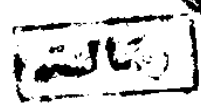


FETAL BIOPHYSICAL PROFILE SCORING
IN DIABETIC PREGNANTS

THESIS
SUBMITTED FOR PARTIAL FULFILMENT OF
MASTER DEGREE OF GYN.AND OBST.

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ACKNOWLEDGMENT

Thanks God for helping me to terminate this work.

I would like to express my deepest gratitude and appreciation to my eminent professor Dr. Maher Mahran chairman and professor of Gyn. and Obst. faculty of Medicine Ain Shams University, for his continuous guide, kind advise, endless encouragement, and valuable suggestions throughout the present work.

I never ever forget his meticulous, persistent support, and Fatherhood for me in all situations, and I feel a great honour for acting under his kind supervision.

I would like also to express my cordial and unlimited gratefulness to my senior professor Dr. Mohamed Abd Alla El-Maraghy professor of Gyn. and Obst., faculty of Medicine Ain Shams University, for his faithful help, honest assistance, patience and sincere guide, without which, this thesis would have not been delivered in this form.

I wish to express my deepest thanks, and indebtedness to Dr. Gamal Abdel Salam Wafa lecturer of Gyn and Obst. , faculty of Medicine, Ain Shams University for his best, most valuable, kind advise and beneficial help throughout this work.

Last but not least, appreciate thanks and faithful gratitude to my senior staff and my colleagues working in the ultrasonic department of Gyn. and Obst. Ain Shams University for their kind help in carrying out the practical part of this work.

Kala Saad

1990



INTRODUCTION

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Antepartum detection of fetus at risk in utero remains a major challenge in modern obstetric practice. Monitoring of fetal biophysical activities is widely applied as a method for antepartum evaluation of fetal-well being. Most of these methods are based on evaluation of a single biophysical variable such as heart rate responses (e.g. nonstress test); (Rochard, et al., 1976), fetal breathing movements ; (Platt, et al., 1978) or gross body movements; (Sadovsky and Yaff, 1973) and (Manning, et al., 1979). The results of these single variable tests show that, it is not the most accurate method, as all variables individually have false negative rates and false positive rates; (Manning, et al., 1980).

Combined observation of fetal biophysical activities can significantly reduce the false positive rate; (Brady and Freeman, 1977) and (Manning and Platt, 1979). Combined observation of five fetal biophysical variables (Fetal movement, tone, heart rate reactivity, breathing movements and semiquantitative amniotic fluid volume) resulted in a significant decrease in both the false negative and false positive rates; (Manning, et al., 1980).

A " high-risk" pregnancy is one in which the mother or the fetus has a significantly increased chance of death or disability, when compared with a "Low-risk" pregnancy in which an optimal outcome is expected for both; (Chez; 1982).

Diabetes mellitus with pregnancy is one of the most common risk factors for women in all reproductive years, as the occurrence of pregnancy in a diabetic woman has always an obvious effect on both the course of pregnancy and fetal outcome; (Nummi;1972) and (Horgner;1975).

Manning,et al.,(1981) observed that, fetal biophysical profile offers an improved and early method of fetal risk detection, it can be used as a method for antepartum fetal risk assessment in high risk patients .

Steven, et al., (1984) reported that, antenatal surveillance in the well-controlled diabetic woman can be safely achieved by fetal biophysical profile .

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*Evaluation of the value of fetal biophysical profile
in the antenatal assessment of diabetic pregnant.*

REVIEW

DIABETES MELLITUS(D.M.)

Introduction:

Diabetes mellitus refers to a clinical syndrome characterized by hyperglycemia due to a deficiency or diminished effectiveness of insulin .The metabolic disturbances affect the metabolism of carbohydrate, protein, 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. Clinically D.M. may vary from an asymptomatic disorder detected on the basis of an abnormal blood 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 occurrence of pregnancy in diabetic woman 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, D.M. produces placental changes; whether macroscopically; (Nummi,1972),or microscopically;that may affect intrauterine developement of the fetus leading to fetal distress or intrauterine fetal death ; (Fox, 1969; 1978) and (Jacomo, et al.,1976).

METABOLIC CHANGES IN NORMAL AND DIABETIC PREGNANCIES

(I) NORMAL PREGNANCY

(A) Carbohydrate Metabolism

In the first few weeks of pregnancy maternal carbohydrate metabolism is affected by a rise in serum levels of estrogen and progesterone that results in pancreatic beta cell hyperplasia, an increase in insulin secretion and heightened tissue sensitivity to insulin. These initial metabolic alterations are anabolic and stimulate increase storage of tissue glycogen. The increase in peripheral glucose utilization and decrease in fasting plasma levels of glucose by about 10% occurs by the mid to late first trimester, long before the fetus has substantial requirements for this nutrients; (Hollingsworth,1985).

Metzger, et al.,(1982) had observed that, normal pregnant women who are fasted after dinner and skip breakfast demonstrate a significant fall in glucose levels.

During the second half of pregnancy; maternal carbohydrate metabolism is stressed by rising levels of human placental lactogen (H.P.L.) and other prolactin and steroid hormones ;synthetized by the placenta, so that, plasma levels of prolactin (decidual and pituitary

origin) , cortisol and glucagon are increased in late pregnancy. The sum of these hormonal changes results in moderate insulin resistance, mobilization of hepatic stores of glycogen, an increase in hepatic glucose production and stress on normal glucose tolerance in the postprandial state, i.e. postprandial hyperglycemia; (Freinkel, 1980) and (Hollingsworth, 1985).

Phelps, et al, (1981) ; reported that, despite starting from lower premeal level; glucose attains greater and more prolonged postprandial elevation in late pregnancy than the non pregnant state.

So during gestation, the response to feeding promotes delivery of ingested carbohydrate to the fetus through exaggerated and prolonged hyperglycemia; (Naismith, 1981).

(B) Lipid Metabolism

Every aspect of lipid metabolism is affected by pregnancy, particularly the free fatty acids, triglycerides, phospholipids and cholesterol; (Brudenell and Doddridge, 1989).

Free Fatty acid (FFA), triglycerides and glycerol :

The plasma level of FFA falls from early to midpregnancy and thereafter shows a significant rise. The same for plasma level of glycerol. This is in keeping with the accumulation of body fat that occurs during the first two trimesters of pregnancy (anabolic phase). In the last

third trimester increased catabolism occurs causing raised FFA and glycerol levels which are then available as fuel to the maternal tissues to offset the increasing diversion to the rapidly growing fetus of glucose and amino acids. The increased level of FFA also leads to an increase in the transplacental passage to the fetus; (Goldstein, et al., 1985).

Cholesterol and phospholipid :

As with FFA, glycerol and triglycerides, the plasma levels of cholesterol and phospholipid are increased; (O'Sullivan, et al., 1975). The change in cholesterol and phospholipid metabolism in pregnancy, is mediated by hormonal changes and fits into the general pattern of an increase in storage of glycogen and fat in most maternal tissues during the first two trimesters of pregnancy. In the third trimester, the storage of nutrients levels off and more fuel is mobilized for the benefit of both mother and fetus; (Kalkhoff, et al., 1979).

(C)Protein metabolism :

Naismith and Morgan; (1976), had drawn attention to the biphasic nature of protein metabolism during pregnancy with an early phase of protein storage followed by protein breakdown in late pregnancy analogous to the cycle for carbohydrate and fat.

The catabolic phase of protein metabolism occurs irrespective of the protein intake of the mother, indicating that it is under hormonal, rather than dietary control, and that maternal dietary energy rather than protein appears to be the major determinant of fetal growth; (Young, 1983).