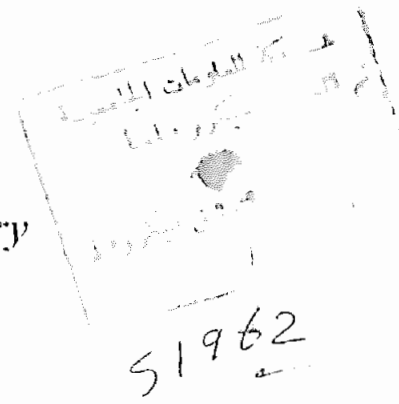
FRUCTOSAMINE AND GLYCOSYLATED HEMOGLOBIN (HBAIc) IN DIABETIC PREGNANCY

THESIS
Submitted For Partial Fulfiliment of
Master Degree in
Obstetrics and Gynaecology

By
Hewida Yousif Afify El-Bagory
MB.B.Ch.



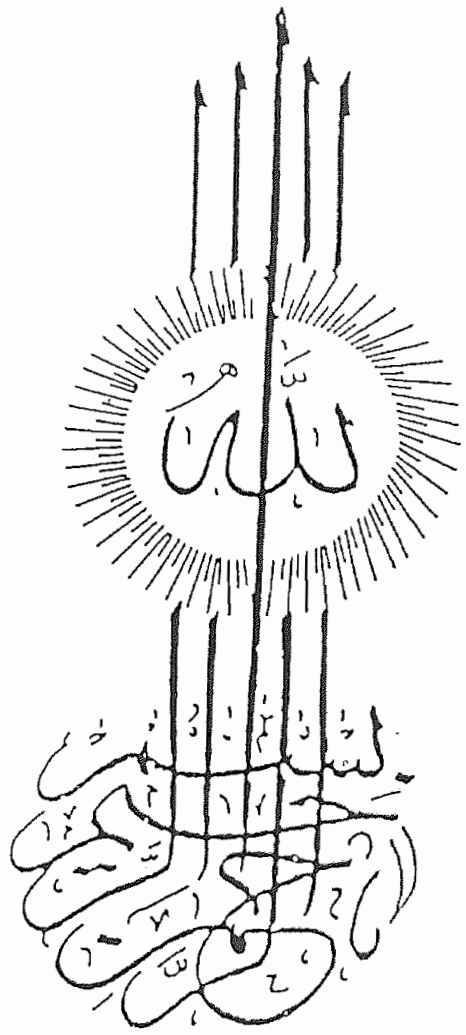
Suppervisors

Prof. *Dr. Mohamed Farouk Fikry*
Prof. of Obstet and Gynae,
Faculty of Medicine , Ain Shames University

Dr. Hazem Amine El-Zeneny
Assist. Prof of Obstetric and Gynae,
Faculty of Medicine, Ain Shames University

Dr. Hadia Hussuin Bassim
Assist. Prof. of Clinical Pathology,
Faculty of Medicine, Ain Shames University

Faculty of Medicine ,
Ain Shames University
1994



قالوا سبحانك لا علم لنا إلا ما علمتنا

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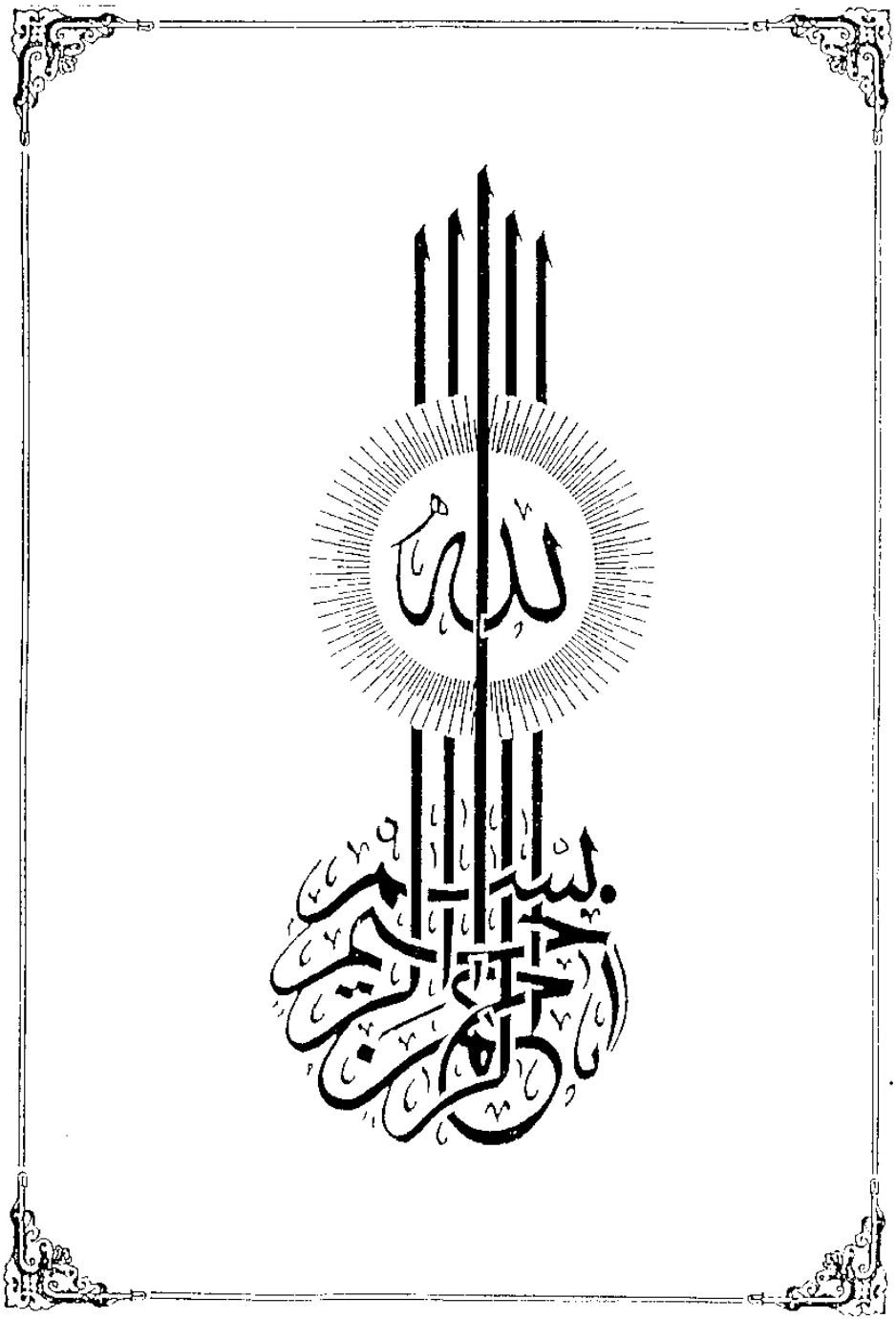

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THIS WORK IS DEDICATED TO

* *MY PARENTS*
* *MY HUSBAND*
* *MY SON*

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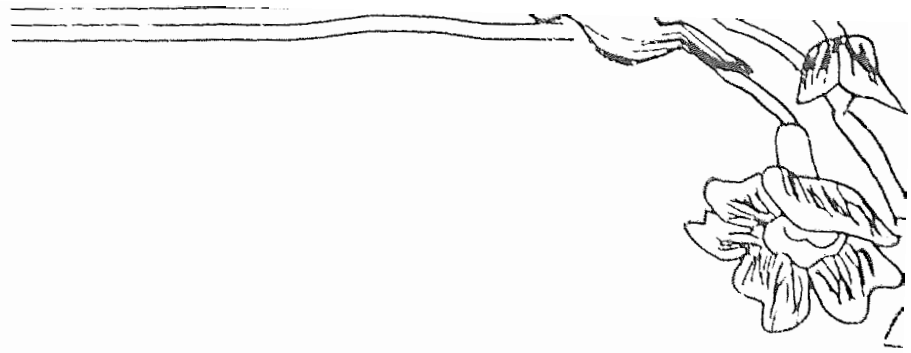


INTRODUCTION
&
AIM OF THE WORK

INTRODUCTION

The effect of diabetes on pregnancy has been extensively studied. It is thought that maternal hyperglycemia passively produces fetal hyperglycemia which induces fetal hyperinsulinemia; *(Pedersen, 1977).*

The functional hyperinsulinemia has been proposed to account for many of the complications observed in newborn infants of diabetic mothers such as hypoglycemia, congenital abnormalities of the spine, skeletal, genitourinary and cardiovascular system; *(Pedersen, et al., 1974).*

Recent reports have emphasized the beneficial effect of careful control of maternal blood sugar levels on diabetic pregnancy outcomes, thereby generating considerable interest in this aspect of management; *(Adashi, et al., 1979).*

Measurement of glycosylated hemoglobin (Hb A1c) have proved to be a useful index of long term (4-6 weeks) monitoring of blood glucose control during pregnancy; *(Schwartz, et al., 1976).*

Hemoglobin (A1c) level appears to depend on the mean circulatory glucose levels to which the erythrocytes are exposed during their 120 days life span. Thus hemoglobin A1c concentration correlates

with mean maternal glycemia when erythrocyte survival time is normal; *(Kjargaard, et al., 1980).*

Pollock, et al., 1981 reported a significant increase in the level of glycosylated hemoglobin in the mothers of large for gestational age infants compared to appropriate control women .

Measurement of glycosylated hemoglobin is useful in patient with stablished diabetes to identify pregnancies at risk for complications known to be associated with significant hyperglycemia such as spontaneous abortion, congenital fetal malformations, fetal loss due to premature labour, intrauterine fetal death, macrosomia and other neonatal morbidities; *(Peterson and Jovanovic, 1986).*

Fructosamine is a novel approach for measuring glycated plasma proteins, based on the ability of glucose bound to protein with a ketoamine linkage to reduce nitroblue tetrazolium in alkaline conditions; *(Johnson et al., 1982) .*

Fructosamine concentration reflect blood glucose control during the previous one to three weeks, but do not change significantly from day to day, offering the convenience of random blood sampling; *(Baker, et al., 1984).*

It is shown that 85% of women with diabetes in pregnancy have higher levels of serum fructosamine than non diabetic pregnant women,

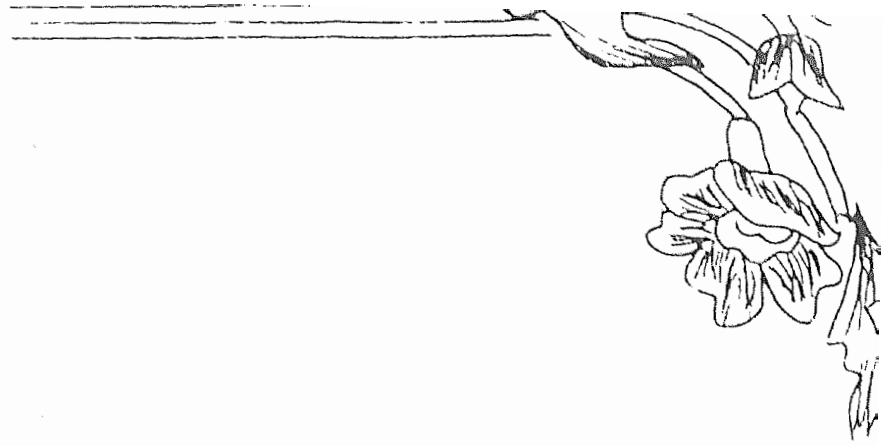
suggesting that fructosamine might be a useful test for gestational diabetes; *(Roberts, et al., 1983).*

In well controlled diabetic pregnancy both fructosamine and Hb A1c reliably indicated trends in blood glucose but fructosamine test has the advantages of precise, fully automated analysis and low cost; *(Parfitt, et al, 1993).*

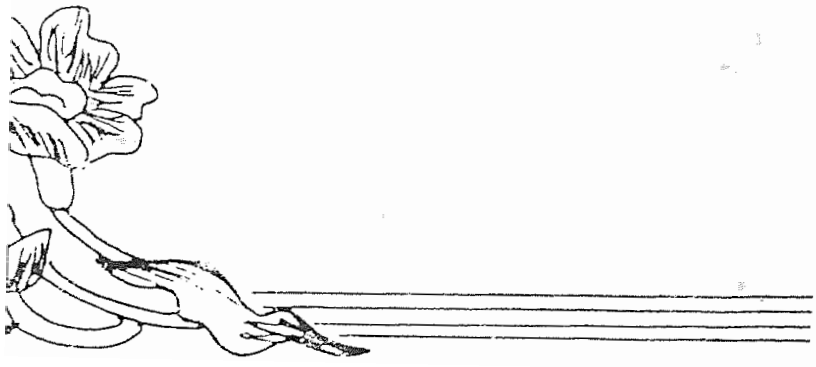
Serum fructosamine estimation did not offer any distinct additional advantage as a retrospective index of diabetic control in the management of diabetic pregnancy; *(Thai, et al., 1991).*

AIM OF THE WORK

In this study we aimed to correlate between maternal serum glucose level and serum level of fructosamine and glycosylated hemoglobin (Hb A1c) both in normal pregnant females and diabetic pregnant females during the first and the third trimester of pregnancy to predict the significance of fructosamine and glycosylated hemoglobin as parameters detecting diabetic control during pregnancy.



REVIEW OF LITERATURE



" Definition Of Diabetes Mellitus"

Diabetes mellitus refers to a clinical syndrome characterized by hyperglycemia due to deficiency or diminished effectiveness of insulin. The metabolic disturbances affect the metabolism of carbohydrate, fat, water and electrolytes; ***(Brudenell and Doddridge, 1989).*** It is accompanied in its complicated form by ketosis and protein wasting. When present for prolonged periods, the disease is complicated by the development of small blood vessel disease (micro-angiopathy) involving particularly the retina (diabetic retinopathy), renal glomeruli (diabetic nephropathy), peripheral nerves (diabetic peripheral neuropathy) and accelerated atherosclerosis; **(Jacomo, et al., 1976).**

Clinical diabetes mellitus may vary from asymptomatic disorder detected on the basis of an abnormal glucose determination to a fulminant, potentially catastrophic condition, in which there is shock, coma or both; ***(Berry and Gabbe, 1986).***

Diabetes may accompany pregnancy in old diabetic female or may be presented for the first time as gestational diabetes. Pregnancy complicated by carbohydrate intolerance is the most common risk factor for women in the reproductive age. The occurance of pregnancy in diabetic women has always had a fascination for the obstetrician because of the obvious effects which the maternal disease has on both the course of pregnancy and fetal outcome. Beside this, diabetes

mellitus produces placental changes; whether macroscopically or microscopically, that may affect intrauterine development of the fetus leading to fetal distress or intrauterine fetal death; *(Fox, 1978).*

"Classifications of Diabetes in Pregnancy"

* *The National diabetic data group (1979).*

A: Insulin dependent type (type I).

B: Non insulin dependent type (type II)

1- Non obese.

2- Obese.

C: Secondary diabetes:

1- Pancreatic diseases.

2- Hormonally induced.

3- Chemically induced .

4- Insulin receptor abnormalities.

5- Certain genetic syndrome.

D: Impaired glucose tolerance (Subclinical diabetes).

E: Gestational diabetes: (Pregnancy induced glucose intolerance).

* *Priscilla White Classification . (1978),*

White "1978" provided an update of her classification of pregnant women with diabetes. Unfortunately its increasing complexity may have impaired its usefulness.

Class A : Chemical diabetes.

Class B : B_1 = Age 20 years.

B_2 = Duration 10 years.

Class C: C_1= Age 10-20 years.

C_2=Duration 10-20 years.

Class D: D_1= Age 10 years.

D2= Duration 20 years.

D3= Benign retinopathy.

D4= Hypertension.

D5= Calcified leg veins.

Class E: Calcified pelvic vessels.

Class F: Nephropathy.

Class G: Many organs failure.

Class H: Heart failure.

Class R: Proliferative retinopathy.

Class T: Renal transplantation.

N:B Another modification of White classification, has been suggested by *"Metzger, et al., 1985"* in which class A is divided into:

A_1: Fasting plasma glucose < 105 mg /100 ml .

A_2: Fasting plasma glucose > 105 mg /100 ml

Pyke classification:

I Gestational diabetes:- Diabetes that starts during pregnancy and disappears after pregnancy.

II Pregestational diabetes:- Diabetes that begins before conception and continues after pregnancy.

III Pregestational diabetes complicated by vascular disease: Retinopathy, nephropathy, pelvic vessels or peripheral vascular disease; *(Pyke and Essex, 1975).*