

Seasonal Prevalence of Protein-energy-malnutrition (PEM)

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Summary

Fatunde OJ Asekun-Olarinmoye EO and Ogundiran FA. Seasonal Prevalence of Protein-energy-malnutrition (PEM). *Nigerian Journal of Paediatrics* 1995; 22: 57. A retrospective study was carried out on the prevalence of protein-energy-malnutrition (PEM) among children attending Adeoyo Maternity and Children's hospital, Ibadan, over a period of 27 months. A significant number of all the patients attended the out-patient (OP) clinic per month during the wet season than during the dry season ($P < 0.05$). Similarly, a higher number of patients with PEM attended the OP per month during the wet season than during the dry season ($P < 0.001$). There was no difference ($P > 0.05$) between the number of in-patients during the wet and dry seasons. There was however, a significant difference ($P < 0.0001$) between the average number of in-patients with PEM during the rainy season than the average number with PEM admitted during the dry season. Scarcity and high prices of staple food items that occur during the wet season before the onset of harvest are among important contributory factors to the seasonal variation in the prevalence of PEM.

Introduction

PROTEIN-ENERGY-MALNUTRITION (PEM) has remained an important cause of high morbidity

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and mortality in most developing countries including Nigeria, despite past recommended measures and efforts to control the disease.¹⁻⁵ Twelve years ago, at the University College Hospital (UCH), Ibadan, 4.4 percent of total paediatric admissions over a five-year period were cases of PEM which was also the cause of mortality in 10 percent of the total number of admissions.⁶ Several important contributory factors to this high prevalence of the disorder in developing countries have been identified and these include the interaction of environmental and socio-economic factors that affect food requirement and its availability and utilization.⁷ It is a well-known fact that the avail-

ability and prices of food items in the country vary with the seasons, but the effects of such seasonal fluctuating factors on the prevalence of PEM have not been previously studied. The aim of the present retrospective study was therefore to examine the effects of the different seasons on the prevalence of PEM in an urban, non-teaching hospital in Ibadan.

Patients and Methods

The study was carried out at the Adeoyo Maternity and Children's hospital, Ibadan. This hospital serves a largely indigenous population most of whom are in the lowest socio-economic class. Medical records of attendance in the children's out-patient department (OPD) and of admissions into the children's wards for the period, January 1988 to March 1990, were retrieved. Information obtained from these records included the total number of patients attending the hospital over the above period, as well as the number of patients with the diagnosis of PEM. The term, PEM, encompasses kwashiorkor, marasmus and marasmic-kwashiorkor, according to the Wellcome Classification of malnutrition.⁸ The type of PEM in each patient was recorded where it was so specified in the records. The total rainfall in millimetres (mm) for each month was obtained from the summary of Ibadan meteorological observations during the period January, 1988 to March, 1990 that are kept in the Department of Geography, University of Ibadan. The difference in the mean prevalence of PEM during the dry months (November to March) compared with that of the wet months (April to October) was analysed, using the Student's 't' test.

Results

The average monthly rainfall during the 27-month period (January 1988 - March 1990) of the present study was 184.5mm and 13.8mm for the wet (April to October) and dry season (November to March), respectively. The monthly and yearly distribution of the total out-patients and cases of PEM are shown in Table 1. During the wet season, covering a 14-month period (seven months each for 1988 and 1989) there were 44227 patients seen and treated in the OPD; thus, the average number of patients attending the OPD was 3159 per month during the wet season, while the average number was 2701 patients during the dry season, covering a 13-month period ($t = 1.76$ $P < 0.05$). The average number of out-patients with PEM was 199 per month during the 14-month period of the wet season, while the average number was 89 per month during the 13-month period of the dry season ($t = 4.15$ $P < 0.001$). Patients with PEM accounted for 5.0, 6.1 and 1.3 percent respectively, of the total annual admissions.

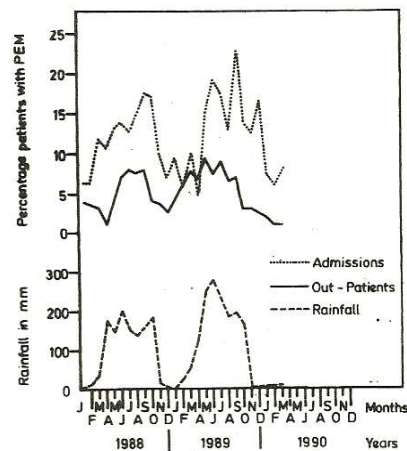


TABLE I

Monthly and Yearly Distribution of Total Number
of Out-patients and Cases of PEM

Month	Year					
	1988		1989		1990	
	Total No of Patients	Total No of PEM	Total No of Patients	Total No of PEM	Total No of Patients	Total No of PEM
Jan	3496	137(3.9)	2660	126(4.7)	3760	66(1.8)
Feb	3664	131(3.6)	2172	131(6.0)	2396	23(1.0)
Mar	3432	111(3.2)	1878	143(7.6)	2485	22(0.9)
April	3530	41(1.2)	2682	181(6.7)	-	-
May	3827	168(4.4)	1714	161(9.4)	-	-
June	3268	225(6.9)	2911	213(7.3)	-	-
July	3696	289(7.8)	3257	289(8.9)	-	-
Aug	4002	304(7.6)	3387	218(6.4)	-	-
Sept	4266	340(8.0)	2533	177(7.0)	-	-
Oct	2321	92(4.0)	2833	87(3.1)	-	-
Nov	2431	90(3.7)	2262	70(3.1)	-	-
Dec	2290	59(2.6)	2190	51(2.3)	-	-
Total	40223	1987(5.0)	30479	1847(6.1)	8641	111(1.3)

PEM = Protein-energy-malnutrition

Figures in parentheses represent percent of total

Table II shows the monthly and yearly distribution of in-patients and cases of PEM. The total number of in-patients for 1988, 1989 and 1990, was 3926, of which 11.4, 13.00 and 7.1 percent (average, 11.6 percent) were cases of PEM per year. During the wet season, the average number of in-patients was 149 per month, while during the dry season, the average number of ward admissions was 142 per month ($t = 0.5$ $P > 0.05$).

The average number of in-patients with PEM during the wet season was 21 per month compared with an average of 13 per month during the dry season ($t = 4.48$ $P < 0.0001$). As shown in the figure, the number of patients with PEM started to rise early in the rainy season, as from May and remained high during most of the season, but decreased sharply towards the end of the season in October.

TABLE II

Monthly and Yearly Distribution of Total Number of In-patients and 457 Cases of PEM

Month	Year					
	1988		1989		1990	
	Total No of Patients	Total No of PEM	Total No of Patients	Total No of PEM	Total No of Patients	Total No of PEM
Jan	144	9(6.3)	147	14(9.5)	120	9(7.5)
Feb	160	10(6.3)	122	7(5.7)	179	11(6.1)
Mar	126	15(11.9)	90	9(10.0)	139	11(7.9)
Apr	121	13(10.7)	250	12(4.8)	-	-
May	131	17(13.0)	173	26(15.0)	-	-
June	142	20(14.1)	150	29(19.3)	-	-
July	203	26(12.8)	125	22(17.6)	-	-
Aug	168	25(14.9)	147	19(12.9)	-	-
Sept	103	18(17.5)	130	30(23.1)	-	-
Oct	110	19(17.3)	128	18(14.1)	-	-
Nov	114	12(10.5)	165	21(12.7)	-	-
Dec	218	15(6.9)	121	20(16.5)	-	-
Total	1740	199(11.4)	1748	227(13.0)	438	31(7.1)

PEM = Protein-energy-malnutrition

Figures in parentheses represent percent of total

TABLE III

Monthly Distribution of 457 In-patient Cases of the different
Types of PEM

Month	Type of PEM				Total No of Cases
	Marasmus	Marasmic - kwashiorkor	Kwashiorkor	Unspecified	
Jan	2	1	12	17	32
Feb	2	0	13	13	28
March	2	5	14	14	35
April	4	7	7	7	25
May	4	7	18	14	43
June	9	12	17	11	49
July	2	9	27	10	48
Aug	5	7	17	15	44
Sept	4	4	17	23	48
Oct	5	1	21	10	37
Nov	1	10	16	6	33
Dec	6	4	9	16	35
Total	46(10.1)	67(14.7)	188(41.1)	156(34.1)	457(100.0)

PEM = Protein-energy-malnutrition

Figures in parenthesis represent percent of total

The monthly distribution of the 457 in-patients with the different types of PEM is summarized in Table III. There were 46 cases (10.1 percent) of marasmus (33 and 13 cases in the wet and dry season, respectively), 67 cases (14.7 percent) of marasmic-kwashiorkor (47 and 20 cases in the wet and dry season, respectively) and 188 cases (41.1 percent) of kwashiorkor (124 and 64 cases in the wet and dry season, respectively). It is apparent that kwashiorkor, being nearly double the number of cases of marasmus and marasmic-kwashiorkor, was the commonest type of malnutrition in the series. The seasonal prevalence with a higher number of cases in each type of malnutrition during the rainy season compared with the dry season, is evident.

Discussion

The average annual rate of 11.6 percent of admission of patients with PEM in the present study was much higher than the rate of 4.4 percent reported by Laditan and Tindimebwa⁶ from the UCH that is also located in Ibadan city. This vast difference in the admission rates may be explained by the fact that UCH is a referral tertiary hospital that caters for a wider, but selected range of diseases than Adeoyo hospital. Besides, Adeoyo hospital is located within the city slum area and is patronized mostly by the poorer segment of the population among whom PEM is, as to be expected, prevalent. It is also pertinent to note that the socio-economic level in the country was much worse during the period of the present study compared with the prevailing level during the period that Laditan and Tindimebwa undertook their study. Therefore, there might have been a real increase in the incidence of PEM in the Adeoyo zone of Ibadan.

Significantly, more total numbers of both in- and out-patients attended the hospital during the rainy season than during the dry season. Similarly, there were more patients with PEM who attended the out-patients clinic during the rainy than the dry season. There were also more in-patients with PEM who were admitted during the rainy than the dry season. The reasons for more patients attending the out-patient, or being admitted during the rainy season are unclear. However, the low prevalence of PEM during the dry season coincided with the period immediately following the harvesting of staple food items such as maize, yams, beans etc. During the early wet season, when farming usually begins, stored food items from the previous harvest tend to run short and most of the stored grains also go bad, or are destroyed by pests. Consequently, the prices of these food items are increased such that poor and marginalized families cannot afford to buy these food items. Scarcity and increased prices of high protein items such as beans, fish etc., during most of the rainy season would thus explain the high prevalence of PEM during this season.

Increased prevalence of PEM during the wet, post-wet and monsoon seasons, has been reported in other tropical and subtropical regions.⁹⁻¹¹ While recognising the role of other factors, such as gastroenteritis, respiratory tract infections and measles, on the high prevalence of PEM,¹² there can be no doubt that seasonal availability, or scarcity of nourishing food items, was the determining factor in either the high or low prevalence of PEM in the present study. Effective methods of food preservation and storage against seasons of food scarcity would contribute to the prevention of PEM. It

is important that the strong seasonal influence on the prevalence of PEM, as shown in the present study, be taken into consideration when short-term studies on this disorder are undertaken, since the results vary widely, depending on the time of the year that the study is carried out.¹³ The observation of a greater number of patients with kwashiorkor being admitted compared with those of marasmus and marasmic-kwashiorkor is similar to the report of Laditan and Tindimebwa⁶ which showed that the number of patients with kwashiorkor admitted into the hospital was about double the total number of patients with the other two forms of PEM.

Acknowledgements

We are grateful to Professor J B Familusi for his useful comments and the Department of Geography, University of Ibadan, for the meteorological data.

References

- Ogbeide MI. The influence of protein-calorie malnutrition on the pattern of pre-school childhood diseases. *Clinic Pediatr* 1968; 7: 425-31.
- Bamgboye EA and Familusi JB. Morbidity trends at a children's emergency room, University College Hospital, Ibadan. *Afr J Med Sci* 1990; 19: 49-56.
- Bamgboye EA and Familusi JB. Mortality pattern at a children's emergency ward, University College Hospital, Ibadan. *Afr J Med Sci* 1990; 19: 127-32.
- Wharton B. Protein energy malnutrition: problems and priorities. *Acta Paediatr Scand* 1991; 374: 5-14.
- Abiodun PO. Use of soya-beans for the dietary prevention and management of malnutrition in Nigeria. *Acta Paediatr Scand* 1991; 374: 175-82.
- Laditan AAO and Tindimebwa G. The protein-energy-malnourished child in a Nigerian Teaching Hospital. *J Trop Paediatr* 1983; 29: 61-4.
- Tombins A. Improving nutrition in developing countries: Can Primary Health Care help? *Trop Med Parasitol* 1987; 38: 226-32.
- Editorial. Classification of infantile malnutrition. *Lancet* 1970; II: 302.
- Coulter JB, Omer MI, Suliman GI, Moody JB, Mcfarlane SB and Hendrickse RG. Protein-energy malnutrition in Northern Sudan: prevalence, socio-economic factors and family background. *Ann Trop Paediatr* 1988; 8: 96-102.
- De Vries HR and Hendrickse RG. Climatic conditions and Kwashiorkor in Mumias: a retrospective analysis over a 5-year period. *Ann Trop Paediatr* 1988; 8: 268-70.
- Brown KH, Black RE and Becker S. Seasonal changes in nutritional status and the prevalence of malnutrition in a longitudinal study of young children in rural Bangladesh. *Am J Clin Nutr* 1982; 36: 303-13.
- Tolboom JJ, Ralitapole-Maruping AP, Kabir H, Molatseli P and Anderson J. Severe protein-energy malnutrition in Lesotho: conditioning factors and death and survival in Hospital. *Trop Geog Med* 1989; 41: 1-8.
- Siddique AK and Abengowe CU. Protein-energy-malnutrition in Nigerian children in Savannah Belt. *J Trop Paediatr* 1984; 30: 45-7.