CASE FATALITY RATE AND ETIOLOGICAL FACTORS OF MALNUTRITION IN CHILDREN LESS THAN 5 YEARS OF AGE

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ABSTRACT

Objective: To calculate the case fatality rate and etiological factors of malnutrition in children less than 05 years of age presenting to a tertiary care hospital.

Methodology: A descriptive cross sectional study was conducted in the admitted patients in the Department of Pediatrics and Neonatology, Lady Reading Hospital, Peshawar, during one and an half year period from January 2009 to June 2010. A total of 976 patients (aged from 0 day to 60 months, both male and female) with various diseases were recorded as samples. The frequency of different types and grades of malnutrition and important etiological factors for malnutrition in these children were scrutinized. Case fatality was also calculated among the malnourished children.

Results: Out of 976, 294 (30.12%) were malnourished. Among these, majority (n= 195, 66.3%) were in the age range of 13-60 months, with mean age of 36.20 + 3.82 months. Many (n=157, 53.4%) were male children with male to female ratio of 1.14:1. majority 139 (44.28%) had grade I malnutrition. The commonest medical etiological factors was chronic or recurrent diarrhea n=205, 69.72%), anemia (n=139, 47.27%), respiratory tract infections (n=115, 39.11%); and inadequate feeding history (n=111, 37.75%). Most prominent social etiological factors were poverty (n=236, 80.27%), uneducated mothers (n=223, 75.85 %), more than 2 children under 5 years in family (n=136, 46.25%) cases. Case fatality (mortality) rate was 40 (13.6%).

Conclusions: Majority of malnourished children are males between the age of 13 to 60 months. Mass media campaign should be started for the eradication of malnutrition in children.

Key Words: Case fatality rate, Etiological factors, Malnutrition, Children.

INTRODUCTION

Malnutrition means more than feeling hungry or not having enough food to eat. Inadequate intake of protein (necessary to keep the body healthy and build muscle), calories (a measure of energy the body needs), iron (for proper blood cell function), and other nutrients make up different types of malnutrition. It may be "Primary" malnutrition associated with lack of primary health care and other social/environmental factors and "Secondary" malnutrition due to presence of some underlying diseases. It is one of the leading causes of morbidity and mortality in children[1-3].

Malnutrition is a silent emergency. Its persistence has profound implications for children, society, and the future of mankind. More than half of the young children in South Asia suffer from protein- energy malnutrition. Growth stunting, as a manifestation of deprivation in early childhood is a common problem among young Pakistani children[4].

It is estimated that more than half of the young children in South Asia suffer from protein-energy malnutrition, which is about five times the prevalence in the Western hemisphere, at least three times the prevalence in the Middle East and more than twice that of East Asia. Estimates for sub-Saharan Africa indicate that the prevalence is approximately 30%. Currently, over two-thirds of the world's malnourished children live in Asia followed by Africa and Latin America[5].

According to UNICEF report, two out of every five children in age groups under-five, in Pakistan are malnourished and three, out of every five children under-five years are stunted[6].

Prevalence of stunting and wasting is 32.50% and 16.5% respectively in rural areas of Pakistan which is higher in comparison to the urban areas. This difference may be attributed to limited access and utilization of health services. Only 35% of rural areas have access to health whereas 90% of urban areas have these facilities[7,8].

In order to assess the impact of malnutrition and mortality in hospitalized children, and etiological factors of malnutrition in children up to 5 years of age presented to Department of Pediatrics and Neonatology, this study was done.

METHODOLOGY

This descriptive cross sectional study was conducted in the admitted patients in the Department of Pediatrics and Neonatology, LRH, Peshawar during one and an half year period from January 2009 to June 2010. A total of 976 patients (aged from 0 day to 60 months (5 years), both male and female) with various diseases admitted to the Department of Pediatrics and Neonatology, LRH, Peshawar were recorded as samples. Children having normal height or weight for age, with fatal congenital disorders, cancer, prolonged or terminal illness at the time of admission and clear high risk mortality factors other than undernutrition and infections were excluded from the study.

After getting approval from the hospital ethical committee to conduct the study, data was collected of all those patients under 5 years of age with various diseases, who present through Out-patient department (OPD) or Emergency department and were admitted in Department of Pediatrics and Neonatology of Lady Reading Hospital Peshawar. Patients who fulfilled the inclusion criteria were included in the study and informed written consent was taken from parents or relatives of the patients for further evaluation. All patients weight for age was calculated. Malnutrition was categorized using weight for age parameters (Modified Gomez classification). The child was considered to have Grade I malnutrition if his/her weight was between 70 to 80% of the expected weight for age, Grade II malnutrition, if his/her weight was between 60 to 69% of the expected weight for age and Grade III malnutrition if his/her weight was <60% of the expected weight for age. Anemia was defined as hemoglobin <11 gm/dl. On general physical examination, weight of each child was taken three times by baby weight scale made in China. Each child was weighed without shoes and clothing. Mean of these three readings was taken as the exact weight. Expected weight for age was then worked-out and thus percentage of present weight to the expected weight was calculated. In addition, the nutritional history and history of breast feeding was specifically taken. Age of weaning was also inquired. The important risk factors for malnutrition in these children were scrutinized. Case fatality was also calculated among the malnourished children. All the data was stored and analyzed by statistical program SPSS version 12 for windows.

RESULTS

A total of 976 patients, aged from 0 day to 60 months with various diseases were admitted in the Department of Pediatrics and Neonatology, Lady Reading Hospital,

Table 1: Various characteristics of malnourished children (n=294)

Child demographic data	No. of cases	Percentage
Frequency of malnourished children	294/976	30.12%
Age		
0 - 29 days	09	03.10%
01-12 months	90	30.60%
13-60 months	195	66.30%
Gender distribution		
Male	157	53.40%
Female	137	48.50%
Type of malnutrition		
Grade I	139	44.29%
Grade II	66	22.44%
Grade III	89	30.28%

Table 2: Etiological factors of malnutrition (n=294)

Etiological factors	No. of cases	Percentage
Medical factors		
Chronic or recurrent diarrhea	205	69.72%
Anemia	139	47.27%
Respiratory tract infections	115	39.11%
History of inadequate feeding	111	39.11%
History of delayed weaning	95	32.31%
History of incomplete or partial vaccination	81	27.55%
History of tuberculosis	67	22.78%
Mixed or bottle feeds	65	22.10%
Congenital anomalies	59	20.01%
Low birth weight	48	16.32%
History of measles	36	12.24%
Social factors		
Poverty (Income Rs. <10000/- per month)	236	80.27%
Uneducated mothers	223	75.85%
More than 2 children under 5 in family	136	46.25%
Unemployed father	55	18.70%
Mortality rate		
Children expired	40	13.60%

Peshawar during the period of study. Out of these 976 patients, 294 (30.12%) were found to be malnourished, therefore a total of 294 cases were included in the study.

Age ranges of malnourished children, gender distribution and type of malnutrition are described in Table 1.

Various medical etiological factors were present in all cases where as social etiological factors were also observed in majority of the children. The most prominent medical etiological factors recorded were chronic or recurrent diarrhea in 205 (69.72%), anemia in 139 (47.27%), respiratory tract infections in 115 (39.11%), inadequate feeding history in 111 (37.75%), delayed weaning in 95 (32.31%), incomplete or partial vaccination in 81 (27.55%), history of tuberculosis in 67 (22.78%), mixed or bottle feeds in 65 (22.10%), congenital anomalies in 59 (20.01%), low birth weight 48 (16.32%), history of measles in 36 (12.24%). Most prominent social etiological factors noted were poverty (family income of Rs. <1000/- per month) in 236 (80.27%), uneducated mothers 223 (75.85 %), more than 2 children under 5 years in family was noted in 136 (46.25%) cases. Among the less common etiological factors unemployed fathers was noted in 55 (18.70%). Case fatality (mortality) rate was 40 (13.6%) in malnourished children (Table 2).

DISCUSSION

Malnutrition is a significant public health problem in developing countries, particularly that of the underprivileged and the poor countries. It is a strong risk factor for admission to hospital and death[9,10].

In our study, 30.12% children were found to be malnourished, and more than half were male. Also, older children were more prone to be exposed to anthropometric failure than their counterparts aged less than one year because they are mixed breastfed, even not breastfed at times, while younger children may be protected by the mother's immune system at birth[11]. The risk could be also due to lack of foods in the households due to poverty or the lack of hygiene by mothers, when cooking children foods[12]. The preponderance of malnutrition in females is lesser to that observed by Choudhury KK et al[13], where severe malnutrition was 1.44 times more common in girls as compared to boys.

In our study we have included malnourished children from 0 day to 60 months, as this is most important age range in the development of a child. Mean age in this study was 36.20 months (ranged 0 day to 60 months). A study by Khichi et al[14] included children between the ages of two to five years in the Bahawalpur area. The

study of Nizamani et al[15] where 65.5% of the children below five years of age were found to be malnourished. Ray et al[16] from Kolkata, India reported that 60.29% of children below five years of age were undernourished. Hossain and colleagues[17] found 96% of undernourished children between six to sixty months with varying grades of malnutrition in Bangladesh. In another study they included children age ranged between 6 months to 3 years (36 months). Mean age was 23.44 months, while median age was 24 months[9]. The variations in age ranges could be due to the study design of the respective studies.

The gap observed on stunting prevalence between children from uneducated mothers or those whose mothers have a primary school level of education compared with those from mothers with secondary or high level of education remains high. In fact, education could make a difference by empowering mothers (decision on type of nutrition and/or use of preventive medicine). Similar results have been found in most developing countries. Education could also help the mothers make informed nutritional decisions about cultural norms on certain types of food for children[18]. Many local studies proved that literacy status of parents (mothers and fathers) strongly affects the nutritional state of the children where illiterate parents are a risk for the development of malnutrition in children <3 years of age especially underweight.[2] While in few other studies poverty[19], living in poor environmental conditions[20] and diarrhea[21, 22] were found to be another risk factors of malnutrition.

In our study among the social factors of malnutrition, poverty (family income of Rs. <1000/- per month) was the commonest factor noted in 80.27% cases, uneducated mother in 75.85% cases, more than 2 children under 5 in family in 46.25% cases, and unemployed father in 18.70% cases. Various international and national studies have been reported more or less same results. A study revealed a strong relation between monthly income or socioeconomic status and malnutrition, for instance if monthly income < Rs.5000 there are 5.153 times more chances to have malnutrition[23]. Results are similar to the study conducted by Ayaya et al[24] in Kenya where poverty and social conditions under which the children live have been found as major determinants of malnutrition. However, poor socioeconomic status of the family contributes a lot to the development of malnutrition in the developing regions. With very low income, it is a tough task to provide a nutritious diet to the children[23]. Poverty, according to a study conducted in the Children's Hospital, Lahore, has almost no direct role to play in the determination of malnutrition. In fact some other problem which usually co-exists with the poverty appears to be playing the major role in determining malnutrition. The study has shown the absence of a nutrition-conscious attitude in the mother[25]. In a study[9] major groups

of children were coming from middle class families, with an average family income between Rs. 5000 to 10000. As family income varied between Rs. 3000 to greater than Rs. 10000, there was no direct correlation of family income with the malnutrition. This clearly showed that lack of maternal education regarding child's feeding and weaning played a major part in causing malnutrition. In these families, 35.5% of the mothers were illiterate, 38% mothers studied only up to the primary, 21.5% up to matric and 5% showed higher education above matric.

One study did not show any significant association between either the mother's or the father's education and malnutrition[26]. This is in contrast to other studies where malnutrition was found to be significantly associated with literacy rate of parents. In the study by Pakistan Medical & Research Council, a much lower rate of malnutrition in children was found if any adult female in that household had education of matric or above[27]. This difference may be due to the fact that they only looked at education of the mother and not of other adult female members in the household. Ali SS et al[28] reported significant association between malnutrition in children below three years of age and fathers' low literacy level. Maternal education is a significant predictor of child health. Normally children of educated mothers are considered to be less likely to fall victim to malnutrition than those of the uneducated ones. Increasing education brings improved understanding of health and nutrition and more use of health services, including immunization and antenatal care. But it has been found in the one study that education alone does not prevent malnutrition in children, whatever the income level of the parents[24,29].

There is a need to educate the caretakers, that good nutrition is important for optimal growth and development of young children. It should also be emphasized that good nutrition is just as important in females as it is in males. Consideration should be given to fortification of staple food items such as wheat with iron and minerals to prevent iron and other micronutrient deficiencies in these children[26].

Among the medical risk factors in our study, we have found that most prominent were chronic or recurrent diarrhea in 69.72% cases, anemia in 47.27% cases, respiratory tract infections in 39.11% cases, inadequate feeding history in 37.75%, delayed weaning in 32.31%, incomplete or partial vaccination in 27.55%, history of tuberculosis in 22.78%, mixed or bottle feeds in 22.10%, and congenital anomalies in 20.01% cases. Less common factors were, low birth weight in 16.32%, and history of measles in 12.24% cases. Many studies done at international and national level also have reported more or less same results in their respective studies. A study done in Karachi[7] showed that more prominent medical risk factors recorded were inadequate feeding (100%),

incomplete vaccination (65.4%), and either chronic or recurrent diarrhea (64.6%), mixed or bottle feeds (52.5%) and recurrent respiratory infections (42%). Other medical risk factors recorded were delayed weaning (27.9%), congenital anomalies (22%), low birth weight (15.8%), history of measles in 10.8%, history of treatment/underwent treatment of TB (7.9%), twin births & otitis media were individually observed in 5.4% cases[30]. A significant association was found between malnutrition and anemia in one study population. The study showed that malnutrition and associated anemia are common problems in children of Keamari area of Karachi[26].

Milk is considered a complete diet only for infants below the age of six months. In one study population, however, it was observed that 60% of the children were being given milk, and 50% tea, along with wheat products, as substitutes for meals, by their mothers due to their lack of nutritional awareness[25].

Infant feeding and weaning practices have cultural, social and economical roots making malnutrition more than a medical problem. It has been indicated in many studies all over the world that these practices are strongly influenced by customs, beliefs, superstitions, religion, cultural pattern, mother's education and socioeconomic status of the family[9]. The high incidence of bottle feeding and mixed bottle and breast feeding has been reported at the national and international level. If breast milk is replaced by cow or buffalo's milk or replaced by more expensive formulas, the estimated national expenditure would reach up to millions and trillions of rupees each year. Also, the financial drain of inadequate breast feeding has to take into account more difficult costs to estimate, which are very important cumulatively. These include the cost of treating diarrhoea and infant malnutrition, cost of an increased family planning services and particularly unnecessary expenditure in maternity units[9]. In many local studies commonest risk factors of malnutrition were; fresh (cow) milk feeding, mixed feeding, delayed weaning, more than 2 children under 5, large family size (>5 children), partial vaccination, no vaccination, working mother, un-employed factors, twin delivery[23,31,32]. It was found in an observational study that the major causes of malnutrition found in that study population were illiteracy; food fads; poverty; lack of breast-feeding; improper weaning; diarrhea and respiratory diseases. All these factors were statistically significant[1].

It is estimated that among the downtrodden, hardly 10% of the money is spent on foods obtained from animal sources i.e. egg, milk, curd, meat etc. In the referenced study[23], the risk of malnutrition is higher for children who were not exclusively breast fed. The same observation has been made by other studies conducted in Pakistan[31, 32], Kenya[24] India[33], and Turkey[34]. Some other studies confirmed the fact that completes immunisation

provided protection against malnutrition. Rana et al[31], Malik et al[32], Bloss et al[35] also reported similar results and found that up to date immunization is protective against malnutrition.

To assess the risk factors and case fatality rate of malnutrition in children admitted in the hospital, a descriptive type of study was done at Karachi[30]. Results showed that case fatality rate was 16.2%. It was concluded that the most common medical risk factors are: Inadequate feeding, incomplete vaccinations, chronic and recurrent diarrhea, and bottle-feeding and the results are comparable to previous studies. Prominent social risk factors include uneducated mothers, more than 2 children under 5 and previous child death[30].

Majority of mothers in Pakistan and other developing countries do not have clear guidelines regarding weaning. Though food may be available to them, yet the schedule of food administration and child requirement may not be known to them. Nutritional practices vary according to their social and cultural background, tribal and religious taboos. A very small number of malnourished children can actually be attributed to poverty. There is a need to know the perceptions and practices of mothers regarding child feeding and the impact factor of these perceptions on child malnutrition[9].

CONCLUSION

It is concluded on the basis of results of this study that majority of malnourished children are male between age ranges of 13 to 60 months, having grade I malnutrition. Mass media compaign should be started for the eradication about malnutrition in children.

REFERENCES

1. Badar S, Channer IS, Channer MS, Yasmeen S, Channer MFS, Channer SS, et al. Malnutrition; determinants in children between six months to five years of age in Bahawalpur. Prof Med J 2007;14:669-76.

2. Ali SS, Karim N, Billoo AG, Haider SS. Association of literacy of mothers with malnutrition among children under three years of age in rural area of district Malir, Karachi. J Pak Med Assoc 2005;55:550-3.

3. Heikens GT. How can we improve the care of severely malnourished children in Africa? PLoS Med 2007;4:e45.

4. Qazi SS, Hamza HB. Childhood Protein energy malnutrition in developing countries. Med Today 2005;3:43-6.

5. David LP, Edward AF. Changes in child survival are strongly associated with changes in malnutrition in developing countries. J Nutr 2003;133:107-19.

6. UNICEF. Nutrition, improving the nutritional status of children in Pakistan [Online]. 2009 [cited on 2011 December 02]. Available from: URL: http://www.unicef.org/ Pakistan/

nutrition.htm

7. Pakistan Medical Research Council. National health survey of Pakistan, 1990-94, Islamabad: Pakistan Medical Research Council; 1997. p. 20-7.

8. UNICEF. Atlas of south Asian children and women. New Delhi: UNICEF Regional Office South Asia; 1996. p. 54-5.

9. Azim W, Shafi H, Qureshi SM, Sheikh TS, Azim S, Hayat F. Perceptions and practices of mothers regarding child feeding. Biomedica 2005;21:71-5.

10. Bejon P, Mohammed S, Mwangi I, Atkinson SH, Osier F, Peshu N, et al. Fraction of all hospital admissions and deaths attributable to malnutrition among children in rural Kenya. Am J Clin Nutr 2008;88:1626-31.

11. Kandala NB, Fahrmeir L, Klasen S, Priebe J. Geo-additive models of childhood undernutrition in three sub-Saharan African countries. Popul Space Place 2009;15:461-73.

12. Kandala NB, Madungu TP, Emina JBO, Nzita KPD, Cappuccio FP. Malnutrition among children under the age of five in the Democratic Republic of Congo (DRC): does geographic location matter? BMC Public Health 2011;11:261.

13. Choudhury KK, Hanifi MA, Rasheed S, Bhuiya. Gender inequality and severe malnutrition among children in a remote rural area of Bangladesh. J Health Popul Nutr 2000;18:123-8.

14. Khichi GQ, Channar MS. Growth and nutritional status assessment of two to five years old children admitted in children ward B.V. Hospital, Bahawalpur. Pak Paediatr J 1999;23:201-5.

15. Nizamani MA, Shaikh A, Siyal M, Memon S. A one-year audit of causes of mortality and role of malnutrition in hospitalized children aged 2 months to 5 years at Peoples Medical College Hospital, Nawabshah. Med Channel 2004;10:17-22.

16. Ray SK, Haldar A, Biswas B, Misra R, Kumar S. Epidemiology of undernutrition. Indian J Pediatr 2001;68:1025-30.

17. Hossain IH, Yasmin R, Kabir I. Nutritional and immunization status, weaning practices and socio-economic conditions of under five children in three villages of Bangladesh. Indian J Public Health 1999;43:37-41.

18. Pongou R, Ezzati M, Salomon JA. Household and community socioeconomic and environmental determinants of child nutritional status in Cameroon. BMC Public Heath 2006;6.98:19.

19. Vorster HH, Kruger A. Poverty, malnutrition, underdevelopment and cardiovascular disease: a South African perspective. Cardiovasc J Afr 2007;18:321-4.

20. Mujib SA, Kazmi T, Khan S, Shad MA, Bashir M, Khan B. Relationship of non-organic factors with malnutrition among children under three years of age. J Coll Physicians Surg Pak 2006;16:355-8.

21. Memon IA, Jamal A, Memon H, Parveen N. Intestinal amoebiasis in children and its effect on nutritional status. J Coll Physicians Surg Pak 2009;19:440-3.

22. Seyal T, Ishaaq F, Waheed M, Mannan J, Hanif A. Risk factors for severe protein energy malnutrition in children less than 5 years of age (hospital based study). Pak Paediatr J 2008;32:221-4.

23. Rabbani W, Bukhari SKA, Quddusi SMAI, Abbas SN. Awareness of malnutrition and diarrheal diseases among mothers in Multan region. Pak Paediatr J 2006;30:131-5.

24. Ayaya SO, Esamai FO, Rotich J, Olwambula AR. Socioeconomic factors predisposing under five years old children to severe protein energy malnutrition at the Moi Teaching and Referral hospital, Eldoret, Kenya. East Afr Med J 2004;81:415-21.

25. Agha DA, Maqbool S, Anwar S. Is poverty or lack of nutrition awareness the main cause of malnutrition in children? Pak Pediatr J 2005;29:63-7.

26. Latif R. Malnutrition in children in the low socioeconomic area of Karachi. Pak Paediatr J 2007;31:53-7.

27. Pakistan Medical Research Council. National Health Survey of Pakistan: health profile of the people of Pakistan, 1990-1994. Islamabad: Pakistan Medical Research Council; 1998. p. 28.

28. Ali SS, Karim N, Haider SS. Association of literacy of fathers with malnutrition among children under three years of age in rural area of district Malir, Karachi. Med Channel 2005;11:26-9.

29. Craft N. Women's health, life span: conception to adolescence. BMJ 1997;315:1227-30.

30. Siddique B, Memon I, Jamal A, Aslam R. Assessment of risk factors and case fatality rate of malnourished admitted children. Med Channel 2006;12:47-51.

31. Rana MN, Kazi MY, Nasir A, Hussain A. Prevalence of risk factors of primary 3rd degree malnutrition in children under 5 years of age: admitted in Services Hospital, Lahore. Ann King Edward Med Coll 2006;12:208-9.

32. Malik FR, Tahir M, Kundi ZU. Risk factors for malnutrition in an urban slum. Ann Pak Inst Med Sci 2006;2:265-8.

33. Jones G, Schultink W, Babille M. Child development and nutrition. United Nations Children's Fund, India Country office, New Delhi, India. Indian J Paediatr 2006;73:479-87.

34. Ergin F, Okyay P, Atasoylu G, Beser E. Nutritional status and risk factors of chronic malnutrition in children under five years of age at Aydin, a western city of Turkey. Turk J Paediatr 2007;49:283-9.

35. Bloss E, Wainaina F, Bailey RC. Prevalence and predic-

tors of underweight, stunting, and wasting among children aged 5 and under in western Kenya. J Trop Paediatr 2004;50:260-70.

CONTRIBUTORS

MI conceived the idea, planned and wrote the manuscript of the study. MH, AA, BK and MH helped in the data analysis and write up of the manuscript. All the authors contributed significantly to the research that resulted in the submitted manuscript.