INCIDENCE OF PNEUMOCYSTIS CARINII IN PROTEIN ENERGY MALNUTRITION (PEM)

ESSAY

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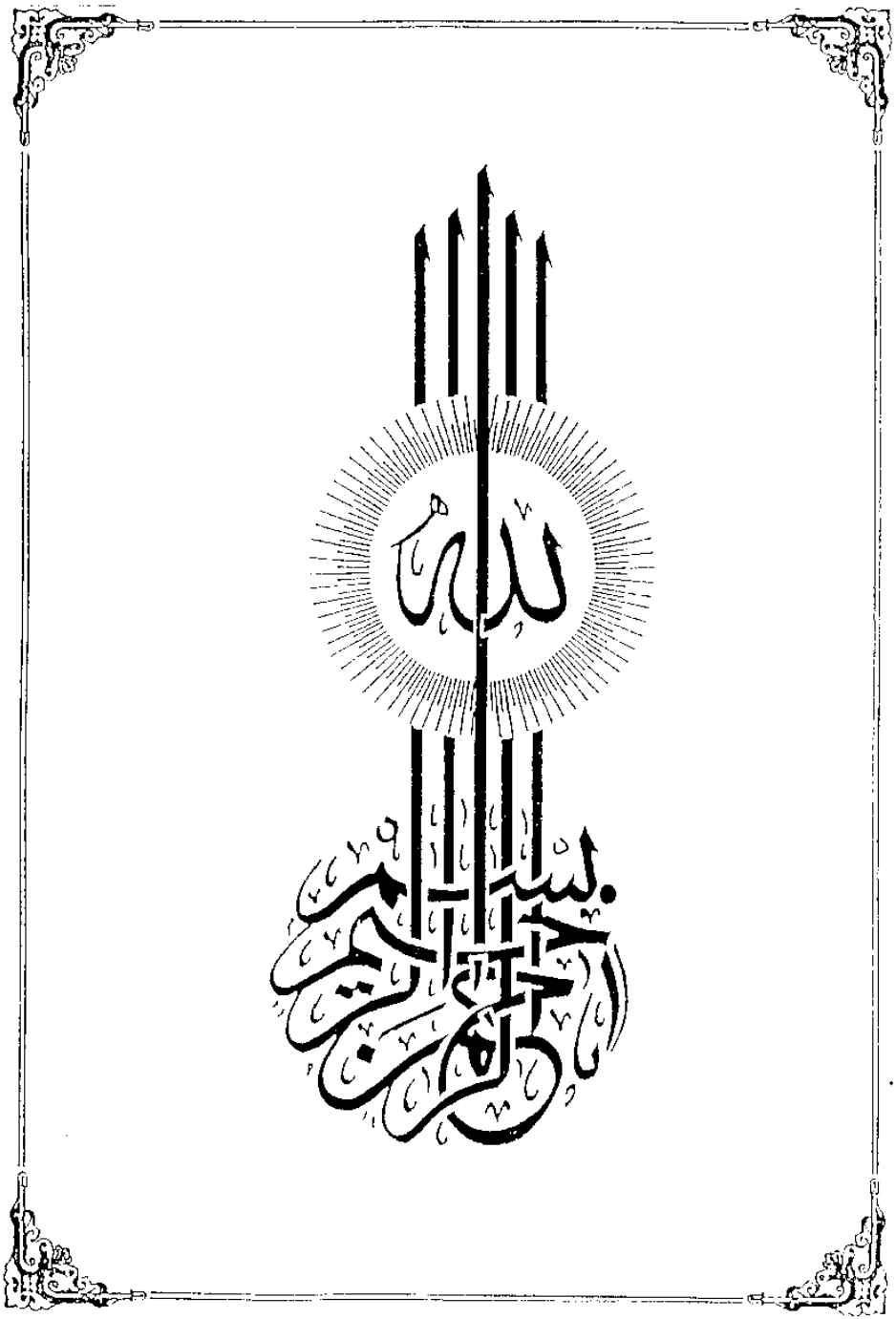

INTRODUCTION AND AIM OF THE STUDY

Malnutrition, impaired immunity and infection can become an inextricable triad, each of which can exacerbate the others (Turk et al., 1983).

The interaction between malnutrition and infection may be either synergistic or antagonistic. A synergistic response is very common in cases of protein-energy malnutrition where the nutritional status becomes worse by the infection. However, also an antagonistic response had been observed mainly in laboratory animals in such a way that malnutrition inhibits or prevents growth or multiplication of the infectious agents, whereas in human there are some indications that antagonistic effects also might occur (Migasena, 1984).

Pneumocystis carinii is a protozoan-like organism recognized in recent years as a cause of fatal pneumonitis in organ transplant recipients, debilitated infants, individuals with cancer and individuals with congenital, acquired, or induced immune deficiency disorders (Hughes, 1984).

Hughes et al., (1974), decided that protein-energy malnutrition might play a role in P. carinii pneumonitis because malnutrition is associated with the various

predisposing factors which may affect host's resistance to infection.

Without treatment, Pneumocystis carinii carries a mortality rate of virtually 100 per cent. It can be prevented by chemoprophylaxis and the protection is afforded only as long as the drug is administered (Hughes, 1984).

The aim of this essay is to study the epidemiology of Pneumocystis carinii and deligneate its relation with protein - energy malnutrition and possible predisposing factors that pave the way for such infection to occur in protein - energy malnutrition.

PROTEIN ENERGY MALNUTRITION

(PEM)

Definition of PEM

Malnutrition, from a world wide perspective, is one of the leading causes of mortality and morbidity in childhood.

Milder degrees of deficiency result in growth retardation, while severe deficiencies cause the syndromes of nutritional marasmus and kwashiorkor. (Forfar and Arneil, 1984).

Definitions of severe PEM were those of the Wellcome Trust, using National Center for Health Statistics standards. Marasmus represents a relative change in body mass, less than or equal to 60% of expected weight for age without oedema or hypoalbuminemia. Kwashiorkor denotes a qualitative change of 60% to 80% of expected weight for age with oedema or low albumin level, whereas marasmic kwashiorkor has less than or equal to 60% of expected weight for age with oedema or hypoalbuminemia (Listernick et al., 1985).

HISTORICAL BACKGROUND

It is over 50years since Cicely Williams provided the first substantial description of kwashiorkor.

In 1933, while working in West Africa as medical officer to the Gold Coast, she reported that kwashiorkor was not uncommon in recently weaned infants. Since the disease developed shortly after a change from breast milk to maize gruels and responded to treatment with milk, one of the possible aetiological factors which she suggested was that "some amino acid or protein deficiency can not be excluded ".

In the late 1940_s and 1950_s, studies in animals and young children showed that the oedema of kwashiorkor was associated with low plasma albumin concentrations, and it was generally held that a causal relationship existed between diet and kwashiorkor where by a low protein intake led to hypoalbuminemia which in turn led to oedema (Ashworth, 1985).

Marasmus (Greek marasmos, wasting) was recognized for hundreds of years as being, with gastro-enteritis, a major contributor to high infant mortality.

Several studies have demonstrated that severe or prolonged PEM has a profound effect on host resistance to infection. Scrimshaw et al., (1968) reviewed the inter-relationships between malnutrition and diseases caused by a variety of pathogenic organisms, including bacteria, viruses, fungi, rickettsiae, protozoa, and helminths. However, the specific role of PEM in the provocation of P. carinii pneumonitis has not been previously described.

Although in 1913 Chagas has described the first human case of pneumocystosis in an autopsy of an adult, and the first definite association of pneumocystosis carinii with human disease was in 1942, P. carinii infestation has not been reported in kwashiorkor.

It may be related to the fact that the organism can not be identified by the standard hematoxylin-eosin stain used routinely for histologic examinations.

Hughes, et al., (1974), described the role of PEM in P. carinii pneumonitis when they noticed P. carinii infestation and pneumonitis in rats maintained on protein-free diets, with and without vitamin supplements, and the absence of the organism in animals under the same experimental conditions that were fed

a 23% protein diet, and by the use of methenamine silver nitrate impregnation, they identified P.carinii in three of 39 children who died with kwashiorkor.

Furthermore, Dutz (1970), observed that the incidence of P. carinii pneumonitis in European infants decreased with post- World War II economic recovery, which was associated with improved nutritional status of the population.

PREVALENCE

protein energy malnutrition is endemic in developing countries. Approximately 65% of the children under the age of 5 years in Central America have weight deficits for age that suggest PEM. (Listernick et al., 1985).

In Egypt, Shukry et al., (1972 a), found that the prevalence of malnutrition ranged between 61-71% in the age group 0-6 years and that the prevalence of severe forms (Kwashiorkor and nutritional marasmus) ranged from 1.3 - 15.4% with the highest prevalence between six months and three years of age (Table-1).

Several studies revealed that diarrhea is more common in undernourished than in normal children, and that the more severe the undernutrition, the more severe are the diarrheal episodes.

A study was carried out in 1980 in El-Ramleh paediatric hospitals in Alexandria by Bayoumi et al., 1983) to investigate the association between diarrheal diseases induced by bacterial or parasitic or mixed infections and the development of dehydration and nutritional status. The distribution of examined children by length for age and type of infection is

illustrated in Table (2).

In general, the prevalence of chronic undernutrition varied with the type of infection causing diarrhea. The results show that when parasites were the cause of diarrhea, 22.7% of the children were stunted and their length was less than 85% of the standard median.

This ratio increased to 30.9% for children infected with bacteria and was as high as 68.7% for children who have had mixed infections.

Table 1 : Prevalence of PEM and different age periods in a rural area.

Age Period	Males		Females	
	Severe PCM	Mild-Moderate	Severe PCM	Mild-Moderate
0 - 3	3.2%	19.4%	1.5%	23.1%
4 - 6	7.1%	33.4%	5.4%	37.9%
7 - 11	11.4%	56.6%	14.0%	62.7%
12 - 23	13.2%	64.9%	15.1%	65.7%
24 - 35	11.0%	61.1%	4.7%	69.1%
36 - 47	0.8%	46.6%	2.4%	56.4%
48 - 59	0.9%	37.2%	00.0%	59.8%

(Shukry et al., 1972 b)

Table 2: Distribution of examined children according to length for age and type of infection.

Type of infection	Chronic Undernutrition				Normal					
	85%		85-89%		90-94%		95+%		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Parasite	5	22.7	--	-	12	54.6	5	22.7	22	100
Bacteria	29	30.9	5	5.3	49	52.1	11	11.7	94	100
Mixed	46	68.6	5	7	11	16.4	5	7.5	67	100
Total	80	43.7	10	5.5	72	39.3	21	11.5	183	100

CLASSIFICATION OF PROTEIN-ENERGY MALNUTRITION

Gomez and his Colleagues (1956) introduced a method of classification based on weight for age, but its main drawback is that it assumes that all children of a certain age should have the same weight, irrespective of their size as measured by height for example.

Jelliffe (1966), modified this system by defining four groups at intervals of 10 per cent body weight deficit (Table 3).

Mc Laren, Pellett and Read (1967), introduced a simple scoring system for classifying the severe forms only. In this system, clinical signs such as oedema, dermatosis, oedema plus dermatosis, hair changes and hepatomegaly were combined with different serum albumin concentrations. No anthropometric measurements were used in this system except that an upper limit of 75% of expected weight for age was applied to patients with marasmus. The problem of expressing chronicity and stage of disease remains unsolved.

The Wellcome classification is based on the presence or absence of oedema and the deficit in body weight (Lancet, 1970).