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PROTEIN-ENERGY MALNUTRITION DURING THE FIRST FIVE YEARS OF LIFE

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ABSTRACT

One hundred child age 2month-5years who admitted to almansur children teaching hospital were suffering from protein energy malnutriton, analysis of the various aspects of P.E.M was done, ninty four percent of the cases were in the first and second year age group. Marasmus was more prevalant which formed 49% of the total number of the cases while under weight type of malnutrition produced 29%of the cases. Kwashirkor and marasmic kwashirkor was formed 22% of the cases which represent high percent in comparison to prevous studies. Bottle feeding was the major cause of P.E.M. in the first year age group while prolong breast feeding and mal weaning practices were the major causes in the second year age group. Gastroentritis was the major precipitating factor. 43% of the cases had incoplate vaccination course according to their age and 17%not vaccinated at all. There were no significant relation between birth order of children and increased incidence of P.E.M. but its more prevalant with family size of (10) member and above. Higher incidence of malnorished cases was found among mothers age group (21-30) years although no significant relation was found between maternal age and the incidence of malnutrition. Mothers occupation play no role in causation of P.E.M. of these cases. High percent of cases of malnutrition were found among children of mothers who were illiterate and with primary educational level. The weight and M.U.A.C were significantly affected by malnutrition,45% of cases their hight were affected wich indicate chronic state of malnutrition. And 36%of cases their head circumference were affected which indicat that malnutriton affect brain growth and later on mental development of those children.

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INTRODUCTION

Malnutrition is one of the major public health proplems among infants and preschool children. The word malnutrition implies that the problem is caused by an insufficient food supply, either in quantity or quality and that food alone will be effective in its cure or prevention (BOVA HLQUIST, 1972). P.E.M. is now generally reviewed abroad ecological problem which also function of generalized poverty, deficient social organization ,poor enviromental sanitation and ignorance of proper feeding and care of the child (Anderson, 1982). The high mortality rate among children from infectious diseases in developing countries is a reflection of the nutritional status of children in these countreis. The survivors of severe episodes of illness, at school age show signs of physical under development and appear to be withdrawn and uninterested in their enviroment. (Nichols, 1977).

Aim of the study

- To throw the light on various aspects of P.E.M. among Iraqi children flowing the economic sanction (age prevalence-aetiology- various clinical presentation)
- 2-to study the effect of malnutrition stats on various anthropometric parameters.

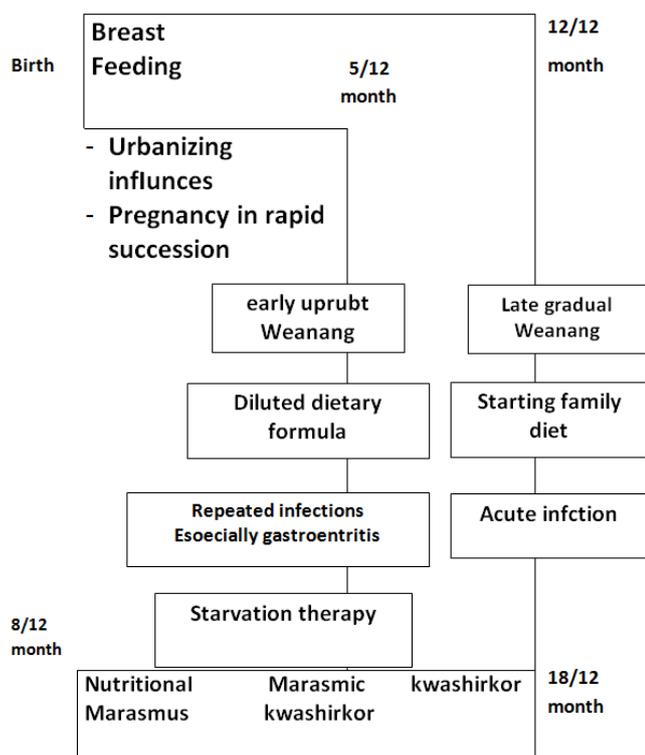
REVIEW OF LETREATURE

Aetiology: P.E.M. has an extremely complex and multifactorial aetiology in which the quality and quantity of food are only two of the involved element s, indeed, poverty with its other sanitary and psychological component is the fundamental cause of P.E.M. Infection and parental neglect are the main precipitating factors (ABDUL MONEN YOUNIS AL-DAGGAGH, 1993).

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Epidemiology: P.E.M. occurs characteristically in children under 5 years of age whenever the diet is poor in protein and energy. A child with typical marasmus usually under one year of age and more frequently in twos, whereas kwashiorkor is a disease of rural areas, usually occurs in children 1-3 years old. In parts of under developed countries between 1-5% of children have severe P.E.M. and up to 50% have moderate form of P.E.M. (ABDUL MONEN YOUNIS AL-DAGGAGH, 1993 and Graham, 1963).

Natural history: The sequence of events leading to P.E.M. has been elucidated from longitudinal studies, most of which were carried out in villages. The majority of normally born breast fed infants had normal growth rates until the age of 3 months. From the age of 6 months on these infants, rarely get more than 600 ml of breast milk /day (Jelliffe, 1968). Supplemental foods may not be provided at all or their nutritional value extremely poor, thus the reserve built up during the nutritionally optimal first 3 months are healthy drawn up and weight gain begins to lag behind growth standards (Waterlow, 1980). Once breast feeding has been ceased completely i.e during the 2nd year of life in most part of the world (Jelliffe, 1962), the rural children are at their greatest risk, in a critical metabolic equilibrium that can easily be destroyed by any sufficiently severe infection i.e gastroenteritis and respiratory diseases (Brown, 1982). In urban areas the risk to be abnormally born child start at the moment of birth, since the protection which could be affected by the mother's milk is often absent, diluted contaminated cow milk formula have been substituted for natural food. These children live in marginal or subclinical malnutrition and they are prone to show serious picture of severe malnutrition if they are exposed to infection like measles, gastroenteritis, pneumonia (Nichols, 1977). McLaren (1966) summarized the nutritional history in the diagram shown below:



Paths leading from early weaning to nutritional marasmus and from protracted breast feeding to kwashiorkor

Clinical features

Under weight child (mild-moderate malnutrition): In developing countries children start their extra maternal life under weight because of malnutrition even during foetal life. The difference in birth weight between the children of under privileged families and those of privileged families may amount to 10-15% or more (BOVA HLQUIST, 1972). Always the underlying cause of P.E.M. is a combination of dietary inadequacy and chronic or repeated acute infection so the majority of children who do not belong to the privileged families start to develop mild-moderate malnutrition. Ashort-stocky unharmonized and ill proportioned body are the late results of marginal malnutrition (Beaton, 1976), these children at higher risk of infection due to alteration in the immune system (Mortorele, 1980).

Severe malnutrition

Nutritional marasmus (inanition, infantile atrophy): Marasmus it is usually occur under one year of age in babies suffering from starvation diet with ensuing balanced malnutrition (protein /calorie) (Anderson, 1982). Marasmic infant looks as a little old man with apparently large head and huge eyes, wrinkled face and tiny body with gross wasting of muscle and subcutaneous tissue, marked stunting, hypothermia, Psychological changes, weakness are common features. Infant usually irritable and fretful, anorexia is less common in marasmus and the appetite as often good (Alleyne, 1977).

Kwashiorkor: Kwashiorkor means deposed child i.e the child no longer suckled, it may be evident from early infancy to about 5 years of age usually in the 2nd year of life (ABDUL MONEN YOUNIS AL-DAGGAGH, 1993). Usually the child presents with failure to thrive, oedema, apathy, anorexia and diarrhea, skin and hair changes. The general appearance may be that of typical "Sugar baby" with clubby features and bloated body (Ebrahim, 1983). Oedema fluid can represent 5-20% of body weight so that changes in the appearance of the child when the fluid is lost is striking. The characteristic dermatosis consist of areas of desquamation and areas of hypo and hyper pigmentation the skin first thickened as if varnished, this is then peels and appears like "flaky paints" leaving cracked or denuded areas of shallow ulceration. Many children with kwashiorkor regress in their physical development and may no longer be able to walk or crawl (Passmore, 1986). Child with kwashiorkor are apathetic or extremely irritable and miserable, marked improvement occurs on treatment (Ebrahim, 1983). The liver can generally be palpated and is firm and not tender (Beherman and Vaugman, 1987).

Marasmic kwashiorkor: Its an intermediate form of marasmus and kwashiorkor its very much commoner than kwashiorkor. The child is usually over one year of age, the condition is not so severe, but growth retardation is generally greater than kwashiorkor, indicating a more chronic form of the illness.

- Oedema tend to be in the lower parts of the limbs.
- Dermatitis may be present.

Pathology and pathphysiology of P.E.M.: Slowing and cessation of growth and maturation merge with advancing malnutrition into wasting and atrophy of tissues. Internal organs show wasting, particularly the thymolymphatic system,

spleen, heart, pancreas. Microscopically cells cease multiplying and shrink in size they appear regress to a simpler structure, columnar epithelium become cuboidal.

Digestive system

The mucosa of upper alimentary tract is atrophic in P.E.M. The intestinal villi become flattened broadened and coalesce resembling their appearance in sprue (Standfield, 1965). Basal gastric acidity as well as its response to histamine is reduced in PEM, this explains the easy infectability of the intestinal tract by enteropathogens and protozoa. All the pancreatic enzymes and the bile acids are decreased in the duodenal and upper jejunal contents (Schneider, 1974). The activity of intestinal enzymes mainly lactase are strikingly affected (Bowie, 1963). Liver in kwashiorkor: the most important changes that take place is fatty infiltration. The main biochemical factor leading to fatty liver appears to be the synthesis of apoproteins or very low density lipoproteins which act as a carrier of fat to and from the liver (Waterlow, 1971 and Trnswell, 1969).

Bone and parathyroid –calciferol system: There is loss of the mineral content of the bone up to 40% and reduction of the total bone mass, osteoporosis and delayed ossification. The delay in ossification is a very sensitive index of malnutrition and may be up to 33% or more at the centres of ossification.

The plasma concentrations of calcium-inorganic phosphate and alkaline phosphatase are low in PEM. Particularly in kwashiorkor and increased during recovery. Plasma concentration of 25 hydroxy cholecalciferol are significantly low in malnourished child (Raghuramula, 1982). Rickets may be associated with PEM it may show a low profile and has been called atrophic rickets (Aboul-Dahab, 1963). Typical florid rickets may develop during recovery.

Central nervous system: Nutritional deficiency if occur during the first few years of life affect the glial multiplication and myelination and in order to have permanent effect must act for a long time (Winnick, 1969).

Mental development: The most serious long term effects of PEM are those permanently affecting the intellectual function and learning capacity also those children had decreased ability and short term memory (Richard, 1976 and MALKA AHMED AL-SAATI, 1976). Chase and Mortin (1970) study revealed that the intelligence or (I Q) of children with greater than 4 months under nutrition were 30 points lower than control group (MALKA AHMED AL-SAATI, 1976).

Biochemical and metabolic disorders in PEM

Body water: in PEM is increased in total body water and an expansion in the extra cellular fluid space accounted for the most of the increased in total body water (Alleyne, 1977).

Minerals in PEM: Plasma osmolality is low in PEM, a very low plasma sodium is taken as ominous prognostic sign. Plasma concentration of potassium, magnesium and phosphate are variable but typically low.

Magnesium deficit is characteristic of severe PEM (Metcoff, 1960). Children with oedematous PEM are prone to metabolic alkalosis (Frenk, 1975). Serum zinc concentration is markedly reduced in kwashiorkor and the dermal and the mucosal lesion seen in kwashiorkor could be related to zinc deficiency

(Sandstend, 2014). Phosphate both inorganic and organic forms are markedly reduced in striated muscle (Trnswell, 1969), both increased with recovery.

Protein metabolism: The concentration of plasma albumin and pro-albumin transferrin, retinol binding globulin complex as well as other proteins are decreased in severe PEM (Waterlow, 1971 and Shetty, 1979). Plasma concentration of essential amino acids are low but those of some non essential amino acids may be higher than normal (Sanders, 1967). Hypoalbuminaemia may affect the metabolism of many drugs, depending on their biological properties (Narang, 1979).

Haematological Finding: Uncomplicated PEM is associated with normocytic slightly hypochromic red cells in the peripheral blood, (Alleyne, 1977), and mild to moderate reduction in hemoglobin level, which correlated with total plasma protein. Partial megaloblastic changes in bone marrow have tend to be ascribed to protein deficiency per se, as they resolve with milk protein. A decreased in RBC survival time has been described which may be related to folic acid deficiency. The platelet function and morphology are altered in severe PEM. Overt or latent purpura seen in 15-20% of cases is associated with severe septic, generalized intercurrent infection and its usually taken as an ominous prognostic sign (Dorantes, 1964).

Immunological function: PEM can be a cause of immunodeficiency, recent studies on the four major components of the immune system lead to the following conclusions: humoral responses appear to be little affected by malnutrition as their is normal number and proportions of B-lymphocyte their is normal or increased synthesis of alpha-globulins. All cases of PEM show thymic atrophy so T-cell function has been to be profoundly impaired. Phagocytosis by monocytes and neutrophils has been to be normal. Decreased complement component levels in PEM infants account for the increased susceptibility rate to bacterial infection (Robert Susking, 1979). There is a study demonstrate that the malnourished child responded adequately to attenuated measles vaccine (Robert Susking, 1976 and Ingenbleek, 1973).

Endocrine function

Endocrine pancreas: Severe bouts of hypoglycaemia are frequent in marasmus and kwashiorkor, as serum albumin concentration falls to abnormal low concentration, insulin concentration also do so, when nutritional recovery ensues insulin level rise but may remain subnormal for periods of up to 3 months (James, 1970).

Growth hormone: In kwashiorkor with gross hypoalbuminaemia, growth hormone concentration is elevated, frequently to levels found in adult acromegally (Pavra, 1997). Most cases of marasmus show normal growth hormone concentration.

Thyroid Hormone: Total and tri-iodo thyronine are reduced in PEM, also intestinal iodine malabsorption has been observed in PEM (Ingenbleek, 1973).

Corticosteroids: Blood cortisol concentration is usually increased in PEM mostly higher values are found in kwashiorkor than in marasmus (Alleyne, 1967). Plasma concentration of aldosterone are generally high in kwashiorkor

(51). Corticosteroid binding globulin are decreased implying an excess of free cortisol and aldosteron.

Catecholamines: Dopamin excretion in urine is decreased in PEM, while epinephrine excretion increased (Hoeldke, 1973). Plasma serotonin is raised in kwashirkor with steatorrhea and normal in others (Teotia, 1975).

Principles of treatment: The principles of treatment are the use of therapeutic diets high in energy and proteins, the careful attention to the correction of fluid and electrolyte imbalance and the control of infections which frequently accompany PEM. Energy rather than protein becomes of the main determinant of catch up growth rates providing for this high energy requirements is the main practical problem (Goplan, 1973). In marasmus child are fed 150-200 kcal/kg/day from the start but in children with kwashirkor are given only 100kcal/kg/day until oedema has been disappeared, as higher intake was found to increase the incidence of heart failure early in recovery (Mdaren, 1966). It is necessary to divided the daily requirement in to six or more equal amounta, these feeds spread around the clock to reduce the incidence of hypoglycaemia and is an important means of preventing hypothermia. Regarding protein requirement, arelatively small incearase over normal protein requirement its sufficient for rapid catch upgrowth provided energy intake is high. Optimal seum albumine regeneration requires an intake of 3.3gm/kg/day of protein, in kwashirkor milk is the most frequent source of protein used in therapeutic but other sources like vegetable protein mixtures have been used successfully (Beaton, 1982). Because intracellular potassim depletion is common in PEM, there for 4-5 mEq /kg/day of potassium should be given. Magnesium has been given as routine 2-3 mEq /kg/day this will inhanced the catch up growth rates. Iron deficiency anaemia is common finding in PEM, Ferrous sulphate 150 mg of elemental iron/day individed doses with it give vitamin C to inhance iron absorption. Vitamines demand increase during recovery for this reaseon multivitamin mix advisable as part of the daily routine. A justification exist for giving antibiotic to all malnourished children on the ground that infection is an almost universale complication (Alleyne, 1977).

Method of monitoring recovery

- Child should be weight daily during recovery and their weight graphically recorded.
- Weekly estimation of serum albumin concentration will indicate the progress of albumin regeneration , an important indicators that biochemical normality is being restarted.

MATERIALS AND METHODS

The study was carried out in AL-MANSUR CHILDREN TEACHING HOSPITAL, on one hundard child who were admitted to the hospital (A aron E. Ifekweeniqwe, 1984) patients were males and (45) females. Their ages rang between (2 month -5 years). THE study was carried out in the period between 17th november 1993- 27th march 1994. Criteria for selection of cases:

- The weight for age was used to select the cases this is becaues the weight for age is good indicator for acute and /or chronic malnutrition, besides the age of cases

easily obtained from all the cases. Because the third centil represent the lower limit of normal weight for age, all the cases chosen were fall below the third centil on the tanner chart of weight /age.

- Only pure nutritional cases were included in the study, cases of malnutrition secondary to other diseases like coeliac disease, congngital diseases, metabolic disaeses, extra, were excluded from the study.
- Wellcome method of classification was used to classify the cases (Elvira, 1992).

The normal or expected weight for age was taken as the 50th percentil of the Bosten standards. To adapt data derived from well nourished population in industrilized countries for ues in developig countries, classification of nutritional status has been shown in terms of percentages of the median are calculated by first identifying the median value for the reference population, this median value is called 100 percent, second absolute values at different percentage unit from median are calculated. The growth chart which is used in welcome method of calssification is Bosten, and because the difference among Bosten and Tanner growth chart are minor. Tanner chart was uesd in this study, for classifying cases of malnutrition. Four clinical types of malnutrition was obtained. Those cases with weight for age less than 60% of the median without oedema called marasmus, and those twith oedema called marasmic -kwashirkor. The cases which their weight forage between 60-80% of the median without oedema called under weight and with oedema called kwashirkor.

In every single case adetailed history was taken: age, sex, residence, birth order presenting symptom, feeding history, immunization history, mother age educational level and occupation, family size and income.

Full physical examination was done including the anthropometric measaurments:

- The weight was measured by scale, weight were conveniently recorded to the last completed 10 grams each time the insturment was checked and caliberated before use it.
- The supine length measured by using unstretchable tape measure in child up to 2 years old and in the child more than 2 years who unwilling to cooperat. The standing height was measerd by using stadiometer.
- The mid upper arm circumference was measured by unstretchable tape measure in the midpoint between the acromion process of the scapula and the olecranon process of the ulna.
- Head circumference was measuerd by tape measure pass between the most promenant part of the occipit and the area just above the orbital ridge. Follow up of the cases throughout the period of admission and investigation was also carried out.

RESULTS

Of the total number of cases (100 case) 66%were in the first year of age. 94% were in the first and second year of age. Peak incidence found during the first year was in the age group 3.1-6 months which formed 29% of the cases. 2nd peak incidence found in the second year age group which formed 28% of the

cases, then the number of cases decline with age. 3% of cases found in 24,1-36 month age group. Few cases were found in the fourth and fifth year so they grouped together in analysis of the results, which was formed 3% of the cases. Distribution of cases in relation to age shown in Fig.1. Of the total number of cases 55% were males and 45% were female. In the age group 12.1 -36 month female were formed 18% of the cases while male were formed 13% of the total number of cases in this age group PEM more in female than male. Table 1 shows the age and sex distribution of cases.

The classification of the total number of cases according to welcome classification shows four clinical types of PEM

- Marasmus formed 49%of the cases, 65.3% (32 case) of them were from urban arease.
- **Under weight:** formed 29% of the cases 28.6% (17 case) of them were from urban areas.
- kwashirkor formed 13% of the cases 76.9 % (10cases) were from urban areas.
- Marasmic –Kwashirkor formed 9% of the cases, 77.7% (7 case) were from urban areas. Table 2 shows the clinical types of the cases of PEM and the distribution according to the residence.
- Of the total number of cases gastroentritis with varous degree of dehydration was the reason for admission in 46%of the cases.19% of the cases were admitted because of oedema, either localized to the feet, legs, hands, or generalized one. 18% of the cases were admitted because of chest infection, 11% because of urinary tract infection and 4% with C,N,S infection Fig. 2 shows percentage of cases in relation to the reason for admission

Feeding history: in the first year age group which was 66case, 36 case (54.5%) was on bottle feeding. 17 case(25.7%) was on breast feeding . 13 case (19.8) was on mixed feeding fig .3 shows the distribution of cases according to the type of feeding in the first year of age group. In the second year age group which was 22 case , 18 case (81.8%) was on breast feeding , 2 cases (9.09%) were on bottle feeding and the same percentage was on mixed feeding , in addition to the extra food which was given with the three pattern of feeding in the 2nd year age group .Distribution of cases according to the type of feeding in the 2nd year age group shown in Fig.4. In conclusion bottle feeding was prevalent in the first year age group while breaset feeding was more prevalent in the second year age group. In cases with bottle feeding, the way of cleansing and or sterilization of bottle :45case (84.9%) from the total 53 case on bottle and mixed feeding , the mothers were uesd boilig of bottles, by using salt or detergent or both , while the way of cleansing was by detergent , salt or both in 7 cases (13.3), and one case (1.9%) the mother was used the water only for cleansing the bottles.

Table 3: shows way of cleansing and or sterilization of bottles in bottle fed group.

- Regarding the vaccination coures and wether its complete or in complete according to age , 43% of the total number of cases (100 case) had incomplate vaccination, 40 % had complet e vaccination, and 17% of the cases not recived any does of vaccine,

Fig. 5. Shows distribution of cases in relation to vaccination course according to age

Table 1. The age, sex distribution of cases

Age group / months	Male		Female		Total	
	No.	%	No.	%	No.	%
> 3-3 m	9	9 %	5	5%	14	14%
3.1 - 6	19	19 %	10	10 %	29	19 %
6.1 – 9	4	4 %	6	6 %	10	10 %
9.1 – 12	8	8 %	5	5 %	13	13 %
12.1 – 24	13	13%	15	15 %	28	28 %
24.1 – 36	0	0	3	3%	3	3 %
36.1 – 60	2	2 %	1	1 %	3	3 %
Total	55	55%	45	45 %	100	100%

Table 2. The clinical types of cases of PEM And the distribution according to their residence

Clinical types Of cases	Urban Areas		Rural Areas		Total	
	No.	%	No.	%	No.	%
	Marasmus	32	65.3	17	34.7	49
Under weight	17	58.6	12	41.4	29	29
Kwashirkor	10	76.9	3	23	13	13
Marasmic -kwashirkor	7	77.7	2	22.2	9	9
Total	66	66	34	34	100	100

Table 3. The way of cleansing and/ or steralization of bottle in bottle feed group

Way of cleansing and / or Sterilization of bottles	Cases on bottle feeding	
	No.	%
Boiling	21	39.6
Salt + boiling	10	18.9
Detergent + boiling	11	20.7
Salt + detergent + boiling	3	5.7
Detergent	3	5.7
Salt	3	5.7
Salt + detergent	1	1.9
Water	1	1.9
Total	53	100 %

Table 4. Distribution of cases according to height /age centil

Height / age centil	No.	%
< 3	45	
3 - < 10	24	24
10 - < 25	20	20
25 - < 50	4	4
50 +	7	7
Total	100	100

Table 5. Distiribution of cases according to head circumference /age centil

Head circumference / age centil	No.	%
< 3	36	36
3 - < 10	25	25
10 - < 25	24	24
25 - < 50	7	7
50 +	8	8
Total	100	100

Table 6. Distribution of cases in 1-4 year age group according to mid –upper arm circumference indicator

M.U.A.C in age group 1-4 y	No.	%
<12.5 cm	29	74.3
12.5 – 14 cm	10	25.7
Total	39	100

Regarding the family size of these malnourished children: PEM more prevalent in families with 10 numbers and above which formed 43% of the cases.

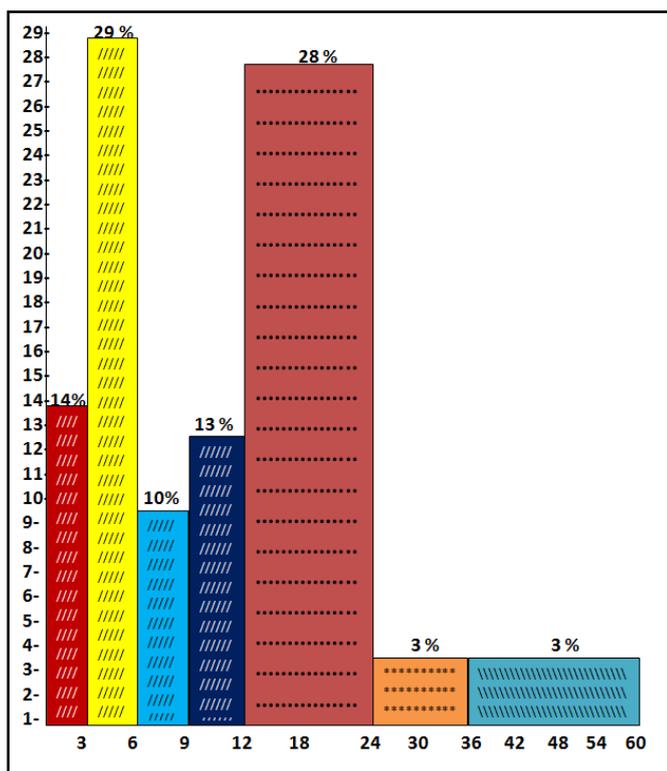


Fig. 1. Distribution of cases in relation/age in months

While families with 5-9 members produced 37% of the cases, 20% of the cases their family size was less than 5. Fig. 6: shows distribution of cases according to family size.

- Regarding the birth order in the prevalence of PEM. cases with birth order below 5 formed 74% of the cases, 26% of the caeses was of birth order 5 and above. Fig. 7: shows distribution of cases according to birth order.
- Regarding the distribution of the cases in relation to maternal age: 59% of mothers of malnourished child were of the age group 21-30 years while those with the maternal age group 31 and above formed 25% of the cases, and the lowest percentage (16%) occred with the maternal age group 20 years and below . Fig 8 : Shows distribution of cases in relation to maternal age
- The distribution of cases in relation to mother education: 39% of the mothers were of the primary educational level, while 33% of the mothers were illiterate and 28% of the mothers were of the secondary educational level. Fig. 9 shows the distribution of cases in relation to mother education.
- 91% of mothers of malnourished child were hous wife .only 9% of the cases their mothers working out side the home. The percentage of working mothers shown in Fig .10.
- From the total number of the cases 45% their height were affected by the malnutrition this indicate chronic form of malnutrition table 4 shows the distribution of cases according to height centil.
- Regarding the head circumference, 36% of the cases thier head circumference fall below 3rd centil which

mean affection of head circumference by malnutrition and affection of brain growth. Table 5: shows distribution of cases in relation to head circumference.

- Mid upperarm circumference which is sensitive anthropometric measurement inPEM had fixed values between 1-4 years so grading of the severity of PEM done on (1-4)years age group which formed 39 case of the total cases , 29 case (74.3%) was suffering from sever PEM, while 10 cases (25.7%) was suffuring from mild to moderate malnutirtion.

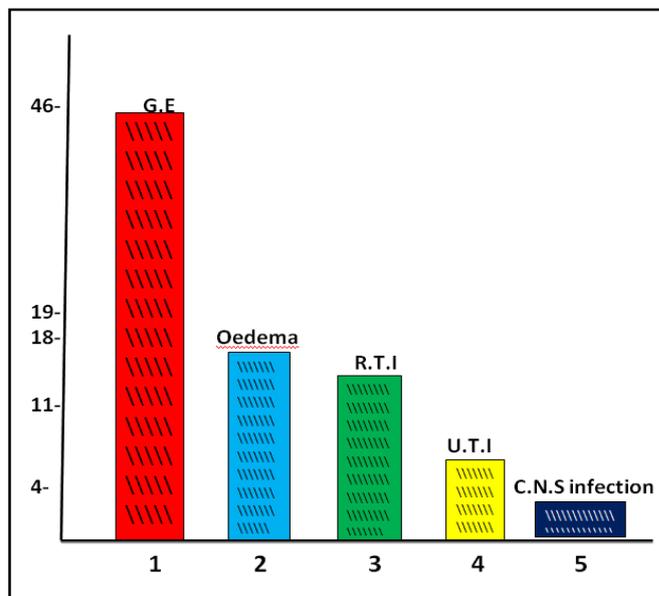


Fig. 2. Distribution of cases according to the reason for admission

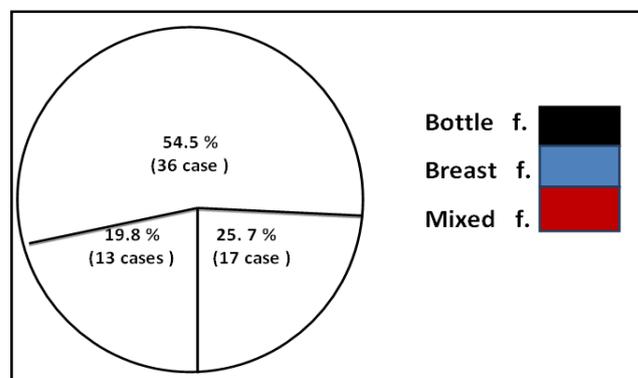


Fig. 3. Distiribution of cases according to type of feeding of the first year age group

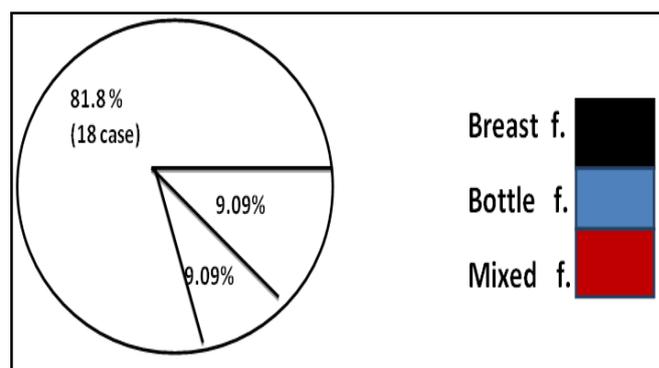


Fig. 4. Distiribution of cases according type of feeding in the 2nd year age group

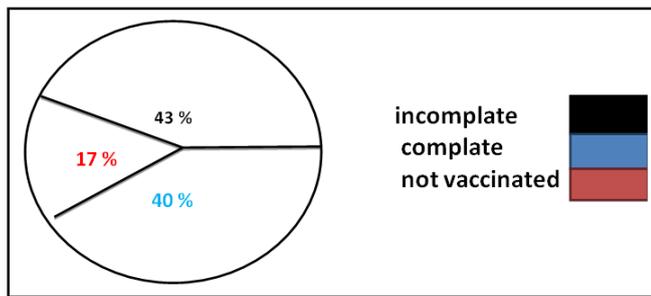


Fig. 5. Distribution of cases in relation to vaccination course according to age

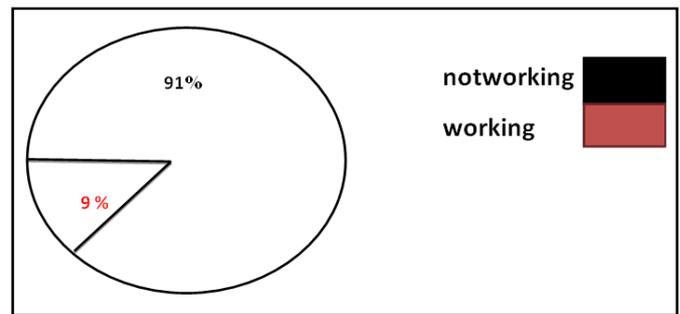


Fig. 10. Percentage of working mothers

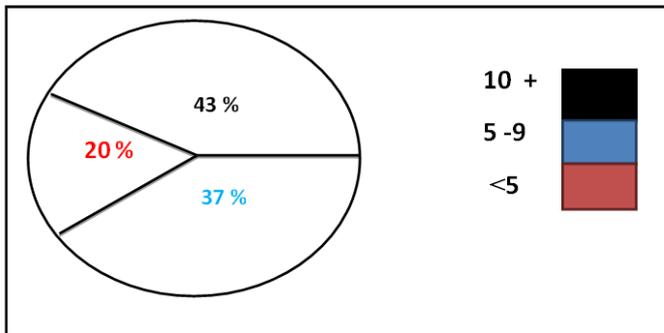


Fig. 6. Distribution of cases according to family Size

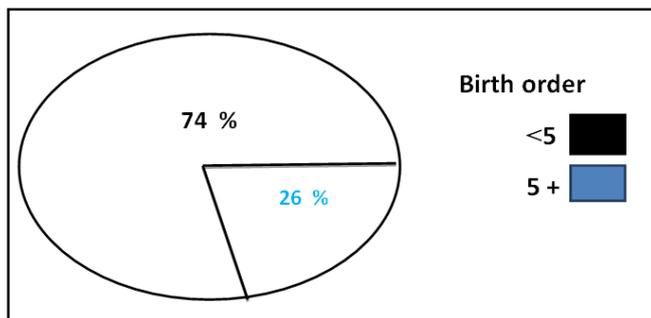


Fig. 7. Distribution of cases according to birth order

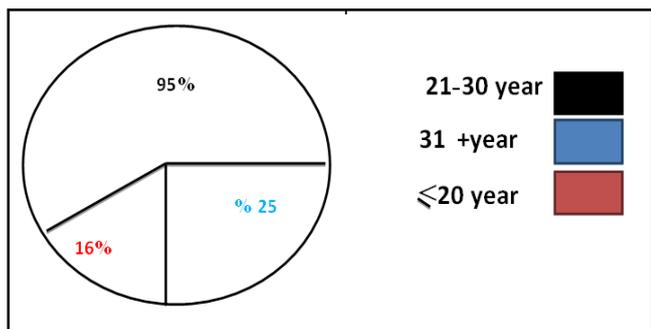


Fig. 8. Distribution of cases in relation to maternal age

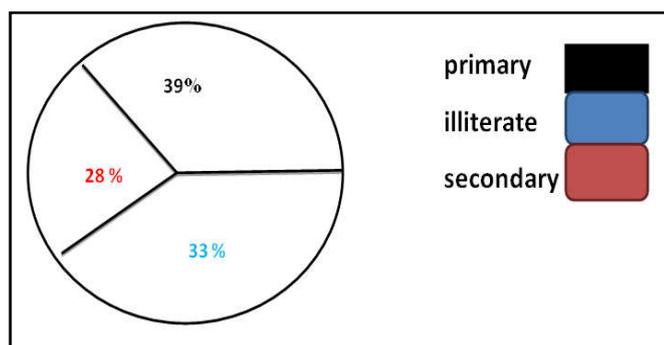


Fig. 9. Distribution of cases in relation to mother education

DISCUSSION

Although PEM represents a major public health problem in many parts of the developing world, it was a rare disease among Iraqi children and was not constituting a health problem to be dealt with. The situation had changed after the economic sanction in 1990, since then the impact of severe shortage in the essential nutrient materials had deleterious effect on the health of Iraqi children which start to show itself in an increasing incidence of cases of PEM of varying severity. The studied group showed higher prevalence rate of PEM in the first two year age group which formed 94% of the total number of cases. This coincides with findings obtained from study conducted in Ibn AL- Balady hospital 1993 (3). And the finding obtained from the study of malnutritional status of Iraqi children conducted at the sheik omar centre (1992), and the finding from mahmood Abad Survey (53). The high prevalence of PEM in the first two years of age which is the period of rapid brain growth had deleterious effect on the mental and physical development of children. For sex distribution :males were produced 55 % of the total number of cases the reason for that may be due to under registering of females morbidity in our country which lead to registering more males than females. In the age group 12.1- 36 month PEM more in female than male which may be due to the mothers care to feed males baby more than females especially the kwashiorkor (protein deficiency) incidence increased in this age group. Gastroenteritis was the reason for admission to hospital in 46% of the cases most of these cases had repeated attack which was the major precipitating factor in the causation of PEM. The same finding was noticed in other studies (Martovell, 1990 and Wijga, 1983).

In 19% of the cases the presenting symptom was oedema , and in many of these cases before the oedema were suffering from G.E. Marasmus produced 49% of the cases in the study and 65.3% of them were from urban areas this is due to the high prevalence of bottle feeding in these areas which is the major causes of marasmus (Jellife, 1968; Mdaren, 1966). And it goes with the finding in other studies (Tolbloom, 1989 and Waterlow, 1973). Kwashiorkor, marasmic kwashiorkor, under weight: Types of malnutrition was also more prevalent in the urban areas this may be due to shortage of nutrients mainly in the town (due to the effect of sanction which is more percussive on the urban than rural areas). Because of shortage of nutrients mainly in the towns and high prices of these nutrients especially meat, eggs, extra most of the families in the study were very occasionally include these essential nutrients in their meals, that why about 22% of these cases were of kwashiorkor and marasmic kwashiorkor type In comparison with the study of nutritional status of children which was done in five maternal and child health centers in Baghdad in 1976, there

was no single case of kashirkor reported and all of the cases was of the marasmic and under weight type of malnutrition. (MALKA AHMED AL-SAATI, 1976). In kwashirkor cessation of breast feeding in the absence of suitable weaning food is doubly disastrous. There is with drawal of a perfectly balanced food and there is nutrient wastage due to diarrhoea and vomiting with varying degree of loss of appetite, effect of fever on nitrogen balance all of these lead to severe PEM (Alleyne, 1977). Regarding the feeding history: For those cases in the first year age group bottle feeding produced 54.5% of the cases and mixed feeding formed 19.8 % of the cases, total cases on bottle feeding 74.3 % 84.9 % of mothers of bottle fed cases were used to cleaning and sterilization of bottle by boiling in the right way but not before every feed, and most of them had not more than one or two bottles to be used. 17 (47.2 %) of the mothers of those babies on exclusive bottle fed in the first year age group they were used to give diluted milk to their infants, as a result of high commercial price of milk, mother had been forced either to dilute the formula or substitute by rice water or sugar water which thrown their children in to malnourished state, mean age at weaning in the bottlefed group was (11 months). For that reason bottle feeding was the major cause of PEM in the first year age group. From the 36 cases on exclusive bottle feeding in the first year age group 69.4 % (25 cases) of them was marasmus. This result is in general agreement about the role of the bottle feeding in the causation of marasmus which was formed 49 % of the cases in the study (56). In the age group 6-9 months the common extra food was given rice water, biscuit or bread in tea while in the age (10-12 months) the common extra food was rice, potato, vegetable soup

The feeding pattern in the second year age group: The percentage of breast feeding was higher than those of bottle feeding (81.8 %). Mean age at weaning in breast feeding cases was 15 months and those on mixed feeding was 18 months. The additional food which was given in the second year age group was rice, vegetable soup, bread very occasionally meat and eggs. From the second year age group on breast feeding (18 cases), 7 cases (38.8 %) showed typical kwashirkor feature, while 4 cases (22.2 %) showed marasmic kwashirkor features. These findings again agree with the known role of prolonged breast feeding and weaning practices in the causation of Kwashirkor (Ebrahim 1983 and Frenk, 1985). The second year of life is "transitional" as regard diet, immunity to infection and psychological dependence, this is a period of rapid growth with high nutrient needs, particularly of protein for a swift increase in muscle tissue, it's a time when several meals are required and when food should be easily masticable and digestible, lastly it's often the occasion for trauma that occurs as a result of sudden separation from the mother after prolonged period of continuous intimate contact and permissive breast feeding, frequently caused by further pregnancy (MALKA AHMED AL-SAATI, 1976). For those cases above 2 years of age (6% of the total number of cases) no precise feeding pattern could be obtained. When the mother asked about the food item they used to give to their children the answer was feed them whatever available and cheap, knowing the food with high biological value like meat, eggs extra expensive and not easily obtained by most of these families, one may conclude that the food of these children received was poor in both quantity and quality which created a state of both calorie and protein deficiency that pushed these children into the malnourished state. All cases of the age group (24, 1-60 months) which formed 6% of the cases were of the Kwashirkor type with the severe dermatosis, one of these cases was (5

years) old boy died because of severe hypoproteinaemia (serum albumin was 1 g/dL) with chest infection. Regarding the immunization course in those malnourished children 43% of the cases had incomplete course of vaccination for their age. The reason for that as the mother said due to unavailability of the vaccine when the mother attending the health centers for vaccination because of shortage of vaccine and drugs due to the effect of sanction, this led to loss of compliance for vaccination. In 17% of the cases who were not vaccinated at all because of the mothers of those children did not believe that the vaccine had any benefit for the child's health.

There is good evidence that infections may greatly influence the nutritional status of children, they may do so in various ways; the appetite is decreased, the metabolic breakdown of tissue is increased, diarrhoea may interfere with absorption and utilization of food. If the infection is long lasting or reoccurs all the time, the unfavorable effect on the nutritional status was also long lasting on the other hand malnutrition predisposes the child to contract infection and to influence their course and outcome. It's quite clear that there is a vicious circle connecting malnutrition and infection, for that reason intervention procedures against certain types of infectious diseases by vaccination, which may act as a useful weapon in the fight against malnutrition (1). Reports from the developing countries on family characteristics of children with protein energy malnutrition often that malnourished infants are the children of grand multiparous mothers (3). While this study shows 74% of the cases were of 4th birth order and below. A possible explanation is that the preschool children number in the family were high as a result of closely spaced pregnancies, which increase the burden on the mothers and increased the risk of protein – energy malnutrition among younger children. The same results obtained from the study done in Ibn Al-Balady hospital 1993 (3). The family size of (10) members and above produced 43% of the cases while 37% of the cases with the family size 5-9. In most of the cases more than one family live in the same house and sharing food, these circumstances of overcrowding accentuate cross infections and the interaction between this and a poor dietary intake accentuate the development of malnutrition (4). Family income then precise family income was difficult to obtain in most of the cases, this is because most of the families had no fixed monthly income were present and secondarily because most of them had big families and had many people who share the income.

The relation of the maternal age to the protein energy malnutrition higher incidence (59%) were found in the maternal age group (21-30) years, similar results were found in the other studies (3,11). 33% of mothers of these malnourished children were illiterate which may play a role in the causation of malnutrition, because of the ignorance of these mothers about child care and feeding practice. Only 9% of the mothers of the studied group were working outside the home this indicated that the work of the mothers play no role in the causation of the malnutrition in those children. The general agreement is that the ill effect of protein energy malnutrition are determined by its occurrence during the period of maximal growth and secondarily by the duration of under nutrition relative to the total period of growth. Anthropometry can provide a sound assessment of growth wasting and stunting. Although the weight for age parameter regarded as the most sensitive anthropometric indicator even in mild to moderate malnutrition but not indicate the chronicity of the disease the

acute and the chronic cases are mixed, can be differentiated between them by height for age parameter. Regarding the effect of malnutrition state on the height of the cases, although all the cases their weight for age were below 3rd centile only 45% of the cases their height fall below 3rd centile (stunting). The explanation for that the stunting take longer time to malnutrition to be evident, a fact had been found in many other studies (ABDUL MONEN YOUNIS AL-DAGGAGH, 1993; MALKA AHMED AL-SAATI, 1979). For head circumference 36% of the cases fall below the 3rd centile on growth chart for head circumference. Malnutrition affects the brain growth and in turn affects the head circumference mostly during the first year of life which is the period of rapid brain growth and because of the "brain sparing" the brain is lastly to be affected by severe malnutrition (Sanders, 1967). The result of this study shows 36% of the cases their brain growth was affected while in the study done in Ibn Al-Balady hospital 1993 showed that the head circumference was not affected by the malnutrition in the studied group. Regarding the mid upper arm circumference this method of assessment of nutritional status of children 1-4 year of age it has advantage that its age unrelated (Shakir, 1965 and Frederick, 1980). In this study (29 case) which formed 74,3% of the cases from age 1-4 years (39 case) was suffering from severe malnutrition while (10) cases (25.7%) were suffering from mild – moderate malnutrition. The drawback of this method it can not differentiate between mild and moderate form of malnutrition.

Conclusion

P.E.M is the disease of early childhood mainly in the first and second years of life. All clinical types of P.E.M were more prevalent in urban than rural areas. Gastroenteritis are the most common precipitating factor of P.E.M. Bottle feeding and malweaning practices are the major cause of P.E.M. Incomplete immunization course in most of those children was play important role to throw them to malnutrition. The maternal age doesn't appear to have a relation with the causation of P.E.M. Mother work had no role in the causation of P.E.M. Large family size play a role in the causation of malnutrition, due to over crowding which accentuate infection and the interaction between this and poor dietary intake. The high number of preschool children in the family correlate with increasing incidence of malnutrition. The weight and M.U.A.C. are the most sensitive parameter in malnutrition while the height needs a longer time to show any change. The head circumference is the least affected by malnutrition. Several other non dietary factors play a role in the causation of P.E.M. and must be taken in to consideration when any nutritional program is implemented.

Recommendation

- Promotion of breast feeding since breast feeding offers the best protection against infant malnutrition.
- Nutritional education particularly to mother on the importance of breast feeding and to utilize the local products in common use for feeding their infants and young children following the scientifically sound advice.
- Early recognition of malnutrition in infants and young children by monitoring growth with serial weighing and the use of weight graphs, and by supplementary feeding when indicated.

- Prevention and early management of infection by immunization using practical schedules adopted to local used and logistic possibilities.
- Establishment of nutrition rehabilitation clinics particularly in pediatrics hospitals, these clinics serve the following :
 - a) Provision of food for nutritional supplementation of malnourished children
 - b) Monitoring the progression of malnourished children.
 - c) Provision of health and nutritional education.

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