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Nutritional disorders: An overview

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Abstract

Nutrition has been identified as a primary factor in human development, not only as a conditioning factor for health but also as a determinant of quality of life and overall development. Access to adequate quantity of quality foods is a basic human right and a necessary precondition for good health. Conditions such as Starvation, which may be total or partial, affects the functioning of key organ systems such as respiratory, locomotor, muscular/skeletal, gastrointestinal, immune system, and related inflammatory response. Nutritional disorders manifested as Protein Energy Malnutrition (PEM), Anaemia, iodine deficiency, Vitamin deficiency, etc affects not only mortality and morbidity figures but also physical growth, intellectual development, school performance of children, effectiveness of education, productivity of labour, and virtually all aspects of human and social development. Development efforts on a global basis are strongly recommended which include measures to improve nutrition and food security as an important component of poverty alleviation. Efforts are to be made for improving the health conditions among the population, so as to improve the overall wellness of nation.

Keywords: Nutrition, primary factor, human development

Introduction

The word “nutrition”, first appeared in 1551, is derived from the Latin word “nutrire”, meaning “to nourish.” Today, we define nutrition as “the sum of all processes involved in how organisms obtain nutrients, metabolize them, and use them to support all of life’s processes”. Adequate nutrition is necessary for the optimal functioning of human body, and severe nutritional inadequacy can lead to disease and even death. Nutritional status in children is considered a good indicator for measuring the overall well-being of a society. The inadequate quantity of one or more nutrients results in many disturbances in the body leading to nutritional disorders. It reflects the state of malnutrition. The most common cause of malnutrition is inadequate food intake. Factors known to increase the malnutrition status include hunger, poverty, ignorance, faulty feeding practices, lack of proper water supply and poor hygiene etc. These factors are governed by number of socio-economic, political and environmental factors, and most of them can be prevented as well as modified. Hunger means a dietary intake that does not provide the quantity of food that is needed for growth and activity and the maintenance of good health. It is estimated that globally more than 800 million people suffer from malnutrition and in developing countries more than 20 per cent of the total population are hungry ^[1].

Causes

The primary causes of malnutrition are poverty and food prices, dietary practices and agricultural productivity, with many individual cases being a mixture of several factors. The population of a community that is within poor governments may be at risk if the area lacks health-related services, but on a smaller scale certain households or individuals may be at an even higher risk due to differences in income levels, access to land, or levels of education. Poor socio-economic status together with many other factors are major contributors of malnutrition. The different forms of malnutrition include under-nutrition, overweight and obesity, and micronutrient deficiencies. Some of the nutritional disorders may be discussed below:

The most important nutritional problem in the world today is the Protein Energy Malnutrition (PEM) ^[2]. The problem is more severe in third world countries affecting children of all ages especially infants. Protein energy malnutrition is very common in children particularly in Sub Sahara countries owing to poverty and consumption of starch based staple diet. Such diet is often very low in protein and also poor in micronutrients. Nutritional deprivation is rampant in children of school age particularly primary school

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children ranging in magnitude from 20-80%. There is significant proportion of the world's child population who are undernourished and suffering from Protein and Energy Malnutrition (PEM) and/or Micronutrient Malnutrition (MNM). Two forms of PEM are kwashiorkor and marasmus, and they commonly coexist [2].

Protein-energy malnutrition (PEM) or protein-calorie malnutrition is a form of malnutrition that includes: Kwashiorkor (protein malnutrition) caused by inadequate protein intake. The main symptoms are oedema, wasting, liver enlargement, hypo-albuminaemia, steatosis, and possibly depigmentation of skin and hair. Marasmus (deficiency in calorie intake) is a form of severe malnutrition characterized by an inadequate intake of protein and energy. A child with marasmus looks emaciated, body weight is reduced to less than 60% of the normal body weight for the age. Marasmus occurrence increases prior to age 1. About 1.02 billion people worldwide are affected by micronutrient deficiency [3]. According to UNICEF/WHO/World bank database, globally in 2012, numbers of overweight children (less than five years) are increasing and prevalence of stunting, underweight, wasting and severe wasting are decreasing. However, under nutrition is higher in Asian countries. There were 162 million stunted, 99 million underweight, 51 million wasted, 17 million severely wasted and 44 million overweight.

Iron deficiency is the most common and widespread nutrition disorders affecting people of all age groups in the world. Micronutrient deficiency, particularly an inadequate intake of Iron, has a direct impact on nutritional status of young children and is most common cause of anaemia. A lower number of RBCs, poor haemoglobin concentrations, or inability of haemoglobin to transport sufficient oxygen, result in decreased oxygen transport to the body cells and subsequent physiological effects [4]. About 30% of world population is suffering from anemia caused by iron deficiency. Children who are stunted, wasted or underweight are much more likely than other children to suffer from moderate to severe anaemia. Half of young children who are stunted or underweight are moderately or severely anaemic, compared with 36-37% of those who are not stunted or underweight [5]. The anaemia prevalence among women varies widely among the states, however it is widespread in every state. The highest prevalence of anaemia in women (more than 60%) is found in eight contiguous states along the East Coast of India continuing north through Jharkhand and Bihar into the Northeast. Severe anaemia is highest in Assam and Andhra Pradesh. The lowest levels of anaemia are in five states that are widely scattered throughout the country (Punjab, Manipur, Mizoram, Goa and Kerala). Even in these states, however, more than 30% of women are anaemic. The geographical pattern of anaemia for men is generally similar to the pattern for women. The lowest prevalence of anaemia for both women and men is in Kerala [6]. Anaemia is defined as decreased haemoglobin level, or circulating red blood cells and it is the most common haematological disorder during pregnancy. Pregnant women with haemoglobin level less than 11g/dl should be considered as anaemic. [7, 8], Iron deficiency can be due to inadequate oral intake or poor bioavailability of iron in foodstuffs. It can also occur due to excessive loss of iron from the body. While the diet may contain adequate amounts of iron, poor bioavailability of dietary iron is considered as the major reason for the

widespread prevalence of iron deficiency anaemia [9-11]. Malaria and hookworm infestations also contribute to the anaemia. Moreover, mothers with fewer intervals between the subsequent pregnancies become anaemic as a result of additional demands and the loss of blood during each delivery. Studies have shown that folate deficiency anaemia in pregnancy has become a global problem and mainly affects the economically unprivileged population [12-18]. Anaemic person usually has less number of red blood cells and low oxygen supply. Diet diversification, supplementation with iron, folic acid as well as vitamin B₁₂ and worm disinfection may help reduction in anaemia. Folic acid deficiency itself is a serious issue particularly among women of child bearing age. In contrast, only 4-12% of women of child-bearing age in developed countries suffer from anaemia [19].

Vitamin A deficiency (VAD) is most common in South Asian countries where nearly 44-50% preschool children are severely affected which in turn is responsible for high mortality in this age group. According to WHO estimates (1995-2005), 5.2 million preschool children and 9.8 million pregnant women suffered night blindness and 190 million preschool children and 19.1 million pregnant women were found to have low serum retinol concentration (< 0.70 µmol). This represents that globally 33.3% preschool children and 15.3% pregnant women are at high risk of VAD [20]. Vitamin deficiencies can create or exacerbate chronic health conditions [21]. Vitamin B complex deficiency along with deficiency of tryptophan causes pellagra. Symptoms include aggression, dermatitis, insomnia, weakness, mental confusion, diarrhea. In advanced cases, pellagra may lead to dementia and death (the 3(+1) Ds: dermatitis, diarrhea, dementia, and death). Vitamin B₅ (Pantothenic acid) deficiency can result in acne and paresthesia, although it is uncommon. Vitamin B₆ (Pyridoxin), the classic clinical syndrome for vitamin B₆ deficiency is seborrhoeic dermatitis-like eruption. Vitamin B₇ (Biotin) deficiency does not typically cause symptoms in adults but may lead to impaired growth and neurological disorders in infants. Vitamin B₉ (Folic acid) deficiency results in a macrocytic anaemia, and elevated levels of homocysteine. Its deficiency in pregnant women can lead to birth defects. Vitamin B₁₂ (Cobalamin) deficiency results in a macrocytic anemia, pernicious anemia, elevated homocysteine, peripheral neuropathy, memory loss and other cognitive deficits.

Iodine deficiency disorder (IDD) is caused due to inadequate production of thyroid hormone. It is most common preventable mental impairment disease worldwide. According to WHO, 71% of world's population use iodized salt but still 28.5% of them have iodine deficiency. In spite of widespread use of iodized salt, people living in areas where soil is deficient in iodine are still at high risk of IDD. Iodine deficiency may not cause death but can result in disability. Selenium which is required for the metabolism of thyroid hormones, its deficiency is often seen in some parts of the world.

Zinc plays an essential role in normal growth, pregnancy outcome, immune system and neurobehavioural development. Analysis of Food balance sheet reveals that 17% of world population consume inadequate amount of zinc. Zinc supplementation has been shown to be linked with reduced incidence of diarrhea, pneumonia, acute lower respiratory infection in young children.

Obesity is a public health problem that has raised concern worldwide. An exhaustive body of literature has emerged to show that overweight and obesity are major causes of comorbidities, including type II diabetes, cardiovascular diseases, various cancers and other health problems, which can lead to further morbidity and mortality [22-23]. Obesity can be defined as a condition of abnormal or excess fat accumulation in adipose tissue, to the extent that health may be impaired [24]. Body Mass Index (BMI), which is calculated as $[(\text{weight in kg}) / (\text{height in m})^2]$, is considered to be the most useful population-level measure of obesity, and it is a simple index to classify underweight, overweight and obesity in adults. There are number of factors which can lead to obesity which includes: genetic background, sedentary lifestyle, hormones, unhealthy eating habits, different socio economic factors etc. Adapting healthy dietary habits, reducing intake of sugars, increasing physical activity may play key role in reducing incidence of obesity. Anorexia Nervosa is a psychological and possibly life threatening eating disorder characterized by an extremely low body weight relative to stature (this is called BMI [Body Mass Index] and is a function of an individual's height and weight), extreme and needless weight loss, illogical fear of weight gain, and distorted perception of self-image and body [25]. Physical signs include rapid weight loss or frequent weight changes, loss or disturbance of menstruation in girls, Fainting or dizziness, feeling cold most of the time, even in warm weather, Feeling bloated, constipated, or the development of intolerances to food. Psychological signs include preoccupation with eating food, body shape and weight, feeling anxious and/or irritable around meal times, intense fear of gaining weight, unable to maintain a normal body weight for their age and height, depression and anxiety. Behavioural signs include, dieting behaviour, deliberate misuse of laxatives, appetite suppressants, enemas and diuretics, repetitive or obsessive behaviours relating to body shape and weight, evidence of binge eating, eating in private and avoiding meals with other people, anti-social behaviour etc. It is commonly accepted that anorexia is more frequently diagnosed in females across the ages. However, a recent population study has suggested that in adolescents, there are an equal number of males and females suffering from this illness. There are two subtypes of Anorexia which are Restricting Subtype & Binge Eating/Purging Subtype. People with Restricting Subtype place severe restrictions on the amount and type of food they consume which can be manifested through restricting certain food groups, counting calories, skipping meals, obsessive rules and rigid thinking. Binge Eating/Purging Subtype is characterized by placing severe restriction on the amount and type of food they consume along with purging behaviour and may also engage in binge eating. Binge eating involves eating a large amount of food and feeling a 'loss of control'. Purging behaviour involves self induced vomiting, or deliberately misusing laxatives, diuretics to compensate for eating food. The risks associated with Anorexia are severe and can be life threatening which include: Anaemia, compromised immune system, intestinal problems, loss or disturbance of menstruation in girls and women, increased risk of infertility in men and women, kidney failure, osteoporosis, heart problems, death. A professional treatment team involving medical doctors, dieticians, and therapists may help the individuals facing this kind of eating disorder [26].

Conclusion

Nutritional disorders compromise of growth and health status impose serious threat to national economy, productivity and development. Many national and international agencies are working intensively for combating malnutrition through various channels in community health centres and medical hospitals. However many social, political, cultural and environmental issues are the hurdles in tackling the nutritional problems. Vitamin and mineral supplementation and fortification programmes should be implemented in all regions in terms of nutrient mix and target groups. The most common interventions should be of iron and folic acid supplementation for women, vitamin A supplementation for children, salt iodization and staple food fortification. National surveys should be carried out adequately to analyse issues related to inequities. Nutrition interventions – including many of the key interventions for maternal, infant and young child nutrition – are seldom implemented at commercial scale. National nutrition surveys are not conducted routinely in a timely manner. Proper measures should be taken so as to reach and deliver nutrition interventions. In addition, when nutrition interventions are being implemented in schools, they should cover the entire spectrum of nutrition problems. School health and nutrition programmes may be implemented to improve the nutrition of adolescent girls, thereby preventing the intergenerational effects and causes of the double burden of under-nutrition, obesity and diet-related diseases.

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