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Prevalence of Malnutrition among Patients on admission to a pediatric hospital.

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Abstract

At the time of admission to the pediatric hospital of Cairo University 150 Children whose ager anged form birth to 12 years; 106 males and 44 females complaining of acute or chronic medical illness, were examined to assess their nutrition status.The aim was to know the extent of malnutrition problem among them. Their weight and length/ height were obtained as well as blood hemoglobin, serum albumin and total lymphocyte count. Most of the patients were coming from families of low socio economic class. The study revealed high prevalence of malnutrition and anemia together with low blood lymphocytic count. This may have predisposed to their medical illness. Hence, it is recommended to supply proper nutrition care to help limiting the period of hospital stay.

Introduction

Malnutrition is one of the leading causes of morbidity and mortality in childhood. It may result from improper or inadequate food intake or may result from inadequate absorption of food. Requirements of essential nutrients may be increased during stress and disease and the administration of antibiotics or of catabolic or anabolic drugs. The diagnosis of malnutrition rests on accurate dietary history and on evaluation of present deviations from average anthropometric measurements. Deficiencies of some nutrients may also be revealed by specific laboratory investigations.

Malnutrition usually involves deficits of more than a single nutrient. Immunologic insufficiency is common consequence of chronic malnutrition and can by demonstrated by total lymphocyte counts ***(Karp, 1993).*** The limited amount of documented information relating to nutrition at outpatient visits and on admission to hospital highlights the continued problem of lack of awareness of nutrition. Awareness of the importance of nutritional status by general practitioners

may afford interventions at an earlier stage and help in monitoring the efficacy of intervention ***(Bistarian et al 1976).***

The aim of the study was to identify the major medical problems of children on admissions to the hospital and to test for evidence of any accompanying malnutrition.

Patient and Methods:

150 patients; 106 males and 44 females whose age ranged from birth to 12 years were admitted over a period of four months to Cairo University Children's hospital. On admission children were subjected to full history and clinical examination to diagnose the medical condition. All children were subjected to anthropometric measurements.

The full history taking included beside personal data, informations about socio economic status; this covered education and occupation of parents and household assets. Collected information were coded and classified into low, middle & high socio economic classes, Also dietary history of the children were collected from the mothers which included feeding and weaning of infants.

Nutritional deficiency signs were examined according to ***Mclaren et al (1991).*** heights / Lengths, and weights were measured according to ***Jelliffe (1966).*** Laboratory tests to determine complete bood picture and serum albumin were done before any medical intervention.

Results:

79 children out of the 150 were below 2 years and constitute 52.7% and 47.3 % were above 2 years. The majority of cases (109) belong to families from low socio-economic class (72.7%) and only 2% were of high socio-economic class.

Table 1 shows type for feeding of infants below 6 months where 60% were breast fed, 11.5% were bottle fed and 28.7% were breast & bottle fed.

Table 2 demonstrates the distribution of patients 6-12 months (28 cases) according to type food eaten. The table shows that children were given either breast, bottle or both, beside the weaning foods which is mostly cereals and of plant origin.

Table 3&4 show the distribution of children (1-2 years and 2-12 years) respectively who consume different types of foods. Those who consume milk frequently or infrequently exceeded 70%. The consumption of animal protein other than milk decreased in the age group 1-2 years

11.7%, to increase in the elder group 21.4%. However those who consume eggs in the age group 1-2 years show little increase (29.3%) and high increase in the elder group (45.7%).

Table 5 shows the prevalence of positive malnutrition signs among admitted children. It varied from high prevalence; teeth caries 39.3%, lack of hair lustre 38.7% skin xerosis 32.7%, spine deformity 26% rickets 25.3% edema of limbs 16.7%; to low prevalence; face edema 2.7% and nail spooning 2.6%.

Table 6 shows the prevalence of undernutrition by percentiles of weight for age and length or Height for age using the National Center of Health Statistics (NCHS) ***(Hamill 1979).*** 58% of patients were below the 5th percentile of weight for age and none were above the 95th percentile. It also shows that 72.2% of children < 2 years had severe or mild undernutrition compared with 83% of children 2-12 years.The prevalence of severe stunting (chronic undernutrition) was 68.7% and mild type was 20%. Severe stunting is higher above 2 years of age compared with less than 2 years.

Table 7 shows the prevalence of acute PEM based on ***Waterlow (1974)*** (weight for height). The heighest prevalence of acute PEM (all degrees) fell in the age group 2-4 years (35.1%), followed by age less than 2 years (22.8%). Severe malnutrition is higher among children less than 2 years 3.8% and no severe cases above 4 years. However, no acute PEM is recorded in the age group 6-8 years.

Table 8 shows the prevalence of chronic PEM based on waterlow ***criteria (1972)*** (height for age). Among the total cases 21.3% had severe stunting while the moderate and mild were 15.3% and 45.3% respectively. The highest percent of stunting was in the age group 8-12 years (100%) followed by age group 4-6 years (94.4%) Severe wasting is more prevalent among the younger two age groups.

Table 9&10 show the prevalence of acute and chronic PEM respectively in different acute diseases. Neonatal sepsis had the highest prevalence of acute PEM 44.4%, followed by pneumonia cases (34.9%) Neonatal jaundice, neonatal convulsions and Guillain Barre case did not show signs of acute PEM All cases of meningitis had mild chronic PEM, followed by pneumonia. 85% had all degrees of chronic PEM, then neonatal sepsis.

Table 11&12 show the prevalence of acute and chronic PEM respectively in different chronic diseases. Cystic fibrosis had the highest prevalence of acute PEM followed by chronic

gastroenteritis . All cases of cystic fibrosis, cerebral palsy, rheumatic heart disease and thalassemia major had chronic PEM, while in chronic gastroenteritis 96.2% had chronic PEM.

Table 13 shows the overall percentage of anemia among children was 50.6 However anemia is more prevalent among children below 6 years (56%), while it was 5.5% among those over 6 years. Those who had very low serum albumin 2.5gm% constitute 23.4% and only 21.4% had serum albumin above 3.5 gm %.

Table 14 shows the frequency and percent distribution of patients according to total lymphocyte count.Those who have count less than 500 cell/ mm^3 were 34 patients (22.6%), 25 patients (16.6%) had lymphocytes count between 500-1000 cells/ mm^3. Another 50 children 33.3% had count between 1000-1500 and 41 Patients 27.5% had level above 1500 cells/mm^3.

Discussion:

Nutrition is fundamental to optimal rate of growth and development. The nutritional status of an individual has been shown to have important effects on health in recovery from illness or injury ***(Mc Whirter and Pennington 1994).***

We identified the prevalence of malnutrition on admission to hospital in patients with a wide variety of disease states as judged by anthropometric and laboratory data.

Of one hundred and fifty patients admitted to the general medical wards of Cairo University Children's Hospital over a period of 4 months (106 males and 44 females, ages ranging from birth to 12 years), the majority of admission 60% were for chronic conditions and 40% were for acute conditions.

Concerning weight for age; in our study 58% of patient were below the 5^{th} percentile, much higher than that of ***Kristy et al (1995)*** who found that only 16% of their patients were below the 5^{th} percentile None of our patient were above 95^{th} percentile compared with 7% in Kristy et al study according to the growth charts of the National Center of Health statistics ***(NCHS)*** Similar trend was found in respect to height where 78.7% of our patients fell below the 5^{th} percentile and none above 95^{th} percentile compared to 23% and 6% respectively among ***Kristy et al study (1995).***The same authors demonstrated approximately the same prevalence of acute PEM as we did in our study, however, the moderate and severe degrees of malnutrition were higher in our study.

Merritt and ***Suskind (1979)*** found in their study that nearly half of their hospitalized pediatric patients (47%) had chronic malnutrition which is less than what we noted in our study. We noticed

that the prevalence of acute PEM in acute diseases was 23.3% and chronic PEM was present in 66.7% of cases. While prevalence of acute PEM in chronic diseases was 24.4% and chronic PEM was present in 92.2%. There was no much difference in prevalence of acute PEM in acute and chronic diseases admitted but there is greater difference in prevalence of chronic PEM in chronic diseases.

The study conducted in Ghana by ***Conmey et al (1985)*** demonstrated that 67% of their patients were malnourished, classified into 54.3% having first degree, 32.3% and 13.4% had 2nd and third degrees malnutrition. These cases were closely related to high incidence of malnutrition associated illness: diarrhea (74%) measles (51%) and intestinal parasites (54%).

The majority of our patients came from low socio- economic class (72.7%) and none of them complains of being malnourished. ***Commeys et al (1985)*** also stated that the majority of their patients came from low socio- economic households and mostly illiterate mothers. This illustrates that poor families are liable to have malnourished children that make them more susceptible to general medical diseases.

Prevalence of anemia (Hb<10g%) in 50.6% of our patients also supports our assumption. This figure is higher than that reported by ***Kristy et al (1995).*** Serum albumin values below 3.5gm% were present in little more than half of cases reported by Kristy et al. while in our cases 76% had serum albumin less than 3.5gm%. ***Whitehead et al (1973)*** regarded serum albumin as a good indicator of the pathophysiological changes noted with severe protein malnutrition. ***Bistarian et al (1976)*** demonstrated significant relationship between malnutrition as judged by arm circumference and serum albumin. However, serum albumin level falls in response to infections or other stresses that trigger an acute phase response and therefore may not represent nutritional status perse. For instance, children having cancer may have low serum albumin levels that correlate more with fever than with decreased energy or protein dietary intake ***(Merritt et al 1980)*** Nonethless, hypolbuminemia is clearly an excellent marker for metabolic stress and multiple studies have correlated low serum albumin levels with mortality ***(Phillips et al, 1989)*** and length of stay ***(Herrman et al, 1992).***

Our results demonstrated that 72.5% of the children had total lymphocytes less than 1500/mm^3 . This was higher than that reported by ***Kristy et al (1995)*** and Merritt and ***Suskind (1979).*** One of the most important consequences of nutritional depletion is depression of host resistance, especially cell mediated immunity ***(Keusch 1990)*** Immune competence is dependent

both on lymphocyte number and function. ***Cunningham- Rundles and Cervia (1997)*** have demonstrated the relationship between nutritional depletion and depressed immune function.

In conclusion we recognize from this study that prevalence of malnutrition in pediatric patients was high whether admitted for acute or chronic medical sickness. This denotes that growth failure may be attributed to malnutrition rather than disease. Hence, appropriate nutritional support of high risk hospitalized patients may be expected to improve their subsequent hospital course.

Table (1): Type of feeding and percent of infants <6 months using it (n=35 cases).

	Breast	Bottle	Breast & Bottle	Total
Frequency	21	4	10	35
Percent	60%	11.5%	28.5%	100%

Table (2): Types of food eaten & percent of infants (6-12 months) using it (n= 28 cases).

Breast or Bottle milk			Animal Protein sources			Plant Protein sources					Vegetables & Fruits				
Breast	Bottle	Breast&	Meator	Eggs		Cereals		Legumes	Mixed	None	Vegetable	Fruits	Mixed	None	Total
			Yes	No	Yes	No	Yes								
14	6	8	6	22	8	20	3	5	4	16	5	5	8	10	28
50%	21.4%	28.5%	21.4%	78.6%	28.5%	71.5%	10.7%	17.8%	14.2%	57.1%	17.8%	17.8%	28.5%	35.7%	100 %

Table (3): Types of food eaten & percent of Children (1-2 years) using it (n= 17 cases).

Milk			AnimalProtein sources				Plant Protein sources				Vegetables & Fruits				
Frequentl y	Infrequent	None	Meator fish		Eggs		Cereals	Legumes	Mixed	None	Vegetable	Fruits	Mixed	None	Total
			Yes	No	Yes	No									
4	9	4	2	15	5	12	1	8	6	2	8	3	2	4	17
23.5%	53%	23.5%	11.7%	88.2%	29.3%	70.6%	5.8%	47.3%	35.2%	11.7%	47.3%	17.6%	11.7%	23.4%	100%

Table (4):Types of food eaten & percent of Children (2-12 years) using it (n= 70 cases).

Milk			Animal Protein sources				Plant Protein sources				Vegetables & Fruits				
Frequently	Infrequently	None	Meat or fish		Eggs		Cereals	Legumes	Mixed	None	Vegetables	Fruits	Mixed	None	Total
			Yes	No	Yes	No									
14	36	20	15	55	32	38	5	15	22	28	15	6	18	31	17
20%	51.5 %	28.5 %	21.4 %	78.6 %	45.7 %	54.3 %	7.2 %	21.5 %	31.3 %	40%	21.5 %	8.5 %	25.7 %	44.3 %	100 %

Table (5): Prevalence of positive malnutrition signs (total 150 Cases).

Sign		No.	%
Hair:	lack of lustre	58	38.7
	Thinness & sparseness	12	8.0
	Easy pluckability	13	8.7
Face:	wasting	36	24.0
	edema	4	2.7
	Parotid enlagement	12	8.0
	Lips angular stomatitis	18	12.0
	cheilosis	19	12.7
Tongue glossitis		18	12.0
Teeth caries		59	39.3
Skin Xeroris		49	32.7
Dermatitis		20	13.3
Nails spooning		4	2.6
Blepharitis		57	38.0
Spine deformity		39	26.0
Rachitic signs		38	25.3
Edema of limbs		25	16.7

Table (6): Prevalence of underweight for age and prevalence of stunting using percentiles (total 150 Cases).

Weight for age							
Status of malnutrition	<2 Y (N 79)		2-12 Y (N 71)		% of total (N150)		
	N	%	N	%	N	%	
<5th severe	45	56.9	42	59.1	87	58	
6th – 24th mild	12	15.3	17	23.9	29	19.3	
25th – 94th None	22	22.8	12	17	34	22.7	
	Length for age		Ht for age		% of total		
	N	%	N	%	N	%	
<5th severe	53	67.0	50	70.4	103	68.7	
6th – 24th mild	14	17.7	16	22.5	30	20.0	
25th – 94th None	12	15.3	5	7.1	17	11.7	

Table (7): Prevalence of acute PEM based on Waterlow (weight for height).

Variable		Acute PEM (wasting) Percent of the median				
Age years	Number & % of malnutrition	Severe <70	Moderate 70-80	Mild 81-90	None >90	Total
<2	Number	3	8	7	61	79
	%	3.8%	10.1%	8.9%	77.2%	100%
2-4	Number	1	4	8	24	37
	%	2.7%	10.8%	21.6%	64.9%	100%
4-6	Number	0	1	3	14	18
	%		5.6%	16.7%	77.8%	100%
6-8	Number	0	0	0	5	5
	%				100%	100%
8-12	Number	0	0	1	10	11
	%			9.1%	90.9%	100%
Total	Number	4	13	19	114	150
	%	2.7%	8.7%	12.7%	76%	100%

Table (8): Prevalence of chronic PEM based on Waterlow (height for age).

Variable		Chronic PEM (stunting) Percent of the median				
Age years	Number &% of malnutrition	Severe <85	Moderate 85-89	Mild 90-95	None >95	Total
<2	Number	17	18	24	20	79
	%	21.5%	22.8%	30.4%	25.3%	100%
2-4	Number	14	2.7%	18	4	37
	%	37.8%	4.3%	48.6%	10.8%	100%
4-6	Number	1	1	15	1	18
	%	5.6%	5.6%	83.3%	5.6%	100%
6-8	Number	0	1	2	2	5
	%		20%	40%	40%	100%
8-12	Number	0	2	9	0	11
	%		18.2%	81.8%		100%
Total	Number	32	23	68	27	150
	%	21.3%	15.3%	45.3%	18%	100%

Table (9): Prevalence of acute PEM in different acute diseases.

Diseases	Severe <70	Moderate 70-80	Mild 81-90	None >90	Total
Acute GE	0	1 7.1%	3 21.4%	10 71.4%	14 23.3%
Guillain Barre	0	0	0	1 100%	1 1.6%
Meningitis	0	0	1 25%	3 75%	4 6.6%
Neonatal Jaundice	0	0	0	5 100%	5 8.3%
Neonatal Convulsion	0	0	0	7 100%	7 11.6%
Neonatal sepsis	1 11.1%	3 33.3%	0	5 55.6%	9 15.3%
Pneumonia	0	1 5%	4 29.9%	15 75%	20 33.3%
Total	1 1.6%	5 8.4%	8 13.3%	46 76.7%	60 100%

Table (10): Prevalence of chronic PEM in different acute diseases.

Diseases	Severe <85	Moderate 85-89	Mild 90-95	None >95	Total
Acute GE	1 7.1%	1 7.1%	6 42.9%	6 42.9%	14 23.3%
Guillain Barre	0	0	0	1 100%	1 1.6%
Meningitis	0	0	4 100%	0	4 6.6%
Neonatal Jaundice	0	0	2 40%	3 60%	5 8.3%
Neonatal Convulsion	0	3 42.9%	0	4 57.1%	7 11.6%
Neonatal sepsis	1 11.1%	0	5 55.6%	3 33.3%	9 15.3%
Pneumonia	2 10%	2 10%	13 65%	3 15%	20 33.3%
Total	4 6.6%	6 10%	30 50%	20 33.3%	60 100%

Table (11): Prevalence of acute PEM in different chronic diseases.

Diseases	Severe <70	Moderate 70-80	Mild 81-90	None >90	Total
Chronic GE	3 11.5%	3 11.5%	1 3.8%	19 73.2%	26 28.8%
Cystic fibrosis	0	5 71.4%	2 28.6%	0	7 7.7%
Congenital H.D	0	0	5 23.8%	16 67.2%	21 23.8%
Cerebral palsy	0	0	0	4 100%	4 4.4%
Renal failure	0	0	2 16.7%	10 83.3%	12 13.33%
Rh.H.D	0	0	1 12.5	7 87.5%	8 8.8%
Sickle cell anaemia	0	0	0	7 100%	7 7.7%
Thalassemia major	0	0	0	5 100%	5 5.5%
Total	3 3.33%	8 8.9%	11 12.22%	68 75.6%	90 100%

Table (12): Prevalence of chronic PEM in different chronic diseases.

Diseases	Severe <85	Moderate 85-89	Mild 90-95	None> 95	Total
Chronic GE	19 73.2%	5 19.2%	1 3.8%	1 3.8%	26 28.8%
Cystic fibrosis	0	2 28.6%	5 71.4%	0	7 7.7%
Congenital H.D	8 38.1%	7 33.3%	5 23.8%	1 4.8%	21 23.8%
Cerebral Palsy	0	0	4 100%	0	4 4.4%
Renal failure	1 8.3%	2 16.7%	6 50%	3 25%	12 13.3%
Rh- HD	0	1 12.5%	7 87.5%	0	8 8.8%
Sickle cell anemia	0	0	5 71.4%	2 28.6%	7 7.7%
Thalassemia major	0	0	5 100%	0	5 5.5%
Total	28 31.1%	17 18.9%	38 42.2%	7 7.8%	90 100%

Table (13): Frequency And Percent Distribution Of Patients According To Hemoglobin And Serum Albumin Levels (N=150).

Variable	No.	%
Hemoglobin g %		
<10g	84	50.6
>10g	66	44.0
Serum albumin g %		
<2.5	35	23.4
2.5-3	34	22.6
3-3.5	49	32.6
>3.5	32	21.4

Table (14): frequency and percent distribution of patients according total lymphocyte count.

Total lymphocyte count Cells/ mm^3	No.	%
<500	34	22.6
500-1000	25	16.6
1000-1500	50	33.3
>1500	41	27.5

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معدل إنتشار سوء التغذية لدى الاطفال عند دخولهم للعلاج بمستشفى الاطفال.

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الملخص العربي

الهدف من الدراسة هو التعرف على المشكلات الطبية الكبرى وتقييم حدوث سوء التغذية المصاحب لحالات الدخول في مستشفى الاطفال.

تم فحص ١٥٠ طفل بين حديثى الولاده إلى عمر ١٢ سنه منهم ١٠٦ ذكور ، ٤٤ إناث عند دخولهم مستشفى الاطفال لجامعة القاهرة للعلاج من أمراض حادة أو أمراض مزمنة وذلك لمعرفة مدى اصابتهم بامراض سوء التغذية فى وجود الشكوى المرضية المصاب بها الاطفال والتى اقتضت دخولهم المستشفى . وتم فحص اوزان الاطفال واطوالهم وكذلك تقدير معدل الهيموجلوبين ونسبة بروتين الالبومين فى السيرم وكذلك عدد الكرات البيضاء الليمفاوية فى الدم . وايجاد العلاقة بين هذه المتغيرات وحالتهم المرضية ، وكان اغلب الاطفال من مستوى اجتماعى منخفض . وتبين من الدراسة انتشار سوء التغذية والانيميا لدى الاطفال مما يوحى بانها عامل مهم في حدوث الحالة المرضية وهذا يستوجب مراعاة الاطفال تغذويا الرعاية المناسبة حتى تقل فترة التنويم بالمستشفى.