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Original Article

Contributing Factors for Protein Calorie Malnutrition in District Mardan

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Abstract

Background: Protein calorie malnutrition (PCM) is a common health problem in developing countries resulting in high mortality in children sunder five years of age. It is also known as protein energy malnutrition.
Objectives: To calculate the incidence and risk factors for Protein Calorie Malnutrition in children attending hospitals of district Mardan, Khyber Pakhtunkhwa.
Study design, settings and duration: Retrospective hospital case record analysis of admitted children diagnosed as suffers of PCM and were admitted in hospitals from 2011-15 was done.
Subjects and Methods: Children <5 years fulfilling the inclusion criteria and reporting at four major hospitals of district Mardan from 2011-15 were included in the study. Data of children fulfilling the definition of PCM were further analyzed using SPSS software. Chi-square test and logistic regression model was used to determine the significance of the risk factors with the PCM disease.
Results: Out of 448 children, 58.5% (n=262) had PCM and 41.5% (n=186) did not have PCM. The significant risk factors in the logistic model fitted for male children included economic status, number of living children, environmental sanitation, immunization, skin changes. Risk factors for PCM in female children were economic status, weight, height, number of living children, environmental sanitation, immunization, hair changes, time to time monitoring of the child and clean water availability. In the logistic model for both genders; the risk factors that showed significant association with PCM were economic status, weight, height, number of living children, environmental sanitation, immunization, hair changes, time to time monitoring of the child health, clean water availability and hypothermia.
Conclusion: Almost 58% children admitted in different hospitals of district Mardan had PCM and the significant risk factors were economic status, weight, height, number of living children, environmental sanitation, immunization, hair changes, time to time monitoring of the child health, clean water availability and hypothermia.
Policy message: To cope with PCM, awareness must be created in public about exclusive breast feeding and immunization.
Key words: Protein calorie malnutrition, risk factors, immunization.

Introduction

Protein calorie malnutrition (PCM) is one of the most serious childhood diseases, throughout the world and is also known as protein energy malnutrition (PEM). Globally it affects about 800 million children with 20% living in developing countries. PCM is associated with 50% deaths all over the world.[1] Inadequate breast feeding or food intake is the major reason of malnutrition in developing countries and is responsible directly or indirectly for about 50% in children under 5 years of age.[2-5] Inappropriate sanitation leading to infectious diseases also increases the nutritional loss of children and thus alters their metabolic demands.[6-10] Socio-economic, biological and environmental factors are also the underlying causes for the insufficient food intake, which leads to PCM. Bottle feeding and lack of awareness on child rearing practices are also responsible for PCM. Extreme cases of PCM are kwashiorkor and Marasmus.[11] Both these conditions mostly affect children between 0-5 years when they do not have enough protein and calorie in their food. The disease is mostly seen in under developed and developing countries where it damages the child's health resulting in permanent defects on child growth. The disease when occurs is prolonged at a very early stage.[12]

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Authors Contribution

DMK and KM has done the conceptualization of project. KM did the data collection. DMK, KM and AA did the literature search. Statistical analysis was done by DMK SAK and A. DMK, KM and AA has also done the statistical analysis. Drafting, revision and writing of the manuscript.

In Pakistan, many studies have been done on PCM in children less than five year of age.[3-6] It is found to be associated with poverty and illiteracy [13] and results in stunted growth and high mortality.[11,12] A report on hospitalized children from Lady Reading Hospital, Peshawar showed malnutrition in children under five year of age to be 30.1% with 13.6% mortality.[14] There are few studies on PCM from district Mardan, Khyber Pakhtunkhwa [15] therefore, this study was done to collect more information on this group.

Subjects and Methods

This was a retrospective case record analysis which was carried out on children who were admitted during 2011 to 2015 in four major hospitals of district Mardan i.e. Central Military Hospital (CMH), Mardan Medical Complex (MCC), District Headquarter Hospital (DHQ) and Tehsil Headquarter Hospital, Ganji (District Mardan).

A questionnaire was used to collect demographic and other information including risk factors. The risk factors considered in the study were: address, gender, age, economical status, weight, height, loss of subcutaneous fats, lower respiratory tract infection, gastroenteritis, number of living children, natural disaster, environmental sanitation, mental changes, access to the health care centre, vomiting, skin changes, clean water availability, hypothermia, diarrhea, immunization, hair change, breast feeding and time to time monitoring.

The questionnaire was checked by senior pediatricians and corrected as per their suggestion. All information was taken from the patients' personal files which also included the information taken from mothers or care-takers. The weight was measured at the time of admission using weight scale, and height was measured to make a comparison of the actual weights and heights with the loss of weights and heights.

The study was approved and permission for data collection was granted by the Advance Studies and Research Board of the Islamia College University Peshawar.

Table-1: Association of risk factors with PCM.

Factors	*Category*	*PCM (%)*		*Total*	*p-Value*	*O.R*	*C.I for O.R*
		No	*Yes*				
Gender	F	109(44)	139(56)	248	0.244	1.253	(0.857, 1.831)
	M	77(38.5)	123(61.5)	200			
Economic status	Poor	14(8.3)	154(91.7)	168	0.000	-	-
	Below average	6(9.8)	55(90.2)	61			
	Average	123(70.7)	51(29.3)	174			
	Above average	43(95.5)	2(4.5)	45			
No. of living children	1-3	83(31.8)	178(68.2)	261	0.000	47.985	22,561, 102.058
	4-5	179(95.7)	8(4.3)	187			
Environmental sanitation	Poor	14(8.9)	143(91.1)	157	0.000	-	-
	Fair	14(14.9)	80(85.1)	94			
	Satisfactory	29(59.2)	20(40.8)	49			
	Good	50(80.6)	12(19.4)	62			
	V. Good	34(94.4	2(5.6)	36			
	Excellent	45(90)	5(10)	50			
Immunization	Not done	12(11.8)	90(88.2)	102	0.000	-	-
	Incomplete	10(38.5)	16(61.5)	26			
	In progress	164(51.2)	156(48.8)	320			
Hair changes	No	151(53.2)	133(46.8)	284	0.000	4.185	2.694, 9.499
	Yes	35(21.34)	129(78.65)	164			
Skin changes	No	138(52.47)	125(47.52)	263	0.000	3.151	2.095, 4.740
	Yes	48(25.94)	137(74.05)	185			
Liver enlarge	No	147(55.05)	120(44.95)	267	0.000	4.460	2.906, 6.947
	Yes	39(21.54)	142(78.46)	181			
Clean water availability	No	85(27.59)	223(72.41)	308	0.000	0.147	0.94, 0.230
	Yes	101(72.14)	39(27.86)	140			
Diarrhea	No	149(45.84)	176(54.16)	325	0.003	1.968	1.264, 3.064
	Yes	37(30.08)	86(69.91)	123			
Breast feeding	Partial	20(25.0)	60(75.0)	80	0.000	-	-
	Mix	23(21.69)	83(78.30)	106			
	Exclusive	143(79.0)	38(21.0)	181			
	Not at all	0(0.00)	81(100)	81			
Age (in months)	1-12	94(39.16)	146(60.84)	240	0.586	-	-
	13-24	58(42.96)	77(57.04)	135			
	25-36	21(50.0)	21(50.0)	42			
	37+	12(40.0)	18(60.0)	30			

Chi-Square test was used to test the significance of each risk factor with the PCM, while logistic regression was utilized to obtain the best fitted model for males and females separately and then collectively through SPSS. The odds ratio and 95% C.I was also calculated and $p<$ 0.05 was used for significance.

All children admitted with low weight or height during the study period were selected in the initial phase, later only those fitting the definition of PCM were included in the final analysis.

Results

A total of 448 children were included in the study out of which 262 had PCM. Table-1 shows that out of 248 female children, 139 (56%) had PCM disease, while out of 200 male children, 123 (61.5%) had PCM disease, but there was no significant association between gender and PCM.

Majority of children having PCM belonged to poor families ($p<$ 0.0001, odd ratio 47.985). Environmental sanitation also showed a strong association with PCM, as majority of the PCM children had poor environmental sanitation. Similarly, the non-availability of clean drinking water and occurrence of diarrhea both showed direct association with PCM while childhood immunization had an indirect effect on PCM because those who were vaccinated were less likely to suffer from PCM ($p<$ 0.000). Breast feeding was an important factor for the prevention of early PCM disease (Table-1).

PCM was most common in children less than one year of age and as the age advanced, PCM frequency went down (Table-1). On physical examination, hair, skin changes and liver enlargement were also noted in children having PCM and all showed significant association with PCM (Table-1).

Table-2 shows that gender, economic, number of living children, environmental sanitation, immunization and skin changes, were the significant risk factors in male children while in females the main risk factors include economic status, weight, height, number of living children, environmental sanitation, immunization, hair changes, time to time monitoring, and clean water availability.

Similarly the risk factor for both genders were economic status, weight, height, number of living children, environmental sanitation, immunization, hair changes, time to time monitoring and clean water availability. Hypothermia did not have a significant association with PCM.

Table 2: Estimates of risk factors among gender.

	5th step	*B*	*S.E.*	*Wald*	*Df*	*Sig.*	*Exp(B)*	*95% C.I for OR*	
								Lower	*Upper*
Male	Economic status	-4.390	1.387	10.017	1	0.002	0.012	0.001	0.188
	No of living children	7.708	2.609	8.730	1	0.003	2.225E3	13.395	3.697E5
	Environmental sanitation	-3.074	.836	13.526	1	0.000	0.046	0.009	0.238
	Immunization	-4.272	1.653	6.677	1	0.010	0.014	0.001	0.356
	Skin changes	5.345	1.991	7.204	1	0.007	209.619	4.230	1.039 E4
	Constant	14.383	5.504	6.829	1	0.009	1.763E6	-	-
								95% C.I for Exp(B)	
								Lower	*Upper*
Female	Economic status	-3.899	1.230	10.055	1	.002	.020	.002	.226
	Weight	-2.237	.762	8.619	1	.003	.107	.024	.475
	Height	4.637	1.765	6.904	1	.009	103.183	3.248	3.278E3
	No. of living children	8.737	2.504	12.178	1	.000	6.232E3	46.072	8.429E5
	Environmental sanitation	-2.143	.744	8.295	1	.004	.117	.027	.504
	Immunization	-2.277	.957	5.658	1	.017	.103	.016	.670
	Hair changes	3.993	1.650	5.856	1	.016	54.206	2.136	1.376E3
	Time to time monitoring	8.316	2.829	8.642	1	.003	4.087E3	15.980	1.045E6
	Clean water availability	-4.223	1.543	7.495	1	.006	.015	.001	.301
	Constant	7.810	3.650	4.577	1	.032	2.464E3	-	-
Both	Economic status	-2.877	.563	26.158	1	.000	.056	.019	.170
	Weight	-1.234	.304	16.440	1	.000	.291	.160	.529
	Height	2.258	.762	8.796	1	.003	9.569	2.151	42.565
	No. of living children	6.424	1.26	26.26	1	.000	616.605	52.820	7.198E3
	Environmental sanitation	-1.631	.324	25.294	1	.000	.196	.104	.370
	Immunization	-1.860	.552	11.356	1	.001	.156	.053	.459
	Hair changes	2.783	.849	10.749	1	.001	16.172	3.063	85.388
	Time to time monitoring	4.091	1.05	15.123	1	.000	59.774	7.606	469.763
	Clean water availability	-3.721	.912	16.648	1	.000	.024	.004	.145
	Hypothermia	1.439	.761	3.573	1	.059	4.216	.948	18.742
	Constant	7.158	2.29	9.756	1	.002	1.284E3	-	-

Discussion

The present study of risk factors for PCM showed that economic status, weight, height, number of living children, environmental sanitation, immunization, hair changes, time to time monitoring and clean water availability were significantly associated with PCM disease. Significant association of economic status with protein calorie malnutrition has also been reported by other worker.[16] PCM was less common in families where number of children is 1-3, as compared to the families with 4 to 5 children. This finding was also in agreement with other worker,[17] who described that more than three children is a risk factor for diarrhea and malnutrition.Other workers have also reported high incidence of PCM (Marasmus) in less than one year of age.[18]

Risk factors which did not have significant association with the PCM disease were gender, area and age of the patients.

Conflict of interest: None declared.

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