

INTRODUCTION

1. Food is essential to all; unicellular and multi-cellular organisms are all equally concerned about food, it may differ in quality and quantity but food is required by the foetus and also by the full growing adult. "The Universal declaration on the eradication of Hunger and Malnutrition" voiced univocally, every man, woman and child has the inalienable right to be freed from hunger, and malnutrition in order to develop fully and maintain their physical and mental faculties. Society today already possesses sufficient resources, organizational ability and technology and hence the competence to achieve this objective. Accordingly the eradication of hunger is a common objective of all the countries and others in a position to help. It is a fundamental responsibility of governments to work together for higher food production and a more equitable and efficient distribution of food between countries and within countries (FAO-1975). McKenzie (1974) described food as a sociopsychological tool, it gives a sense of security, reflects economic affluence. Hippocrates as early as 400 B.C. said "the physician must know, and must be at great pains to know what man is in relation to food and drink and habits generally and the relation of each to each individual". However, there are two main concerns, the first being the food itself and second is the consumers of food; both are interrelated, with the geometrical increase of population, there is more demand for food both qualitatively and quantitatively; food being produced arithmetically the demands

for more food are not usually met with. A major and considerable proportion of world population thus is deprived of sufficient and good quality of food resulting in malnutrition from mildest to gross form. It has been estimated that over half of the world population living in Asia has less than 30% of the world's total food production while Europe and North America with less than 30% of world population have nearly 60% of total food resources.

To define nutrition is difficult, however it is generally accepted as a process similar to the processes like respiration, circulation, excretion, reproduction etc. of the living being. Nutrition, on other hand "is a state resulting from the balance between the supply of nutrients on the one hand and the expenditure of organism on the other" (Michaven, 1976).

Nutritional deficiency or malnutrition is of multifactorial aetiologies like (a) Labour factors, (b) agricultural factors, (c) population factors, (d) Economic factors, (e) Cultural factors, (f) Physiological factors and so on and so forth.

It has been estimated that about 100 million children in the developing countries suffer either directly from malnutrition or from one or more serious or mild consequences

of malnutrition (Patel, 1974). Protein calorie malnutrition in the developing or underdeveloped countries is the commonest form of malnutrition with well developed signs and symptoms at the earliest stage. In India, about 0.4 to 0.9 per cent of the pre-school children is said to suffer from Kwashiorkor and 1.0 to 3.0 per cent from Marasmus (Bengoa, 1970) with a mortality rate of 11.5% (Peddy, 1975) to 14% (Ghai, 1975). The others who escape the immediate effect are liable to suffer from mental retardation (Champakom et al., 1968; Ghai, 1973); Parekh, 1974).

Kwashiorkor is the term first used by William, the first woman medical officer to Gold coast (Ghana) to describe a "deficiency disease of infants". The word Kwashiorkor has been derived from the Ga tribe language the literal meaning of which is "red boy" or "syndrome of changing" (Williams, 1935). According to her, the disease is due to "some amino acid or protein deficiency". The disease is subsequently known as "protein malnutrition". Jelliffe however, introduced the term protein calorie malnutrition (PCM) to describe the clinical conditions of marasmus, Kwashiorkor and other mild to moderate subclinical stages (Jelliffe, 1959).

Liver is the principal organ of metabolism in the body and directly or indirectly liver regulates the metabolic processes of all nutrients. On the otherhand, malnutrition disturbs the normal architecture of this vital organ both

macroscopically and microscopically. Fatty infiltration in the liver is the common feature noted in varying degree of malnutrition. Deposition of fat as high as 39% of wet weight has been observed by Chatterjee and Mukherjee (1968). Munro and Clark (1959) in their observation suggested that regular and adequate supply of amino acids for the reticulum is essential.

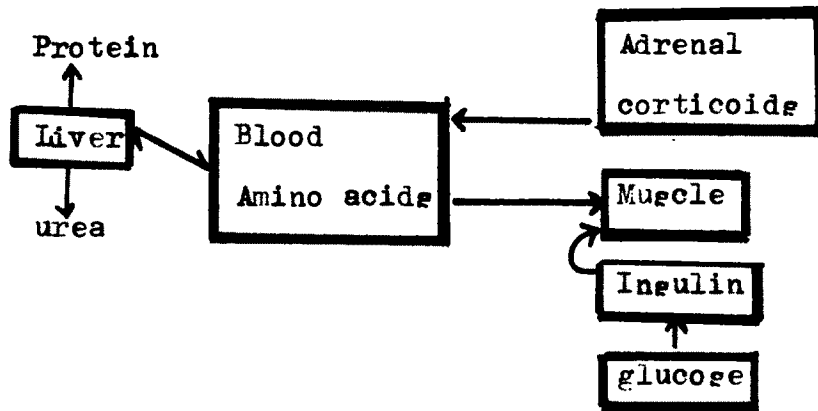
Fawcett (1955) and Bernhard and Rouiller (1956) observed regeneration of reticulum after administration of diet containing large amount of protein. Liver is one of the organs where synthesis of protein takes place and deficiency of dietary protein affects the liver more than the other organs.

An important objective of nutritional research is to determine as precisely as possible the requisites of a diet, that will supply optimal amounts of each components to meet the physiological needs of the body. Of course, to accomplish this goal it has been necessary to develop methods to evaluate the physiological needs and the nutritive quality of the dietary constituents. To develop a satisfactory method for this purpose, great difficulty has been encountered with proteins, which is one of the major components of food. The reason for this is obvious, when one considers the complexity of protein metabolism. The main

functions of carbohydrate and fat are to supply energy to the body, but the major function of the protein is to make, available to the body the necessary amino-acids from which body protein like tissues, enzymes, hormones, antibodies etc. can be synthesized or replenished.

Deprivation of dietary protein results in loss of protein content from the different organs more specially from the liver. Addis et al. (1936) carried out a series of extensive studies and observed that with deprivation of protein there was loss of initial protein contents by 40% in case of liver, 29% in case of prostate and seminal vesicles, 28% in case of alimentary tract, 20% in case of kidney and the blood, 18% in case of heart, 8% in case of carcass i.e., muscle, skin and skeleton and 5% in case of brain. The loss of protein from the liver occurs much more rapidly than any other organs in the first few days of protein deficiency and on refeeding with high protein diet liver regains protein more rapidly. This indicates the considerable sensitivity of liver protein to dietary proteins.

Administration of glucose showed enhanced incorporation of labelled amino acids into the muscle proteins with the resultant effects of reduction in urea production by the liver and diminished protein synthesis in tissues other than muscles. It has been suggested that insulin secretion influences the amino-acids deposition in muscles after ingestion of carbohydrate as depicted below :



(After Munro and Allison, 1964).

As the diet influences the activities of many endocrine glands so also the hormones regulate the metabolic processes of dietary constituents. Any nutritional study, therefore, cannot forget to take into consideration the importance of endocrinal factors in nutrition.

It is accepted almost universally that many liver enzymes are very sensitive to the dietary supply of protein, and in a state of malnutrition in our country, the dietary supply of protein is either low or is utilized for purposes other than maintaining the regular and normal supply of amino acids to the liver.

In the present investigation, it is, therefore aimed to study the effect of protein deficiency on the liver enzymes, experimentally by feeding the animals with a restricted amount of dietary protein.