STUDIES ON CERTAIN DIETARY FOODS

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B.Sc., Food Science, Ain Shams Univ. 1970.

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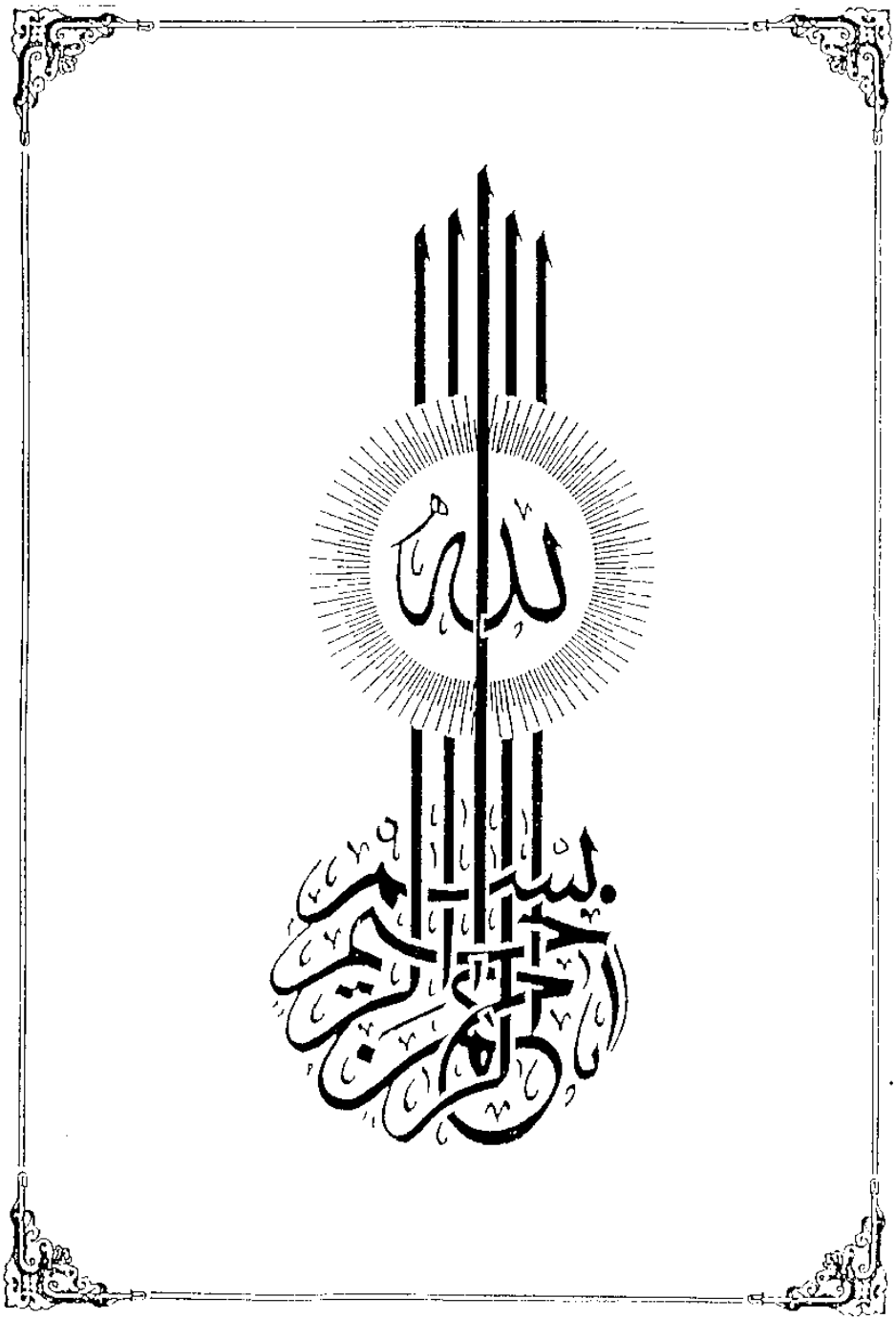

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C O N T E N T S

INTRODUCTION

Diabetes mellitus has been known for over two thousand years and was named in the second century. The most noticeable features of the disease are reduced ability to utilize carbohydrate, excessive urination (polyuria), high blood glucose levels (hyperglycaemia) and the excretion of glucose in the urine. Although the most obvious feature of diabetes is the impaired utilization of carbohydrate, the metabolism of fat and protein is also affected. The exact nature of these features can be explained by a relative deficiency of insulin, the hormone excreted by the pancreas.

The prevalence of diabetes is very high, there are about a quarter of a million cases in UK, two million in the USA and about 1,2 million in Egypt. Moreover, it is estimated that there are at least an equal number of cases undiagnosed. Evidence that the numbers are increasing was suggested by the attendence of new cases of children at Leicester Clinics (UK) where the number was doubled in ten years period (1952 - 1962).

Over-nutrition and obesity predispose to the development of diabetes at least in those persons who have an inherited tendency towards the disease. The liability increases with the degree of obesity. Also several diseases are more common among obese than among normal people,

these include heart and artery disease, high blood pressure and gallstones. On the other hand under nutrition seems to have a good effect in the treatment of newly diagnosed diabetes and weight reduction is often part of the treament. Mild diabetes cases may be treated by controlling the diet, more severe cases require the administration of insulin. Generally dietary treatment involves the reduction of the intake of carbohydrate.

At the same time, the carbohydrate is distributed throughout the day and any concentrated source of sugar is avoided. Some medical authorities prefer a special dietary foods which refer to the special quality of the food rather than to the pathological condition involved. Thus a food suitable for diabetics would be labelled low-carbohydrate or "energy reduced".

Special diabetic foods available in the UK include preserves, canned fruits, bread, flour, biscuits, beverages, sweets and chocolates, sauces, dessert moulds and jellies. In Egypt Bisco Misr company is producing the toast bread regime as a sole source of special di tary food. Bread is consumed in many forms by more than 1000 million humans. It contributes to a considerable amount of calories and protein compared to any other food (El-Samahi et al., (1985). The Middle Eastern diet consists mainly of cereals

and legumes, and about 64% of the daily protein intake is derived from cereals, (Mahmoud, 1978).

Restriction of carbohydrate in the diet of diabetics is widely advocated and practised in the Western Countries, but posses a special problem in the treatment of diabetic patients in many countries, where cereal based diet contributes the major bulk of their daily diet. Drastic changes in the diet may be needed to curtail carbohydrate intake. Recenlty there has been much interest in the possibility of treating diabetics with fiber-rich diets in addition to the restriction of available carbohydrates.

Bread and macaroni products contribute the major source of the caloric intake in Egypt. Therefore the production of low caloric-high fiber bread and macaroni will have commercial and public interest in treating diabetics.

Suggestions of several formulas for diabetic bread and macaroni on the basis of reduction of available carbohydrates and increasing the dietary fiber contents throughout different extent of flour or semolina replacement either by dietary fiber sources and/ or by protein rich sources which include wheat bran, guar gum, carboxy methyl cellulose, laboratory dietary fiber preparations, defatted soy

and chickpea flours were the first objective of the study.

Since introducing non-wheat protiens in bread making or macaroni formulas will affect the physical properties and dough characteristics, rheological properties evaluations of either suggested bread or macaroni formula were the second objective of this investigation. Bread making characteristics and sensory properties of suggested diabetic breads as well as cooking qualities and acceptabilities of produced diabetic macaroni were the third objective . Determination of chemical composition and caloric value of suggested diabetic bread and macaroni, were the fourth objective.

The work also includes the possibities of formulating blends for making bread and macaroni for body-weight control purposes. As energy is present in fats, proteins, carbohydraties, a reduction in each of these materials should have to induce a reduction in the energy value of foods. Therefore, produced foods containing bulky (with no calories) by using materials such as gums, pectins and other dietary fibere were considered the basis for body-weight control bread and macaroni formulations in this study.

On this basis formulations of bread and macaroni for body-weight control and obesity treatments were the fifth

objiective of this work. Dough physical properties and its suitabilities for bread or macaroni production are important and can not be excluded from these objectives as well as the chemical compositions, energy values, breadmaking characteristices or macaroni cooking qualities of the suggested bread and macaroni for body-weight control.

There is an evidence of the interference of the amylase inhibitors with starch metabolism and therefore decrease in starch availability. This finding lead to expect that alpha-amylase could be used as therapeutic agents to reduce postprandial hyperglycaemia and hyperinsulinaemia in patients with diabetes, obesity and related diseases. Such possibilities will have available interest in the field of special dietary food preparations for diabetes and over-weight purpose. In this respect, a survey of alpha-amylase inhibitors of local cereal and legume would be of interest. Food processing of such activities were also investigated. Characteristics of some alpha-amylase inhibitors such as effect of pH, and heat were determind. Physiological effects and nutritional significance of alpha-amylase inhibitors in rats diet were evaluated.

2. REVIEW OF LITERATURE

2.1. Dietary Foods:

The Food and Drug Administration (FDA) defined the term "special dietary uses" as applied to food for man as including "uses for supplying particular dietary needs which exest by reason of a physical, physiological, pathological or other conditions including but not limited to the conditions of diseases, convalescence, pregnancy, lactation, allergic hypersensitivity to food, underweight, and overweight" (FDA, 1955). According to this definition, any claim purporting that a food would supply a particular dietary need for diabetics or overweight would have classified the product as a food for special dietary use.

Foods intended for diabetics were required to bear nutritional labeling and the following statement "diabetics, this product may be useful in your diet on the advice of a physician. This food is not a reduced caloric food." If, however the food was useful in reducing or maintaining caloric intake, the last sentence in the statement could be eliminated. Terms such as for "diabetics" or "diabetes" were allowed to be included as part of a food. Finally, terms such as "dietetic diet" or similar descriptions could be included in the labeling of a food solely

because of its usefulness in the diet of diabetes. It was also felt that with the statement of ingredients on the lable indicating composition of the food, the diabetic and the physician would be able to evaluate the usefulness of the food, (FDA, 1978, 1980).

2.2. Diabetes:

Diabetes is a condition resulting from the failure of the pancreas to provide an adequte supply of insulin. In this condition a person can have high levels of sugar in the blood stream after a meal but the cells can not take the sugar to produce energy. Subsequently, under extreme conditions a diabetic can go into a coma,unlese there is an alternative source of energy (Labuza, 1974).

Diabetes mellitus has been known for over two thousand years and was defined in the second century. The outstanding features of the disease are reduced ability to utilize carbohydrate, excessive urination (Polyuria); high blood glucose levels (hyperglycaemia) and the execretion of glucose in the urine (glycosuria). Although the most obvious feature of diabetes is the impaired utilization of carbohydrate, the metabolism of fat and protein is also affected. The name from the Latin: diabetes to siphon or pass through, and mellitus-honey, indicating the passing of large volumes