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A critical review of malnutrition and its management

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Abstract
The term malnutrition is used to describe a deficiency, excess or imbalance of a wide range of nutrients, resulting in measurable adverse effects on body composition, function and clinical outcome. As such it can refer to individuals who are either over- or under-nourished, although it is usually used synonymously with under nutrition, as is the case in this article. Although it is well known that malnutrition is common problem in the developing country. A new World Bank report warns that malnutrition is costing poor countries up to 3 present of their yearly GDP, while malnourished children are at risk of losing more than 10 present of their lifetime earnings potential. The report also says malnutrition may increase the risks of HIV infection. Malnutrition has long been known to undermine economic growth and perpetuate poverty, and yet, over previous decades, the international community and most governments in developing countries have failed to tackle malnutrition. These are mind-blowing statistics, yet this economic and human cost can be avoided. To solve the problem of malnutrition, the private sector, civil society and government need to work together, as the problem is too big to be solved by one group alone. The World Bank says this action plan needs to be agreed to, and then acted upon by developing countries together with the development community. As the new report argues, malnutrition perpetuates poverty, and "without coordinated, focused, and increased action, no significant progress in nutrition or in poverty reduction can be expected."

Keywords: Malnutrition, Resomal, PEM, Kwashiorkor, under nutrition, flaky-paint dermatosis etc.

Introduction

Malnutrition continues to be a major public health problem throughout the developing world with its two constituents of protein–energy malnutrition and micronutrient deficiencies. Diets in populations there are frequently deficient in macronutrients (protein, carbohydrates and fat, leading to protein–energy malnutrition), micronutrients (electrolytes, minerals and vitamins, leading to specific micronutrient deficiencies) or both. The prevalence of bacterial and parasitic diseases contributes greatly to malnutrition in developing countries. It is the direct cause of about 300 000 deaths per year and is indirectly responsible for about half of all deaths in young children [1].

Malnutrition is seen in women and children in India specially. About 63% of under-5 children in India were malnourished, 53% were moderately and severely underweight, and 52% were stunted [2].

The UN estimates that 2.1 million Indian children die before reaching the age of 5 every year – four every minute - mostly from preventable illnesses such as diarrhoea, typhoid, malaria, measles and pneumonia. Every day, 1,000 Indian children die because of diarrhoea alone [3].

The World Bank estimates that India is one of the highest ranking countries in the world for the number of children suffering from malnutrition. The prevalence of underweight children in India is among the highest in the world, and is nearly double that of Sub Saharan Africa with dire consequences for mobility, mortality, productivity and economic growth [4].

Under-nutrition is more prevalent in rural areas, again mainly due to low socio-economic status. Anaemia for both men and women is only slightly higher in rural areas than in urban areas. For example, in 2005, 40% of women in rural areas, and 36% of women in urban areas were found to have mild anaemia. In urban areas, overweight status and obesity are over three times as high as rural areas. Punjab, Kerala, and Delhi also face the highest rate of overweight and obese individuals [5].

When it comes to child malnutrition, children in low-income families are more malnourished than those in high-income families. Some cultural beliefs that may lead to malnutrition is religion. Among these is the influence of religions, especially in India are restricted from consuming meat. Also, other Indians are strictly vegan, which means, they do not consume any sort of animal product, including dairy and eggs. This is a serious problem when inadequate protein is consumed because 56% of poor Indian household consume cereal to consume protein. But unfortunately, the type of protein that cereal contains does not parallel to the proteins that animal product contain [6].

The four most important forms of malnutrition worldwide (protein-energy malnutrition, iron deficiency and anaemia's (IDA), vitamin A deficiency (VAD), and iodine deficiency disorders (IDD) are examined below in terms of their global and regional prevalence's, the age and gender groups most affected, their clinical and public health consequences, and, especially, the recent progress in country and regional quantitation and control. Zinc deficiency, with its accompanying diminished host resistance and increased susceptibility to infections, is also reviewed. WHO estimates that malnutrition (underweight) was associated with over half of all child deaths in developing countries? [7].

Malnutrition and its associated disease conditions can be caused by eating too little, eating too much, or eating an unbalanced diet that lacks necessary nutrients. Under-nutrition is defined as failure to consume adequate energy, protein, and micronutrients to meet the basic requirements for body maintenance, growth, and development. Malnutrition is one of the most devastating problems worldwide and is inextricably linked with poverty [8].

A sign of nutritional deprivation is failure in growth and development. To evaluate the nutritional status up to the age of maturity, sex- and age-based assessment of growth and development is necessary. Any nutritional disorder or deficiency leads to mental and growth failure and low activities [9].

Nutrition plays a crucial role in the pathogenesis and management of disease. Inadequate, excessive, and inappropriate nutrition all lead to increased morbidity and mortality. Nutritional factors have been linked with a range of disorders, including hypertension, vascular disease, and cancer. Dietary management is important in the treatment of many disorders, including ischemic heart disease, diabetes, and renal disease.

Aims and Object

To conduct a review of the published literature in order to summarise the situation of Protein Energy Malnutrition in children.

- The Aim of this strategy to improve- threw optimal feeding-The Nutritional status, Growth and development, Health and thus the survival of infants and children's.
- To increase the commitment of Governments, International Organizations and other concern parties for optimal actions for infants and young children's.
- To solve these problems (Malnutrition and Ill health) concern both mother and children's together.
- Woman, in turn, have the right to proper nutrition, to decide how to feed their children, and to full information and appropriate condition that will enable them carryout their decision. These rights are not yet realized in many environments [10].

Material and Method

Literature was searched using PubMed, and Google Scholar. Search terms were limited to publication. Papers that addressed PEM in children, women, other age groups except under five years and malnutrition other than PEM.

Observation and Discussion

Protein–energy malnutrition

- Kwashiorkor (protein malnutrition predominant)
- Marasmas (deficiency in calorie intake)
- Marasmic Kwashiorkor (marked protein deficiency and marked calorie insufficiency signs present, sometimes referred to as the most severe form of malnutrition)

Prenatal protein malnutrition

Protein malnutrition prenatally has been shown to have significant lifelong effects. During pregnancy, one should aim for a diet that consist at least 20% protein for the health of the foetus. Diets that consist of less than 6% protein in utero have been linked with many deficits, including decreased brain weight, increased obesity, and impaired communication within the brain. Even diets of mild protein malnutrition (7.2%) have been shown to have lasting and significant effects. The following are some in which prenatal protein deficiency has been shown to have unfavourable consequences:- Decreased brain size, Impaired neocortical long-term potentiation, Altered fat distribution, Increased obesity, Decreased birth weight, and gestation duration, Increased stress sensitivity, Decreased sperm quality, Altered cardiac energy metabolism, Increased passive stiffness. The following are some studies in which prenatal protein deficiency has been shown to have unfavourable consequences- Decreased brain size [11], Impaired neocortical long-term potentiation [12], Altered fat distribution [13], Increased obesity [14], Decreased birth weight and gestation duration [15], Increased stress sensitivity [16], Decreased sperm quality [17], Altered cardiac energy metabolism [18], Increased passive stiffness [19].

Kwashiorkor

Kwashiorkor is one of the serious forms of PEM. It is seen most frequently in children one to three years of age, but it may occur at any age. It is found in children who have a diet that is usually insufficient in energy and protein and often in other nutrients. Often the food provided to the child is mainly carbohydrate; it may be very bulky, and it may not be provided very frequently.

Kwashiorkor is often associated with, or even precipitated by, infectious diseases. Diarrhoea, respiratory infections, measles, whooping cough, intestinal parasites and other infections are common underlying causes of PEM and may precipitate children into either kwashiorkor or nutritional marasmus. These infections often result in loss of appetite, which is important as a cause of serious PEM. Infections, especially those resulting in fever, lead to an increased loss of nitrogen from the body which can only be replaced by protein in the diet.

Differential diagnosis

Table 1.

Feature	Kwashiorkor	Marasmus
Growth failure	Present	Present
Wasting	Present	Present, marked
Oedema	Present (sometimes mild)	Absent
Hair changes	Common	Less common
Mental changes	Very common	Uncommon
Dermatosis, flaky-paint	Common	Does not occur
Appetite	Poor	Good
Anaemia	Severe (sometimes)	Present, less severe
Subcutaneous fat	Reduced but present	Absent
Face	May be oedematous	Drawn in, monkey-like
Fatty infiltration of liver	Present	Absent

Nutritional marasmus

In most countries marasmus, the other severe form of PEM, is now much more prevalent than kwashiorkor. In marasmus the main deficiency is one of food in general, and therefore also of energy. It may occur at any age, most commonly up to about three and a half years, but in contrast to kwashiorkor it is more common during the first year of life. Nutritional marasmus is in fact a form of starvation, and the possible underlying causes are numerous. For whatever reason, the child does not get adequate supplies of breast milk or of any alternative food.

Perhaps the most important precipitating causes of marasmus are infectious and parasitic diseases of childhood. These include measles, whooping cough, diarrhoea, malaria and other parasitic diseases. Chronic infections such as tuberculosis may also lead to marasmus. Other common causes of marasmus are premature birth, mental deficiency and digestive upsets such as malabsorption or vomiting. A very common cause is early cessation of breast feeding.

Clinical features of nutritional marasmus

Poor growth, Wasting, Alertness, Appetite, Anorexia, Diarrhoea, Anaemia, Skin sores, Hair changes, Dehydration.

Marasmic kwashiorkor:

Children with features of both nutritional marasmus and kwashiorkor are diagnosed as having marasmic kwashiorkor. In the well classification (see above) this diagnosis is given for a child with severe malnutrition who is found to have both oedema and a weight for age below 60 percent of that expected for his or her age. Children with marasmic kwashiorkor have all the features of nutritional marasmus including severe wasting, lack of subcutaneous fat and poor growth, and in addition to oedema, which is always present, they may also have any of the features of kwashiorkor described above. There may be skin changes including flaky-paint dermatosis, hair changes, mental changes and hepatomegaly. Many of these children have diarrhoea.

Causes and epidemiology

Protein energy malnutrition, unlike the other important nutritional deficiency diseases, is a macronutrient deficiency, not a micronutrient deficiency. Although termed PEM, it is now generally accepted to stem in most cases from energy deficiency, often caused by insufficient food intake. Energy deficiency is more important and more common than protein deficiency. It is very often associated with infections and with micronutrient deficiencies. Inadequate care, for example infrequent feeding, may play a part.

The cause of PEM should not, however, be viewed simply in terms of inadequate intake of nutrients. For satisfactory nutrition, foods and the nutrients they contain must be available to the family in adequate quantity; the correct balance of foods and nutrients must be fed at the right intervals; the individual must have an appetite to consume the food; there must be proper digestion and absorption of the nutrients in the food; the metabolism of the person must be reasonably normal; and there should be no conditions that prevent body cells from utilizing the nutrients or that result in abnormal losses of nutrients. Factors that adversely influence any of these requisites can be causes of malnutrition, particularly PEM. The aetiology, therefore, can be complex. Certain factors that contribute to PEM, particularly in the young child, are related to the host, the agent (the diet) and the environment. The underlying causes could also be categorized as those related to the child's food security, health (including protection from infections and appropriate treatment of illness) and care, including maternal and family practices such as those related to frequency of feeding, breastfeeding and weaning.

Some examples of factors involved in the aetiology of PEM are:

- The young child's high needs for both energy and protein per kilogram relative to those of older family members.
- Inappropriate weaning practices
- Inappropriate use of infant formula in place of breastfeeding for very young infants in poor families
- Staple diets that are often of low energy density (not infrequently bulky and unappetizing), low in protein and fat content and not fed frequently enough to children
- Inadequate or inappropriate child care because of, for example, time constraints for the mother or lack of knowledge regarding the importance of exclusive breastfeeding
- Inadequate availability of food for the family because of poverty, inequity or lack of sufficient arable land, and problems related to interfamily food distribution
- Infections (viral, bacterial and parasitic) which may cause anorexia, reduce food intake, hinder nutrient absorption and utilization or result in nutrient losses
- Famine resulting from droughts, natural disasters, wars, civil disturbances, etc.

The view that kwashiorkor is the result of protein deficiency and nutritional marasmus the result of energy deficiency is an oversimplification, as the causes of both conditions are complex. Both endogenous and exogenous causes are likely to influence whether a child develops nutritional marasmus, kwashiorkor or the intermediate form known as marasmic kwashiorkor [20].

Physical examination of malnourished children's

Weight and length or height, Oedema, Enlargement or tenderness of liver, jaundice, Abdominal distension, bowel sounds, "abdominal splash", Severe pallor, Signs of circulatory collapse: cold hands and feet, weak radial pulse, diminished, Consciousness, Temperature, hypothermia or fever, Thirst, Eyes: corneal lesions indicative of vitamin A deficiency, Ears, mouth, throat: evidence of infection, Skin: evidence of infection or purpura, Respiratory rate and type of respiration: signs of pneumonia or heart failure, Appearance of faeces.

The principal tasks during initial treatment are

Treat or prevent hypoglycaemia and hypothermia, dehydration, septic shock, infection, vitamin deficiency, severe anaemia and heart failure, and restore electrolyte balance.

Treatment:

A. Oral rehydration salts (ORS) solution for severely malnourished children

B. Amount of Re So Mal to give-

Between 70 and 100 ml of Re So Mal per kg of body weight is usually enough to restore normal hydration.

Composition of oral rehydration salts solution for severely malnourished children (Re So Mal)

Table 2

Component	Concentration (m mole/l)
Glucose	125
Sodium	45
Potassium	40
Chloride	70
Citrate	7
Magnesium	3
Zinc	0.3
Copper	0.045
Osmolality	300

C Intravenous rehydration

The only indication for IV infusion in a severely malnourished child is circulatory collapse caused by severe dehydration or septic shock. Use one of the following solutions (in order of preference):

- Half-strength Darrow's solution with 5% glucose (dextrose).
- Ringer's lactate solution with 5% glucose.
- 0.45% (half-normal) saline with 5% glucose.

D. Feeding during rehydration

Breastfeeding should not be interrupted during rehydration. Usually the diet and Re So Mal are given in alternate hours. If the child vomits, give the diet by tube. When the child stops passing watery stools, continue feeding.

E. Dietary treatment

Children who do not require other emergency treatment, especially for hypothermia, dehydration or septic shock, should immediately be given a formula diet. They should also continue to be breastfed.

F. Vitamin deficiencies

Severely malnourished children are at high risk of developing blindness due to vitamin A deficiency. (E.g. night blindness, conjunctiva xerosis with Bitot's spots, corneal xerosis or ulceration, or keratomalacia). Many malnourished children are also deficient in riboflavin, ascorbic acid, pyridoxine, thiamine and the fat-soluble vitamins D, E and K. All diets should be fortified with these vitamins by adding the vitamin mix.

G. Immunization

The child should be immunized in accordance with national guidelines. The mother should be informed of where and when to bring the child for any required booster doses [21].

H. Health education

He is advised to take correct and complete treatment for her child any illness. She is educated maintaining personal hygiene and also she is educated to take recommended balance diet for her, especially if she is a lactating mother [22].

Conclusion

We have Improving political commitment and public awareness; Implementing a programme of human resource development and capacity building; Raising the level of community participation; Programme design modifications; community-based with strong community participation; social mobilization through advocacy, information and communication**.**

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