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AND TRIOTHEIN

USING RADIOACTIVE IODINATED OLEIC ACID

EGYPTIAN CHILDREN AND IN CASES OF KWASHIORKOR
STUDIES ON FAT DIGESTION AND ABSORPTION IN NORMAL

V V

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INTRODUCTION

From the dawn of history man, developed his knowledge, about food using his instincts and experience, till the chemical revolution of the second half of the 18th century when new information about the function and the composition of food became available.

In the field of nutrition we are nowadays facing greater problems in tropical and subtropical regions, which have resulted from the alarming increase in populations, and from prevalence of nutritional diseases, due to both ignorance, and poverty, as well as prevalence of gastrointestinal diseases due to lack of adequate sanitary measures, and medical services in such areas.

Malnutrition in its various forms, is still by far the most frequently encountered underlying cause for the high morbidity, and mortality rates in infants, and young children in the U.A.R. Marasmus represents an ultimate picture of General starvation while kwashiorkor is a deficiency syndrome which results from lack of dietary protein. A lack of calories is commonly associated, and is almost present in marasmus kwashiorkor. All gradations between are found.

Therefore, malnutrition may follow deprivation of sufficient quality of the diet which could contain the proper

INTRODUCTION

Conflicting opinions have been held by investigators as to the value of infant nutrition in the world, and

be masked by obesity. However, reflected in the loss of subcutaneous fat, which may however, not uncommon. If caloric malnutrition is present it will be made up with carbohydrate, the picture of the sugar baby was diluted milk formulae were given to infants, and the calories of infants and young children. In the past, when highly ment. However, such a diet is deleterious to the well being other food substances, to face most of the caloric requirement as it is often cheap, and available in larger amounts than A high carbohydrate diet is common in poor communities,

it, and provided there is enough left for other people. recommended, is harmless, provided the individual can afford for the U.A.R. Ingestion of amounts of proteins, larger than those economical impossibility in developing countries, including A diet with sufficiently high proteins, is still an

wasting nor obesity should be allowed. maintain the infant or child in energy equilibrium. Whether hand, the caloric value of the diet must be sufficient to proportions are compatible with good health. On the other hydrates, though considerable variations in their relative essential food elements namely; proteins, fats and carbo-

high fat content in the diet of children, still does not enjoy any popularity between physicians. This is especially so, for sick children who are considered to be intolerant to fats. Skimmed milk has always been a first choice, although it has the disadvantage of causing loose stools. Up to date, the usual forms of dried milks used in artificial feeding do not give more than 35% of the required calories in the form of fat, although the breast fed infant receives about 50% of his calories as fat (Holt et al, 1935).

According to some authors, protein malnutrition "kwashiorkor" is characterised among other abnormalities by low or absent enzymatic activity of the duodenal contents (Carvalho et al, 1947, Trowell, 1952 and Gomez et al, 1954a). This fact, together with the clinical impression that malnourished children develop steatorrhoea when fed moderate amounts of fat has lead the clinicians to prescribe a low fat diet especially during the early stages of recovery.

On the other hand, Chung et al (1951) reported that in cystic fibrosis of the pancreas, where steatorrhoea is caused by a defect of digestion, due to lack of enzymatic activity in the duodenal contents, fat absorption remains proportional to the

fat intake. Gomez et al (1953) have shown that there is no reason for limiting the fat intake in chronic severe malnutrition in children and that whole milk is eminently satisfactory in these cases, where most of its fat is absorbed.

Thus, there is much controversy as to the value of prescribing a larger intake of fat, in the treatment of kwashiorkor cases, and whether this would lead to a better net absorption of fat or would not.

It is possible to meet the caloric requirements of an individual, with a low fat diet but there are some well recognized, and important non-caloric functions of fats, which must be duly considered. These are :

1) The supply of essential fatty acids (Burr & Burr, 1930, 1932).

2) The protein sparing action of fats.

3) Their role in immunity (Hanger, 1934).

4) The supply of the associated fat soluble vitamins.

5) Their action on maturation of the epiphysees.

Therefore, it seemed necessary to study the utilization of fat by malnourished children, before dogmatically accepting the long established practice of prescribing them a diet very

formations.
 clinical method, that is likely to give the most accurate in-
 iodine. This method of study was chosen as it is the practical
 use of a fat, and a fatty acid labelled with radioactive
 studying fat digestion, and absorption in kwashiorkor by the
 high fat content. This investigation was carried out by
 feeding kwashiorkor cases on diets containing sufficiently
 the present work which aims at investigating the result of
 poor in fat content. This was the stimulus for carrying out

REVIEW OF LITERATURE

group of kwashiorkor syndrome.

the literature, they concluded that these cases belong to the Egyptian children, and after studying these cases, and reviewing edema with fatty liver, and hepatic cirrhosis among weaned Shukry, Awad & Hashem (1952) described cases of nutritional fatty damage in their hepatic parenchyma. A year later, of these cases, and by liver puncture biopsy they found marked reported a marked disturbance in the carbohydrate metabolism hepatic fatty change. In 1950, Mourice, Awad & Abo-El-Magd They also noticed that at post-mortem such cases show a marked studied some of the biochemical aspects of such a condition. diseases of infancy. Later Shukry, Mahdi & El-Gholmy (1958) (1958) on edema developing in the course of gastrointestinal In the U.A.R. the first attention was drawn by Shukri

Waterlow & Scrimshaw (1957). detailed in the literature especially by Trowell et al (1954); The characteristics of kwashiorkor have been sufficiently

comitant lack of vitamins. calories is commonly associated, besides an occasional con- fundamental deficiency is lack of dietary protein. A lack of Kwashiorkor is a deficiency syndrome, in which the

(I) The Kwashiorkor Syndrome

It has been pointed out, that those organs which are most active in handling proteins, and other nutrients are those most vulnerable to protein deficiency. These are the pancreas, the alimentary tract, the liver, and the salivary glands. Lesions have been described in all these organs (vide infra). (Srikanta et al, 1964; Bowie et al, 1963; Bhatnagar et al, 1962; Gillman et al, 1962; Arroyave et al, 1959; Badr El-Din & About Wafa, 1957). Opinions regarding the pathological findings of the pancreas in kwashiorkor are controversial. It is stated by Belsey (1961); Waterlow et al, (1957); Bras. et al, (1956); Gillman & Gillman (1951); Davies; (1948) that pancreatic changes in kwashiorkor include necrotic foci, and atrophy of the acini with disappearance of the zymogen granules as well as fibrotic changes, this would result in diminished enzymatic activity of the duodenal contents. However, the diagnostic value of these enzyme determinations in kwashiorkor remains questionable, and according to Scrimshaw (1957) the information they give is no more significant than that given by serum albumin determination alone. Despite the deficiency of pancreatic enzymes the digestion of food stuffs suffers relatively little in the absence of acute diarrhoea. (Orvalho et al, 1947; Thompson & Howell, 1952; Gomez et al, 1954a). On the other hand, Symons (1953) claimed that at

World maps of the distribution of kwashiorkor, and of high incidence of adult cirrhosis, and of primary carcinoma of liver overlap to a great extent. This would suggest, that all these three conditions may be produced by malnutrition. This lead to a widespread belief that malnutrition in infancy often predisposes to hepatic cirrhosis. Evidence has been put forward for a progression from the fatty liver of kwashiorkor to the development of cirrhosis. (Davies, 1948; Davies, 1951; Howell et al 1954; Dimecotte, 1956; Garwako, 1957; Chanda, 1958; and Ramalingaswami, 1964). However, there is a considerable weight of opinion against such a course of events, which is supported by long term follow up investigations which included liver histology. Besides, there is no evidence that progressive liver disease and cirrhosis are resultant of treated kwashiorkor. (Gillman & Williams, 1951;

post-mortem the pancreas is almost invariably normal which may account for the good food tolerance. Also Gillman et al, (1955) suggested that the acutely developing fatty liver in kwashiorkor might be related to an acute endocrine disturbance involving the islets of Langerhans, the adrenal cortex and the thyroid gland and not necessarily leads to atrophy of the exocrine part of the pancreas