GASTRIC MOTILITY STUDIES IN DIABETES MELLITUS

THESIS

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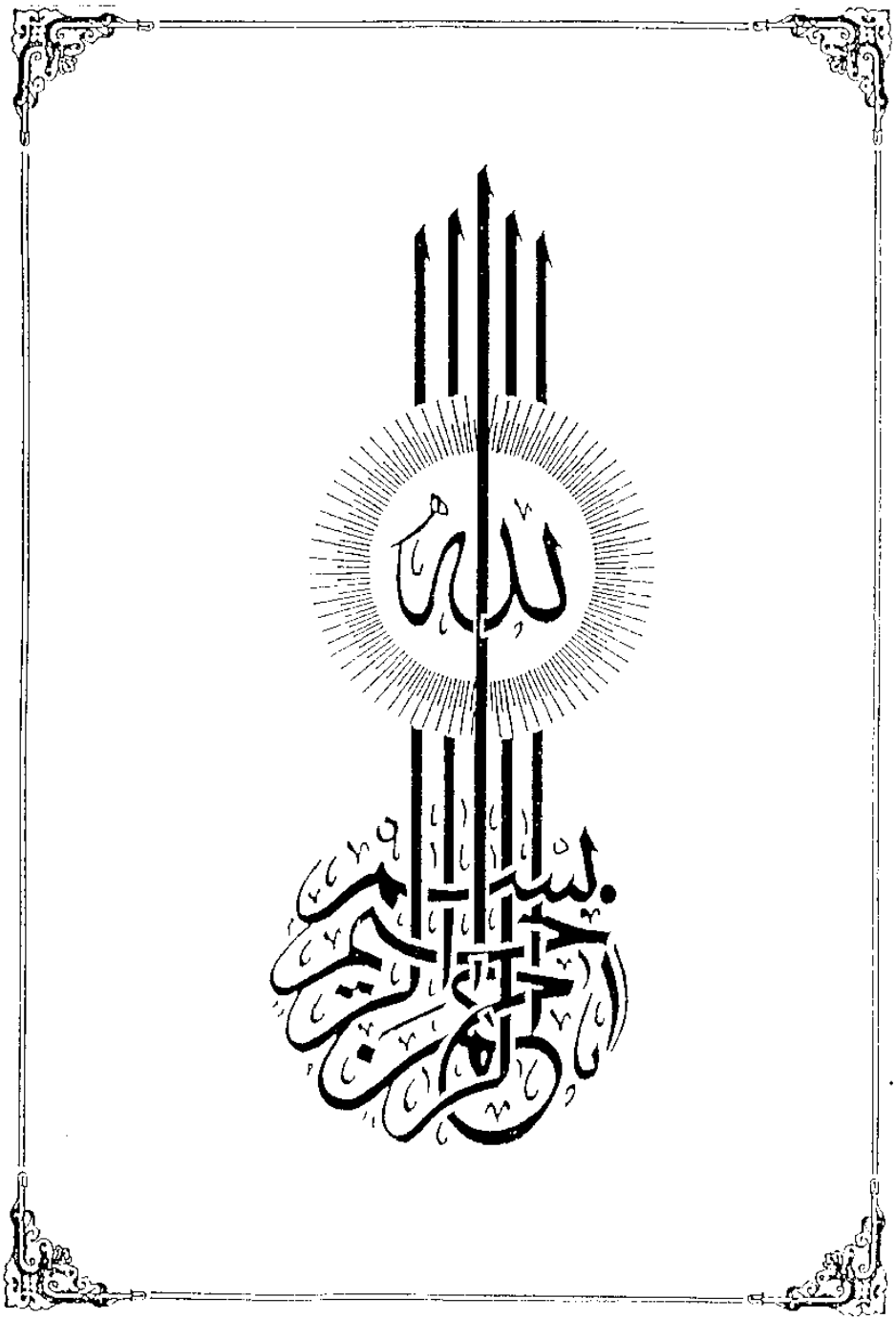

DEDICATION

TO MY BELOVED PARENTS

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INTRODUCTION AND AIM OF WORK

Introduction:

Diabetes mellitus, is one of the most prevalent metabolic disorders that provide the most serious long term risk. Diabetes mellitus is characterized by long-term complications.

The gastrointestinal symptoms resulting from motor abnormalities are very common in dibetes mellitus.

The symptoms of diabetic gastroparesis include: nausea, vomiting, satiety, gastric dilatation and diminished or absent peristalsis. Some diabetics, particularly those with evidence of autonomic neuropathy have shown delayed gastric emptying which occured much later (Graf et al., 1981).

Studies of gastric motility and emptying in diabetic patients often show poor motility and gastroparesis. Various techniques are employed in studies of gastric motility and emptying in man. The number of available techniques indicates that no single technique is perfect. The abdominal ultrasonography is an easy, simple, accurate, non-invassive and non-hazardous technique (Hassani N. 1976).

The seach for abnormalities is based on the assumption that an observed abnormalities of motility may be the cause of a patients symptoms. Disorders of gastric emptying give rise to non-specific clinical manifestations. Delayed gastric emptying can frequently be demonstrated in asymptomatic patients and severe symptoms can remit spontaneously. It is becoming increasingly clear that disorders of gastric

motility and emptying are of clinical importance (Robert Heading, RC, et al., 1988).

Diabetic patients have higher level of glucosylated haemoglobin, particularly HbA_{1c}. Estimation of the level of glycosylated haemoglobin is useful in evaluating the degree of control of the diabetic patient over the previous four to six weeks (Bunn H.F. 1981).

Ain of work:

The aim of this work is to study the effect of diabetes mellitus on the gastric emptying using abdominal ultrasonography.

The early detection of the effect of diabetes on the gastric motility and emptying is of great value in early management and thus may be of great help in reducing complications and mortalities resulting from diabetes.

REVIEW OF LITERATURE

DIABETES MELLITUS

DIABETES MELLITUS

Definition:

Diabetes mellitus is a syndrome characterized by a rise in blood glucose concentration above normal value, which if high enough will cause glucose to be excreted in the urine. The causes of hyperglycaemia are either an absolute or a relative insulin deficiency which leads to wide spectrum of defective carbohydrate metabolism. Also, the rise in blood glucose may be due to an inappropriate secretion of glucagon (Toft A.D. et al., 1983).

Eetiology of Diabetes Mellitus:

During the last ten years, newer knowledge of the aetiology and pathogenesis of diabetes mellitus has indicated that the disease is heterogenous in nature. It is now well established that diabetes mellitus is a heterogenous group of disorders sharing the common features of glucose introlerance. The various types which constitute this group differ in their clinical behaviour, epidemiological features, and pathological findings, thus most likely have a different aetiology and pathogenesis (Fajans et al., 1981).

Aetiologically, there are good evidences that there are two types of diabetes:

* Primary diabetes ; the cause is quite incomplete , although several factors are implicated - There are two different harms of primary diabetes :

1- Insulin - dependent diabetes mellitus (IDDM) , or type I diabetes, previously termed juvenile D.M.

2- Non-insulin - dependent diabetes mellitus (NIDDM) or type II diabetes , preniously termed maturity onset D.M.

* Secondary diabetes ; is rare and this occurs when the pancreas is nearly destroyed by a neoplasm, chronic pancreatitis, haemochromatosis or removed surgically.

Classification of Diabetes Mellitus:

Briefly, in the last few years, different classifications of diabetes have been reported (Bottazo and Doniach, 1976, Woodrow, 1976, Irivine, 1977 - National Diabetes Data Group, 1979 - World Health Organization, 1980 and Cudworth, 1981).These classifications reflect the state of knowledge on diabetes and the different characteristics of these types of diabetes. The classification proposed by World Heath Organization 1980 (WHO) and National Diabetes Data Group 1979 (NDDG) is made not according to age at onset or present age but rather according to the type of diabetes.

According to the "National Diabetes Data Group" in 1979 and the "World Health Organization" in 1980 the various clinical and pathogenetic types of sustained hyperglycaemia i.e. diabetes mellitus, are classified as follows:

Classification:

(1) Type I : Insulin-dependent diabetes mellitus "IDDM".

(2) Type II : Non-insulin dependent diabetes mellitus "NIDDM".

(3) Secondary diabetes: Diabetes mellitus associated with certain conditions and syndroms:

a) Pancreatic disease e.g. pancreatitis, cancer of the pancreas, haemochromatosis and toxic damage of pancreas.

b) Endocrine disease e.g. pheochromocytoma, acromegaly, cushing syndrome, glucagonoma and somatostatinoma.

c) Drug or chemically induced conditions.

d) Insulin receptor abnormalities.

e) Certain genetic syndromes.

f) Other types of secondary diabetes.

(4) Gestational diabetes mellitus.

(5) Impaired glucose tolerance (IGT):

This group includes;

a) Non obese impaired glucose tolerance.

b) Obese impaired glucose tolerance.

c) Impaired glucose tolerance associated with certain conditions a and syndromes.

(6) Normal glucose tolerance but experienced transient hyperglycaemia either spontaneously or in response to identifiable stimuli:

a) Previous abnormality of glucose tolerance (formely' latent diabets).

b) Potential abnormality of glucose tolerance (formely; prediabetes).

Glycosylated haemoglobin:

Definition of glycosylated haemoglobin:

Glycosylated haemoglobin is defined as haemoglobin component having a carbohydrate moiety attached to the N-terminal amino acid of both beta chains of the haemoglobin molecule. Glycosylated haemoglobin differs from HbA by having a carbohydrate moiety attached to the N-terminal valine of beta globin chain of HbA molecule, via a Schiff base linkage, which is rearranged into an irreversible and stable ketoamine linkage. Therefore, the sugar remains attached and detectable as such until the life of the red blood cell is ended (Bunn et al., 1981).

The glycosylation of hemoglobin is dependent on the cncentration of blood glucose. The reaction is not reversible, so that the half-life of glycosylated hemoglobin relates to the life span of red cells (which normally circulate for up to 120 days). Thus, glycosylated haemoglobin generally reflects the state of glycemia over the preceding 4-6 weeks, thus providing a method of assessing chronic diabetic control. A glycosylated hemoglobin close to the normal range (5-8%) would reflect good control during the preceding 2-3 months, whereas a glycosylated hemoglobin in the range of 12-15% would reflect poor control during the same period (Francis S. Greenspan, 1991).

Glycosylated haemoglobin and diabetes mellitus:

Trivelli et al., (1971) in a larger study on 100 diabetic patients and control subjects included 20 normal individual who had no family history of diabetes. They found that increase of two to three fold of HbA_{1c} concentration in diabetic patients.

Tattersall et al., (1975) proposed that the abnormal increase in glycosylated haemoglobin found in diabetes mellitus is one of manifestations of metabolic abnormality of diabetes rather than in genetic marker.

Koeing et al (1976) found a highly significant correlation between HbA_{1c} concentration and the response to an oral glucose tolerance test in diabetic patients.

Fraser et al., (1979) studied 40 newly diagnosed non-obese diabetic patients and showed that the glycosylated haemoglobin concentration is raised in all diabetics at diagnosis.

These results agree with our work as regard to the increase of two to three fold of HbA_{1c} concentration in diabetics over values found in normal subjects.

Glycosylated haemoglobin and diabetic control:

Gabbay in 1976 concluded that there is a general agreement that the level of glycosylated haemoglobin is an important index of the control of diabetics during treatment. On the other hand, glycosylated haemoglobin is a more reliable index than the presence of hyperglycaemia or glycosuria. In additional, following the observation of increased concentration of