with co-morbid conditions like cardiac failure, nephritic syndrome, renal failure and other chronic diseases were excluded. Socio-economic and environmental risk factors were recorded. Chi-square test was applied for determining association between risk factors and malnutrition.

Results: Out of 400 children, 210 (52.5%) were males and 190 (47.5%) were females. The mean age was 1.69 years (SD 1.142). Various socio-economic risk factors like education and occupation of parents, monthly family income, drug addiction in family, more than two children under 5 years of age, previous infant/children death, large family size, next pregnancy and environmental risk factors like, family type, domestic water supply, source of drinking of water, and type of latrine were significantly associated with malnutrition ($P < 0.001$).

Conclusion: Various socio-economic and environmental risk factors have significant association with malnutrition in children aged less than 5 years.

Key Words: Children, Risk factors, Severe acute malnutrition, Socio economic factors

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INTRODUCTION

Pediatric malnutrition is a leading public health problem in the developing countries. It causes death in 3.1 million children under 5 years of age every year¹. The term severe acute malnutrition is used for very low weight for height i.e. less than 3 median Z- scores of WHO growth charts, visibly severe wasting, or nutritional edema. The risk of death in children with SAM is nine times higher than that of children without SAM². According to a report of 2014, 45% of children under age of 5 years are affected by malnutrition³, and 50 million are estimated to be stunted and wasted. In developing countries significant proportion of children under the age of five years are malnourished, about 31% are underweight, 38% are stunted and 9% are wasted⁴. According to the 2015 report of UNICEF, the prevalence of stunting was high among children below 5 years in

Africa (36%) and Asia (27%)⁵. The global prevalence of malnutrition in children under the age of 5 years has declined to 36% over the past two decades; from an estimation it was 40% in 1990 with a decrease to 26% in 2011⁶. Among children under 5 years of age the prevalence of malnutrition is very high in many developing countries of the world⁷. Similarly, undernutrition in these children is highly prevalent in South East Asia and Africa⁸. In Nigeria especially the occurrence of malnutrition is high due to insufficient food and nutrients availability⁹. Furthermore, a study by Azuh et al. reported that the nutritional condition of such children is influenced by socio-demographic factors that are marital status, social class, ethnicity, number of children and mothers' age¹⁰. In Pakistan, 33.03% of children under five year of age are underweight, 53.83% are stunted and 11.52% are wasted, which clearly shows poor nutritional status¹¹. According to the national nutritional sur-

vey 2011, 15.1% were affected by SAM. The rate of SAM was higher in rural (16.1%) than in urban areas (12.7%). Severe stunting accounts for 24.4% and 29.7% severely underweight children across Pakistan¹². The etiology of malnutrition is complex and depends on several factors that are related to the nutritional status of children at varying levels. The prevention of malnutrition is quite possible provided that the risk factors are recognized and controlled at an early stage of child growth¹³. Socio-economic variables like gender inequality, poverty, lack of education, clean water availability and sanitation are key determinants of the health outcome in most of developing countries. Scientific literature is evident of the association between undernutrition, poverty and low education level of mothers^{14, 15}. Literacy status of parents has strong effects on the nutritional status of children whereas non formally educated parents are at risk to develop malnutrition in children under three years of age particularly with regards to weight^{16, 17}. Poverty and living in poor environmental conditions were also risk factors for malnutrition¹⁸.

As malnutrition is the cause for many diseases and in children, high amount of energy is required to meet the need of growth and development, malnourished children are unable to develop mentally and physically. So it will be helpful to know the various socioeconomic and environmental risk factors for SAM in children under five years of age in our local population. This will help clinicians in diagnosis and timely treatment of these children.

METHODOLOGY

This cross sectional study was conducted at Nutrition Rehabilitation unit of pediatric ward, Leady Reading Hospital, Peshawar from January to June, 2017 after approval from hospital ethics and research committee. A total of 400 children from both genders, having age range of 6 month to 5 years, presenting to Nutrition rehabilitation unit pediatric, Leady Reading Hospital, Peshawar and meeting the criteria of SAM according to the operational definition were included in the study. SAM was defined as very low weight for height i.e. less than 3 median Z- scores of WHO growth charts, visibly severe wasting, or nutritional edema². Children with co-morbid conditions like cardiac failure, nephritic syndrome, renal failure and chronic medical diseases were excluded. All the details of the children enrolled on the pre-structured proforma designed for the study. The questionnaire contained information regarding personal information, anthropometric measurement and biochemical assessment, dietary and clinical assessment. Anthropometric measurements were done by well-trained pediatrician and initial assessment by the Nutritional Rehabilitation Unit Staff. The Weight of children under 2 years of age was taken in the lying position with the help of pediat-

ric scale, while the weight of a child who could stand was taken on adult beam scale. Both the scales were calibrated before the use. The Height/Length was taken with the help of length board and stadiometer. The collected data was analyzed by using SPSS version 21. Quantitative variables like age, weight and height were expressed as mean and standard deviation. Qualitative variables like gender, literacy, employment of parents, family income and environmental condition were presented as frequencies and percentages. Chi-square test was applied to see the significance and association between related factors and malnutrition. P value of ≤ 0.05 was considered significant.

RESULTS

Of total 400 malnourished children, 210 (52.5%) were male and 190 (47.5%) were female with male to female ratio of 1.1:1. The most common age range was 1-2 years ($n=172$) (43%). The mean age was 1.69 years (SD, 1.142). Majority of children had weight range of 01-05 kg ($n=212$, (53%). The mean weight of the sample was 05.948 Kg (SD, 1.99). The most commonly encountered height was 61-100 cm ($n=326$, 81.5%) with mean height of 68.340 cm (SD, 943). Majority ($n=213$, 53.25%) belonged to rural, followed by urban areas ($n=187$, 46.75%). Edema was found in 148 (37%) cases. Dermatitis was present in 82 (20.50%) children. All the results except for gender and weight were highly significant which shows the age, height, area of residence, edema, and dermatosis fits the expected distribution as shown in Table 1.

Socio-economic risk factors were significantly associated with malnutrition ($P<0.001$). Most of the fathers of malnourished children were illiterate ($n=242$, 60.50%). Most common occupation of fathers was laborer ($n=197$, 49.25%). Most of the mothers of malnourished children were illiterate ($n=328$, 82%). Most of the families income was low i.e. Rs. 6000–10000/= ($n=178$, 44.5%). Details are given in table 2.

Environmental risk factors were also significantly associated with malnutrition ($P<0.001$). But family type (joint or separate) and house type (cemented or mud-ded) had non-significant association with malnutrition ($P>0.05$). (Table 3).

Most of male children were in age group 01-12 months ($n=90$, 22.5%) while most of the female children were in age group 1- 2 years ($n=98$, 24.5%). The distribution of ages between genders in malnourished patients was statistically significant ($P<0.001$) as shown in table 4.

The association of age and weight-length/height ratio in malnourished patients was also statistically significant ($P<0.001$) as shown in table 5.

Table 1: Distribution of gender, age, weight, height, area of residence, occipitofrontal circumference, weight-length/height, edema and dermatosis of malnourished children (n=400)

Child demographic data		N	%	P-value*
Gender	Male	210	52.50	.317
	Female	190	47.50	
Age	01-12 months	130	32.50	<0.001
	1- 2years	172	43.00	
	3 - 5 years	98	24.50	
Weight	1 – 5 kg	212	53	.230
	6 – 12 kg	188	47	
Height	31 – 60 cm	74	18.50	<0.001
	61 – 100 cm	326	81.50	
Area of residence	Rural	213	53.25	<0.001
	Urban	187	46.75	
Occipitofrontal circumference (OFC)	31 – 40	106	26.50	<0.001
	41 – 50	247	61.75	
	51 – 60	34	8.50	
	61 - 70	8	2.00	
	71 – 80	5	1.25	
Weight-length/height	<1 –2 SD	62	26.50	<0.001
	<3– 4 SD	338	61.75	
Edema	Present	148	37	<0.001
	Not present	252	63	
Dermatosis	Present	82	20.50	<0.001
	Not present	318	79.50	

*Chi-square goodness of fit test; P<0.05 was significant level

DISCUSSION

In our study we included children less than 5 years of age. The growth and development of a child is very rapid and need adequate nutrition. So in case of improper supply of nutrients, malnutrition can result. Similar age for determining risk factors for malnutrition was used in previous studies¹⁹. Different studies have highlighted that the severity of malnutrition occurs in the age group of 2 to 5 years children. Laghari et al²⁰. and Gul and Kibria²¹ reported that the malnutrition prevalence is significantly higher in children below 2 years of age.

The average age of the participants in the current study was 1.69 ± 1.14 years. Similarly in a recent study the median age of the child was 18 months²². In another study²³ the mean age was reported to be 26.40 ± 16.20 months. In the study referenced above, age of the child was found to have statistically significant association with nutritional status, as the risk of being malnourished increases with age of child increases. Another justification could be delayed introduction of supplementary food with inadequate nutritional sup-

plements²⁴.

A few studies found that males were more affected by malnutrition than females younger than five years old²⁵⁻²⁷. This is also evident from the results of our study that there was a male preponderance than females. In another study²³ conducted on 3095 children, residents of rural area, among which 50.1% were females, which is contrast to other studies like ours. The reason may be due to genetic factors.

Socio-economic risk factors like, education and occupation of parents, monthly income of family, drug addiction in family, more than two children under 5 years of age, previous infant/children death, large family size, next pregnancy and environmental risk factors like, family type, domestic water supply, source of water consumed, latrine, house type were significantly associated with malnutrition ($P < 0.001$).

Gritly et al²⁷. reported that low income of family was the most common risk factor for malnutrition in children. They found that mothers having sufficient education had higher probability to provide more nutritious

Table 2: Association of socio-economical risk factors with malnutrition in children (n=400)

Risk Factors		N	%	P-value*
Fathers' education:	Illiterate	242	60.5	<0.001
	Primary	18	4.5	
	Middle	14	3.5	
	Secondary/matric	60	15	
	F.A/F.Sc or above	64	16	
	Died	2	0.5	
Fathers' Occupations:	Banker	2	0.5	<0.001
	Clerk, police, mechanic	14	3.5	
	Died	2	0.5	
	Disable	2	0.5	
	Driver, Electrician	12	3	
	Private employee, Painter, Security guard	20	5	
	Farmer, Tailor	28	9.5	
	Shopkeeper	72	18	
	Laborer	197	49.25	
	Molvi	4	1	
	Pharmacy, Property dealer	14	3.5	
	Student	2	0.5	
	Teacher	12	3	
	Jobless	9	2.25	
Mothers' education:	Illiterate	328	82	<0.001
	Primary	10	2.5	
	Middle	16	4	
	Secondary/matric	24	6	
	F.A/F.Sc or above	20	5	
	Died	2	0.5	
Mothers' Occupations:	House wife	368	92	<0.001
	Tailor	4	1	
	Died	2	0.5	
	Teacher	14	3.5	
	Home worker	12	0.5	
Monthly income of family	000 – 5000	98	24.5	<0.001
	6000 – 15000	284	71	
	16000 – 30000	15	3.75	
	31000 and above	5	1.25	
Drug addiction in family	Yes/No	56/344	14/86	<0.001
> two children under 5	Yes/No	256/144	64/36	<0.001
Previous infant/child death	Yes/No	164/236	41/59	<0.001
Large family size	Yes/No	232/168	58/42	<0.001
Next pregnancy	Yes/No	124/276	31/69	<0.001

*Chi-square goodness of fit test; P<0.05 was significant level

Table 3: Environmental risk factors in children having malnutrition (n=400)

Risk Factors		N	%	P-value*
Family type	Joint	190	47.50	0.317
	Separate	210	52.50	
Domestic water supply	Piped	154	38.50	<0.001
	Home	156	39.00	
	Community	90	22.50	
Source of water consumed	Well	228	57.00	<0.001
	Spring	96	24.00	
	River	68	17.00	
	Other	8	2.00	
Latrine	House hold with flushing system	152	38.00	<0.001
	Pit latrine	232	58.00	
	No latrine	16	4.00	
House type	Cemented	196	49.00	0.689
		204	51.00	

*Chi-square goodness of fit test; P<0.05 was significant level

Table 4: Distribution of age between genders in malnourished patients (n=400)

Age	Gender				Total	P-value*
	Male		Female			
	N	%	N	%		
01-12 months	90	22.5	40	10	130	<0.001
1-2 years	74	18.5	98	24.5	172	
3-5 years	46	11.5	52	13	98	
Total	210		190		400	

*chi-square test for independence; P<0.05 was significant

Table 5: Association of age and weight-length-height in malnourished patients (n=400)

Age	Weight-length/height ratio								Total	P-value*
	<-1SD		<-2SD		<-3SD		<-4SD			
	N	%	n	%	N	%	N	%		
01-12 months	0	0.0	14	3.5	52	13.0	64	16.0	130	<0.001
1-2 years	16	4.3	20	5.0	84	21.0	51	12.8	172	
3-5 years	2	.5	12	3.0	48	12.0	36	9.0	98	
Total	198		48		184		150		400	

*chi-square test for independence; P<0.05 was significant

food than illiterate mothers. These results are similar to our study. Another study conducted in Nigeria found an association between mother's education and malnutrition in children²⁸. The educational level of mothers is the determinant for the nutritional status of the children.

The mothers having better education in nutrition can select right nutritional combination of food suitable for proper family servings. A mother lacking the knowledge of basic nutrition, preservation, proper cooking and serving of foods, cannot provide the child the nutrients

required for normal body growth and development.

Asghar et al²⁹. reported that the knowledge and practices not only affects health but it can also modify an individual's life and characteristics of a person to be healthier. Also education helps in preventive methods for instance hygienic behavior, enhanced sanitation at home like killing insects and vectors carrying diseases, etc. The results of this study correlate with one recent study's finding on association of maternal educational level and less frequent malnutrition³⁰.

Socio-economic variables like gender inequality, poverty, lack of education, clean water availability and sanitation are key determinants of the health outcome in most of developing countries. Parental occupation and financial status play key role in determining the nutritional status of children. The financial status of a family is an indicator of access to appropriate food supply, usage of health services and sanitation facilities which are basic determinants of nutritional status of children¹³. In our study results showed that majority of parents of the children had poor financial status. Most of the families' income was low i.e 6000 – 10000 (44.5%) and income above 31000 was found only in 1.25%. In the same way, a study by Kolasanoro³¹ found that nutritional deficiencies are more prevalent in the poor. Another study showed that below 5 years children from poor families were at a higher risk of malnutrition than with children from rich families¹⁵. Similarly in another recent study a large number of children belonged to poor socio-economic status, whereas no child was from higher socio-economic status³².

Olubadewo et al³³. reported that type of occupation and family income is a silent variable that affects the nutritional status of children. Udoh³⁴ in his study emphasized that mothers with high income are more likely to provide balanced diet to the children than those having low income. Likewise in our study, majority parents of malnourished children were laborers by profession (49.25%), who's income was much low to provide nutritious food to their children.

Among factors associated with malnutrition, sanitation and hygiene which are considered as minor factors but in reality they are the backbone of nutrition. There is strong association among overcrowded, unsanitary living conditions and poverty³⁵. Similar results were reported in another study in Brazil by Ferrari et al³⁶. Another study revealed that the adjustment of sanitation and hygiene were weak among malnourished than healthy children²⁹.

In a recent study³², it was observed that children practicing open defecation were having 2.3 fold higher risk of malnutrition as compared to children facilitated with sanitary latrine. In our study results showed that there was majority of homes with pit latrines, with a

higher risk of malnutrition in children ($P < 0.001$).

In our study, source of water supply was well, followed by spring. Similarly, in a study reported that risk factors such as a source of water and storage form of water in the home had no association with malnutrition, but the method of drinking water extraction from store, for example, immersing both hands and the glass into water storage, by the children had the strong association with malnutrition³².

The usual size of family, in Pakistan, is almost 07 members per family, and only one member is satisfying the economic, social, and biological requirements of the whole family³⁷. It was also observed in our study that majority of cases were having large family size.

Among malnourished children, a higher percentage of sweets and candies, chocolates consumption was observed as compared to normal children. Among the children who ate more sweets or candies, the higher risk of malnutrition might be due to the lack of intake of nutritious food which is essential for growth of the child³². Malnutrition is largely a treatable condition. Therefore, prompt identification, prevention and treatment is vital. In order to get the required target and to improve the nutrition status of children, the period from 2016 to 2025 has been declared as the decade of action on nutrition³².

RECOMMENDATION

The government should initiate policy measures to control all forms of malnutrition in our country. Therefore, the plan should aim for the provision of hygienic food with adequate nutrients and strategy for awareness and behaviour change about nutrition among public.

CONCLUSION

Socio-economical risk factors were significantly associated with malnutrition.

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CONTRIBUTORS

AM conceived the idea, designed the project and wrote the manuscript. AKK helped execute the plan as per protocol and supervised all steps including critical appraisal of the manuscript. BK helped data collection, compilation and analysis according to objectives. SI carried out corrections in the manuscript and helped in literature search. MH and LM helped in data collection and finalizing the manuscript after going through different versions of the draft and helped in bibliography. All authors contributed to the submitted manuscript significantly.