

**An-Najah National University
Faculty of Graduate Studies**

**Improving Health Services for Diabetic Pregnant
Women who are Attending Governmental Clinics in
Nablus and Jenin Districts.**

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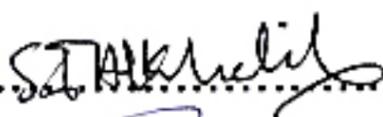
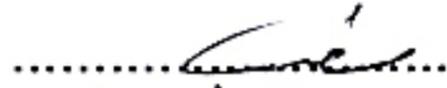
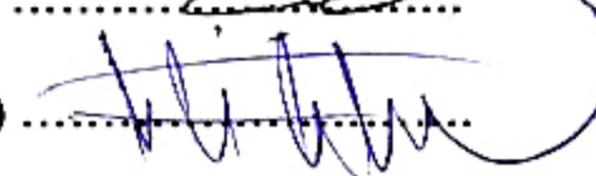
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This Thesis was defended successfully on 23/12/2006 and approved.

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Dedication

I would like to thank my father and mother and to my brothers and sisters for their encouragement and support through out my study.

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Abbreviations

DM	Diabetes Mellitus
GDM	Gestational Diabetes Mellitus
IGT	Impaired Glucose Tolerance
IFG	Impaired Fasting Glucose
FPG	Fasting Plasma Glucose
OGTT	Oral Glucose Tolerance Test
2-h PG	2-h Post load Glucose.
GCT	Glucose Challenge Test
BMI	Body Mass Index
UTI	Urinary Tract Infection

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Abstract

Diabetes is often detected in women during their childbearing years and can affect the health of both the mother and her baby. Poor control of diabetes in a pregnant woman increases the chances for birth defects and other problems for the baby. It might also cause serious complications for the woman. Proper health care, before and during pregnancy, will help prevent birth defects and other poor outcomes, such as miscarriage and stillbirth.

The risk factors, associated with diabetes during the childbearing age among women in Nablus and Jenin district, were studied in addition to the complications facing both the woman and her baby. The researcher also assessed women's knowledge about diabetes.

A random sample of 200 diabetic pregnant women was chosen, of these, 117 of women, included in the sample had developed gestational diabetes, another 38 had pre-gestational diabetes (Type 1) and another 45 had pre-gestational diabetes (Type 2).

Data were collected for the purpose of filling the questionnaires using the files available at the health clinics. Data included personal information, obstetric history information and medical information. All

data of the questionnaire for 200 subjects were entered into the computer and computed using SPSS program.

After data collection and analysis, it was found that, according to BMI: 15.8% of women who had pre-gestational diabetes (Type 1) were over weight, and 15.8% were obese .The results according to age of onset were : about 10.5% of them (the age of onset) were between 5-15, 63.2% of them (the age of onset) were between 15.1-25, 21.1% of them (the age of onset) were between 25.1-35 and 5.3% of them (the age of onset) was more than 35. Pertaining to family history of diabetes, 71.1% of them had first degree relatives.

In contrast, according to BMI, of all women who had pre gestational diabetes (Type2), 40% of them were over weight, 42.2% were obese and 6.7% had morbid obesity. According to age of onset, 8.9% of them (the age of onset) were between 15.1-25, 66.7% of them (the age of onset) were between 25.1-35 and 24.4% of them (the age of onset) were more than 35 years old. Pertaining to family history of diabetes, 88.9% of them had first degree relatives.

Also, it was found that 27.4% of women who had gestational diabetes were over weight, 39.3% were obese and 7.7% had morbid obesity. According to age of onset, 15.4% of them (the age of onset) were between 15.1-25, 41.0% of them (the age of onset) were between 25.1-35, and 43.6% of them (the age of onset) were more than 35 years old. Concerning family history of diabetes, 76.1% of them had first degree relatives.

Chapter One

Introduction

1.Introduction

Given my work in the Palestinian Ministry of Health and very close to the diabetes clinic, I noticed a growing number of pregnant women visiting the diabetes clinic. Some had Type 1 diabetes, while others had type 2 diabetes, and some had gestational diabetes. Diabetes can affect the health of both the mother and her baby. Poor control of diabetes in a pregnant woman increases the chances for birth defects and other problems for the baby. It might also cause serious complications for the woman. Against this background, I decided to shed light on this disease to raise awareness and bring health professional's attention to this health problem and its consequences in terms of cost, suffering, low productivity, and to highlight the importance of providing the diabetic patient with quality health care services through the diabetes health clinics run by the ministry of health directorates. In addition, this research aimed at providing researchers and health professionals with updated data about the state of the disease.

Diabetes mellitus “is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of various organs, especially the eyes, kidneys, nerves, heart, and blood vessels”. (Diagnosis and classification of diabetes mellitus. 2005).

Several pathogenic processes are involved in the development of diabetes. These range from auto-immune destruction of the B-cells of the pancreas with consequent insulin deficiency to abnormalities that result in resistance to insulin action. (Diagnosis and classification of diabetes mellitus. 2005).

1.1 Classification of diabetes mellitus

1.1.1 Type 1 diabetes :(B-cell destruction, usually leading to absolute insulin deficiency) Immune-mediated diabetes, or juvenile-onset diabetes. Type 1 diabetes represents 5-10% of cases of diabetes mellitus. These individuals need insulin treatment to survive.

1.1.2 Type 2 diabetes: (ranging from predominantly insulin resistance with relative insulin deficiency to predominantly insulin secretory defect with insulin resistance). This form of diabetes, which accounts for 90-95% of those with diabetes, was previously referred to as non-insulin dependent diabetes, or adult-onset diabetes. These individuals do not need insulin treatment to survive.

1.1.2.1 Causes and risk factors for type 2 diabetes

These included age \geq 45years, family history(first degree relatives with type 2 diabetes), obesity(BMI \geq 27 kg/m²), with central fat distribution), history of impaired fasting glucose or impaired glucose tolerance, history of gestational diabetes or delivery of a baby weighing >4kg, race and ethnic background, hypertension(blood pressure \geq 140/90 mmHg), low level HDL cholesterol or high level of triglyceride, malnutrition in the first year of life, and particularly in utero, lifestyle factors(physical inactivity, high-fat low-carbohydrate diet, alcohol, smoking).(Pickup J. and Williams G. 2003)

1.1.2.2 Prevention of type 2 diabetes

The onset of type 2 diabetes can be prevented or delayed in individuals with IGT, by following healthy lifestyle measures including a

low- fat diet, increased physical activity and modest weight loss, high risk individuals; especially in susceptible ethnic groups they should be screened for hyperglycemia every 3 years. (Pickup J. and Williams G. 2003)

1.1.3 Gestational diabetes mellitus (GDM)

Gestational diabetes mellitus is defined as any degree of glucose intolerance with onset or first recognition during pregnancy. The definition applies regardless of whether insulin or only diet modification is used for treatment or whether the condition persists after pregnancy.

1.2 Symptoms and signs of diabetes mellitus

These include polyuria, polydypsia, increase of appetite, blurred vision, drowsiness, dehydration, hyperglycemia with massive glucosuria, extreme fatigue, muscle wasting, weight loss, frequent and/or slow-healing infections (including bladder, vagina, skin). Ketoacidosis is unfortunately still too frequent and sometimes fatal on Type 1 diabetes. (Patel A, 2003)

1.3 Treatment of diabetes mellitus

Treatment of type 1 diabetes depends on insulin, diet and physical exercise, whereas treatment of type 2 diabetes depends on diet, physical exercise, tablets, insulin or both (insulin and tablets). Both types should be supported by diabetes education, and self-care, particularly blood glucose self-monitoring. (Alwan A. 1994)

1.4 Complications of diabetes mellitus

Acute complication: Hypoglycemia, ketoacidosis (more severe on

Type 1), infections, hyperosmolar non-ketotic coma on adult.

Late complications: Microvascular origin (retinopathy, nephropathy, neuropathy), Macrovascular origin (accelerated atherosclerosis, coronary heart disease; stroke and peripheral vascular disease), diabetic foot and amputation. (Clavell MC. 2001)

1.5 Criteria for the diagnosis of diabetes mellitus

1. Symptoms of diabetes plus casual plasma glucose concentration ≥ 200 mg/dl (11.1 mmol/L).

Casual is defined as any time of day without regard to time since last meal. The classic symptoms of diabetes include polyuria, polydipsia, and unexplained weight loss. Or

2. FPG ≥ 126 mg/dl (7.0 mmol/L). Fasting is defined as no caloric intake for at least 8 hrs. Or
3. 2-h postload glucose ≥ 200 mg/dl (11.1 mmol/L) during an OGTT. The test should be performed as described by WHO, using a glucose load containing the equivalent of 75 g anhydrous glucose dissolved in 250-350 ml of water. (Diagnosis and classification of diabetes mellitus. 2005).

1.6 Impaired Glucose Tolerance (IGT) and impaired fasting glucose (IFG)

Impaired glucose tolerance is a category that permits classification of individuals whose glucose tolerance is above the conventional normal range but lower than the level considered diagnostic of diabetes. Such

persons do have a high risk of developing diabetes mellitus.

This group is defined as having fasting plasma glucose (FPG) levels ≥ 100 mg/dl (5.6 mmol/l) but < 126 mg/dl (7.0 mmol/l) *or* 2-h values in the oral glucose tolerance test (OGTT) of ≥ 140 mg/dl (7.8 mmol/l) but < 200 mg/dl (11.1 mmol/l). Patients with IFG and/or IGT are now referred to as having "pre-diabetes" indicating the relatively high risk for development of diabetes in these patients. In the absence of pregnancy, IFG and IGT are not clinical entities in their own right but rather risk factors for future diabetes as well as cardiovascular disease. IFG and IGT are associated with the metabolic syndrome, which includes obesity (especially abdominal or visceral obesity), dyslipidemia of the high-triglyceride and/or low-HDL type, and hypertension. (Diagnosis and classification of diabetes mellitus. 2005).

1.6.1 Criteria for the diagnosis of impaired glucose tolerance (IGT) and impaired fasting glucose (IFG)

The categories of FPG values are as follows:

FPG < 100 mg/dl (5.6 mmol/l) = normal fasting glucose;

FPG 100-125 mg/dl (5.6-6.9 mmol/l) = IFG (impaired fasting glucose);

FPG ≥ 126 mg/dl (7.0 mmol/l) = provisional diagnosis of diabetes

The corresponding categories, when the OGTT is used, are the following:

2-h postload glucose < 140 mg/dl (7.8 mmol/l) = normal glucose tolerance;

2-h postload glucose 140-199 mg/dl (7.8-11.1 mmol/l) = IGT (impaired glucose tolerance);

2-h postload glucose ≥ 200 mg/dl (11.1 mmol/l) = provisional diagnosis of diabetes. (Diagnosis and classification of diabetes mellitus. 2005).

Table (1.1) Criteria for the diagnosis of diabetes mellitus.

Normoglycemia	IFG and IGT	Diabetes mellitus
FBG <100 mg/dl	FBG ≥ 100 mg/dl and <126mg/dl (IFG)	FBG ≥ 126 mg/dl
2-h PGT < 140mg/dl	2-h PGT ≥ 140 mg/dl and < 200mg/dl(IGT)	2-h PGT ≥ 200 mg/dl

1.7 Diabetes mellitus and pregnancy

1.7.1 Classification of diabetes in pregnancy

Diabetes in pregnancy can be classified as:

1.7.1.1 Pre-gestational diabetes is present prior to pregnancy and is either Type 1 diabetes or Type 2 diabetes.

1.7.1.2 Gestational- diabetes develops during pregnancy due to the diabetogenic effect of pregnancy.

1.7.2 Gestational Diabetes-mellitus (GDM):"is carbohydrate intolerance resulting in hyperglycemia of variable severity with onset or first recognition during pregnancy." The definition applies irrespective of whether or not insulin is used for treatment or the condition persists after pregnancy; it does not exclude the possibility that glucose intolerance may antedate pregnancy but has been previously unrecognized. (Gestational diabetes mellitus. 2004)

1.7.2.1 Women at risk for gestational diabetes

Women at risk for gestational diabetes include those who are obese,

have history of gestational diabetes, have strong family history, over 25 years old, high blood pressure, belong to an ethnic group known to experience higher rates of gestational diabetes, given birth to a big baby, unexplained stillbirth, baby with birth defects.

1.7.2.2 Prevalence and incidence of GDM

There has a significant increase in prevalence of GDM in the last few years. Approximately 7% of all pregnancies are complicated by GDM, and prevalence ranges from 1-14% of all pregnancies. The prevalence varies depending on factors, such as age, parity, and obesity, and on the criteria used in testing. Incidence of 0.5% of GDM was in women younger than 20 years of age and 4% in women aged 35-39 years (in the United States). Usually it disappears after delivery. Numerous studies have shown that women with GDM have a 17-36% risk of developing non-gestational diabetes within 5-16 years after GDM affected pregnancy.

1.7.2.3 Classification of GDM

White classification of the diabetic pregnancy

- A Diabetes treated with diet or drugs
- B Age of onset ≥ 20 years, and duration < 10 years
- C Age of onset 10-19 years, or duration 10-19 years
- D Age of onset < 10 years, duration > 20 years
- E Calcification of pelvic vessels
- F Nephropathy

- R Proliferative retinopathy
- FR Nephropathy and proliferative retinopathy
- G Poor obstetric history

1.7.2.4 Testing for Gestational Diabetes

There are certain factors that place women at lower risk for the development of glucose intolerance during pregnancy, and it is likely not to be cost-effective to screen such patients.

Pregnant women who fulfill all of these criteria need not be screened for GDM.

1.7.2.5 This low-risk group comprises women who

Are <25 years old,

Have normal body weight,

Have no family history (i.e., first-degree relative) of diabetes,

Have no history of abnormal glucose metabolism,

Have no history of poor obstetric outcome,

Are not members of an ethnic/racial group with a high prevalence of diabetes (e.g., Hispanic American, Native American, Asian American, African American, and Pacific Islander).

Risk assessment for GDM should be undertaken at the first prenatal visit. Women with clinical characteristics consistent with a high risk of GDM should undergo glucose testing as soon as possible. If they are found

not to have GDM at that initial screening, they should be retested between 24 and 28 weeks of gestation. Women of average risk should have testing undertaken at 24 to 28 weeks of gestation.

A fasting plasma glucose level >126 mg/dl (7.0 mmol/L) or a casual plasma glucose >200 mg/dl (11.1 mmol/L) meets the threshold for the diagnosis of diabetes. In the absence of unequivocal hyperglycemia, the diagnosis must be confirmed in a subsequent day. Confirmation of the diagnosis precludes the need for any glucose challenge. (Diagnosis and classification of diabetes mellitus. 2005).

1.7.2.6 GDM screening

Screening for GDM has become a standard in maternity care practice despite the lack of clear evidence to support routine use. Recommendations vary widely on whether and how to screen.

1.7.2.6.1 Rationale for GDM screening

There are three main reasons commonly cited for screening the pregnant population for GDM:

1. Screening allows identification of a group of women who have an increased risk (50% or more) of developing DM later in life. Such knowledge may enable women to delay or prevent the development of diabetes with lifestyle changes.
2. Management of DM in pregnancy may prevent macrosomia, thereby reducing the risk of fetal trauma, cesarean delivery, and neonatal hypoglycemia.

3. Diagnosis of the small subpopulation that will develop frank DM in pregnancy will allow management and prevent or reduce stillbirth. (Evidence- Based Diabetes Screening during Pregnancy. 2001)

1.7.2.6.2 Screening Procedures

The glucose challenge test (GCT): The GCT is the most commonly used screening procedure in the United States. It involves assessing plasma glucose 1 hour after consumption of a 50-g glucose load. If this initial 50-g screen is abnormal, it is followed by a 3-hour, 100-g GTT for diagnosis of gestational diabetes or impaired glucose tolerance. The test is given without regard to fed or fasting state, although there is evidence that the test may be more sensitive when administered in the fasting state.

1.7.2.7 Diagnosis of GDM (Two-step versus One-step OGTT)

Two-step testing: In the United States, the standard screening and diagnostic testing for GDM is a two-step procedure. The initial step is a non-fasting 50-g GCT. Women who have plasma glucose greater than 140 mg/dl (7.8 mmol/L) receive the 100-g 3-hour OGTT. Advantages of the two-step testing protocol include fewer blood tests for women who have a negative GCT, and a long history of use of this protocol in maternity care. When the two-step approach is used, a glucose threshold value >140 mg/dl (7.8 mmol/l) identifies approximately 80% of women with GDM, and the yield is further increased to 90% by using a cutoff of >130 mg/dl (7.2 mmol/l).

One-step testing: The European Diabetic Pregnancy Study Group and WHO use the 75-g, 2-hour OGTT for diagnosis of diabetes in pregnancy. The test is based on the 75-g glucose load, which is the internationally

accepted diagnostic test for nonpregnant adults. The one-step WHO criteria define both gestational diabetes and impaired glucose tolerance.

Table (1.2) Diagnosis of GDM with a 100-g oral glucose load.

	mg/dL	mmol/l
Fasting	95	5.3
1-h	180	10.0
2-h	155	8.6
3-h	140	7.8

Table (1.3) Diagnosis of GDM with a 75-g oral glucose load.

	mg/dL	mmol/l
Fasting	95	5.3
1-h	180	10.0
2-h	155	8.6

Two or more of the venous plasma concentrations must be met or exceeded for a positive diagnosis. The test should be done in the morning after an overnight fast of between 8 and 14 hrs and after at least 3 days of unrestricted diet (≥ 150 g carbohydrate per day) and unlimited physical activity. The subject should remain seated and should not smoke throughout the test.

1.7.3 Effect of maternal diabetes on pregnancy

1.7.3.1 Effect of diabetes on the fetus

1. Congenital malformation: The congenital malformation rate associated with diabetic pregnancies (4-10%) remains three to five times higher than in the general population. Indeed, congenital malformation is now the major cause of morbidity and mortality in infants born to women

with diabetes. Malformation often involves the heart and central nervous system and is potentially lethal.

2. Abnormal fetal growth: This generally means a birth weight over nine pounds (4 kg). Macrosomia occurs in 15 to 45 % of diabetic pregnancies compared to 10 % in the nondiabetic population.

3. Stillbirth: This term describes the delivery of a baby which shows no signs of life i.e. respiration or heart beat, from 24 weeks gestation (Hanretty KP.2003)

The excess of late stillbirths in diabetic pregnancies is still unexplained, although both maternal hyperglycemia and fetal macrosomia are associated. (Pickup J. and Williams G. 2003).

4. Perinatal mortality: According to studies, the risk of death during the 'perinatal ' period (from 28 weeks gestation to 27 days after birth) is four times greater for women with diabetes than for the general population.

1.7.3.2 Effect of diabetes on the newborn

1. Hypoglycemia: This is a common problem among babies of women with diabetes. It occurs in up to 50% of neonates and is especially common in those with macrosomia and hyperinsulinaemia.

2. Respiratory dysfunction: Respiratory distress syndrome (RDS) has been a major cause of neonatal morbidity and mortality in diabetic pregnancies. The risk of respiratory distress syndrome is six times higher for women with diabetes.

3. Polycythaemia and jaundice: Polycythemia is more common in infants of diabetic mothers. Jaundice occurs in over 60% of babies and is more common among macrosomic babies; half of these babies develop severe hyperbilirubinaemia.

4. Hypocalcaemia and hypomagnesaemia

5. Hypertrophic cardiomyopathy is detectable at birth by ultrasound in 30% of babies of diabetic mothers.

1.7.3.3 Maternal complications

1. Ketoacidosis and hypoglycaemia

Ketoacidosis is caused by hyperglycaemia; it can kill fetus at any stage in pregnancy and sometimes before the mother feels seriously ill. However Hypoglycaemia does not seriously harm the fetus, but harms the mother.

2. Spontaneous miscarriage

Miscarriage is the expulsion, dead, of the products of conception before 24 weeks' gestation... (Hanretty KP. 2003). Poor glycaemic control is assumed to increase the incidence of spontaneous miscarriage.

3. Polyhydramnios

Polyhydramnios may be defined as a four-quadrant liquor volume, as measured by ultrasound ('amniotic fluid index'), that is greater than the 90th percentile for gestational age. It may be due to fetal polyuria secondary to fetal hyperglycaemia. (Pickup J. and Williams G. 2003)

4. Pre-eclampsia

Pre-eclampsia is a condition in which a pregnant woman develops very high blood pressure, protein in the urine and water retention. It usually occurs during the last trimester of pregnancy. This important obstetric complication is dangerous for both mother and fetus; the prenatal mortality rate for diabetic pre-eclamptic pregnancies is 60 per 1,000, compared to 3.3 per 1,000 for normotensive diabetic pregnancies.

Long duration of diabetes, poor glycaemic control and pre-existing microalbuminuria are other independent risk factors.

5. Preterm labor

This is important because of increased perinatal morbidity and mortality. Spontaneous preterm delivery is significantly associated with poor glycaemic control after mid pregnancy and with urogenital infection. (Pickup J. and Williams G .2003)

6. Difficult labor

Labor can sometimes be more difficult for women with diabetes if the baby is too big.

7. Maternal mortality

Before the introduction of insulin, up to 50% of pregnant diabetic women died. Today, maternal mortality has fallen to between 0.1% and 0.5%, but remains significantly higher than the 0.01% for non-diabetic pregnancies. (Pickup J. and Williams G .2003)

8. Diabetic nephropathy, retinopathy, macrovascular disease.

1.7.4 Future risk of diabetes in the child

The probability of Type2 diabetes is higher than that of Type1; the incidence is around 30% when one parent is affected and rises to 50-60% with both parents. The increased risk of later Type 2 diabetes in the child of diabetic pregnancy appears to be independent of genetic factors and has been attributed to the long-term 'programming' of the intrauterine environment on insulin sensitivity. (Pickup J. and Williams G. 2003)

1.7.5 Management of diabetic pregnancy

First trimester: All diabetic women should be seen early in the first trimester to reinforce pregnancy advice, to optimize glycaemic control, during the critical period of organogenesis, and to screen for and treat any diabetic complications (hypertension and heart disease).

Follow- up is generally every 2-4 weeks at this stage, depending on diabetic control and the presence of complications.

Optimal glycaemic control (targets fasting blood glucose <90mg/dl (<5mmol/L), postprandial blood glucose: <126mg/dl (<7mmol/L) HbA1c normal range <6.1).

Second trimester: Monitor glycaemic control: insulin dosage needs to be altered according to glucose monitoring. Insulin requirement usually increases gradually through the second trimester, coinciding with the physiological decrease in insulin sensitivity that occurs between the second and third trimesters, and continues until delivery.

Monitor and treat complication (hypertension, retinopathy). Fetal monitoring (ultrasound). Obstetric assessment, check for complications (pre-eclampsia, polyhydramnios, urinary tract infection).

Third trimester: Monitor glycaemic control: adjust insulin dosage.

Monitor fetal growth: frequent ultrasound. Maternal complication: pre-eclampsia, preterm labor.

1.8 The protocol for the screening of gestational diabetes mellitus used by Palestinian Ministry of Health.

Screening for gestational diabetes

GDM is usually asymptomatic and is detected by routine screening.

Fasting plasma glucose is the recommended screening test for gestational diabetes and should be performed as follows:

* At first antenatal visit for:

- All pregnant women ≥ 25 years of age.

- All women regardless of age with clinical characteristics consistent with a high risk of GDM (strong family history of diabetes, personal history GDM, glucosuria, overweight BMI ≥ 27 before pregnancy, previous infant >4 kg... Previous unexplained intrauterine fetal death, previous infant with a congenital anomaly and personal history of development of polyhydramnios).

* Between 24-28 weeks of gestation for:

- Pregnant women < 25 years of age.

- Other women with normal FBG on first registration

Oral Glucose Tolerance Test (OGTT): using 75 gram oral glucose

(Anhydrous) challenge should be performed for pregnant with

FPG 100 -126 mg/dl to rule out or to confirm diagnosis of GDM.

Confirmation of diagnosis of GDM and initiation of management are based on the following

* Fasting plasma glucose \geq 126 mg/dl, or

* 2-hour plasma glucose \geq 140mg/dl.

Pregnant women with major risk factors should be closely monitored for possible development of gestational diabetes at any time during pregnancy.

Table (1.4) Distribution of women's reported visits to government PHC diabetic clinic, by type of treatment, age group and complications, West Bank 2005.

Age groups		0-4	5-14	15-24	25-34	35-44	45-54	55-64	65+	Total
West Bank Region		49	979	1838	2375	8741	19712	25469	29104	88267
Type 1		49	979	1709	1040	742	104	17	0	4640
Type2	Diet only	0	0	3	37	172	302	284	261	1059
	Tablets	0	0	36	796	5566	14240	17282	19602	57522
	Combined Therapy	0	0	5	47	327	1187	1620	1602	4788
	Insulin only	0	0	6	188	1514	3857	6263	7639	19467
Diabetes & pregnancy	Gestational Diabetes	0	0	16	95	131	4	0	0	246
	Pre-Gestational Diabetes	0	0	63	171	288	18	0	0	540
Impaired glucose regulation		0	0	0	1	1	0	3	0	5
Complications (Total)										
Complications	Nephropathy	0	0	60	72	168	566	1128	1305	3299
	Retinopathy	0	3	62	143	364	1404	2846	3980	8802
	Neuropathy	0	10	106	240	884	3059	4845	5866	15010
	Cerebro-vascular accident	0	0	1	4	46	239	569	915	1774
	Cardio-Vascular Disease	0	0	13	100	419	2106	3808	5368	11814
	Diabetic Foot	0	5	26	44	169	580	927	1131	2882
	Other	3	21	122	186	607	1696	2275	1970	6880

1.9 Goal

The overall goal of the study was to improve health services offered to diabetic pregnant women who attend governmental clinics.

1.10 Objectives

The objectives of the study can be summed up in the following:

- Increasing awareness of diabetic pregnant women.

- Identifying the risk factors causing gestational diabetes, Type 1, and Type 2 diabetes during child bearing age.
- Identifying the health effects and complications of diabetes on both the pregnant woman and her baby.
- Detecting the level of knowledge women have about diabetes and pregnancy.

Chapter Two

Methodology

Methodology

2.1 Target population

The target population of the study was drawn from Nablus and Jenin districts in the West Bank: 4,288 patients were registered at the diabetes clinics in Nablus district, and 4,381 patients were registered at the diabetes clinics in Jenin district.

About 246 pregnant women with gestational diabetes and 540 pregnant women with pre-gestational diabetes visited the governmental diabetes health clinics in West Bank in 2005.

2.2 Sample selection

A random sample of 200 women was chosen. The sample included women who had gestational diabetes or pre-gestational diabetes, and who were registered in Nablus and Jenin governmental diabetes clinics.

2.3 Data collection

The data were collected from January 2006-April 2006 using a questionnaire prepared for that purpose. The questionnaire was completed by using medical files of the women who had gestational diabetes and pre-gestational diabetes and who were registered in the diabetes clinics.

The researcher also conducted interviews with the diabetic women, who had visited diabetes clinics, during the period of data collection.

The collected data included personal information such as age, BMI (kg/m^2), family history, education, smoking, and profession.

Obstetric history included history of gestational diabetes, number of parities, number of abortions, stillbirth, big baby and complications during their pregnancy and prenatal period.

Medical information included history of other diseases, the risks facing the mother during pregnancy, and the risks facing the new born baby, treatment, and the result of the last HbA1c test and the last fasting blood sugar (F.B.S) and random blood sugar (R.B.S) tests.

To study the effects of maternal diabetes on pregnancy and glycemic control, the subjects were divided into two groups, good glycemic control (HbA1c < 6.1, or FBS< 90mg/dl, or RBS <126 mg/dl) and, poor glycemic control (HbA1c > 6.1, or FBS> 90mg/dl, or RBS >126 mg/dl).

Glycaemic control targets (fasting blood glucose <90mg/dl (<5mmol/L), postprandial blood glucose: <126mg/dl (<7mmol/L) HbA1c normal range). (Pickup J and Williams G. 2003)

HbA1c normal range <6.1. (Diabetes Guidelines Europe. 2005)

2.4 Data analysis

All data of the questionnaire for the 200 subjects were entered into the computer and were computed using SPSS program.

2.5 Research-related problems

During the completion of this research, the researcher faced two major obstacles.

The first was the tight siege imposed on Nablus district, thus preventing her access to village neighboring Nablus and Jenin district, to

meet the diabetic patients and collect data from them, including their knowledge and awareness of the diabetes.

The second obstacle was the irregular visits of a large number of diabetic pregnant women to the postnatal health clinics and diabetic health clinics after delivery, thus preventing collection of data on complications which women were subjected to during birth delivery and complications the baby was exposed to after delivery.

Chapter Three

Results

Results

3.1 Sample of the Study

Table 3.1 Sample of the study

		Frequency	Percent
	Type 1	38	19.0
	Type 2	45	22.5
	Gestational diabetes	117	58.5
	Total	200	100.0

3.1.1 Diabetes and Pregnancy and District.

Table (3. 1.1) Frequency and percentage of diabetes mellitus and district.

				District		Total	
				Nablus	Jenin		
Diabetes mellitus	Pre-gestational diabetes	Type 1	Count	26	12	38	
			% within DM	68.4%	31.6%	100%	
		Type 2	Count	25	20	45	
			% within DM	55.6%	44.4%	100%	
	Gestational diabetes	Count		78	39	117	
		% within DM		66.7%	33.3%	100.0%	
	Total		Count		129	71	200
			% within DM		64.5%	35.5%	100.0%

As the table shows, 68.4% of the subjects, who had Type1 diabetes, lived in Nablus while 31.6% lived in Jenin. Also 55.5% of Type 2 diabetes lived in Nablus while 44.4% lived in Jenin.

And the table shows, 66.7% of the subjects who had Gestational diabetes lived in Nablus and 33.3% lived in Jenin.

3.1.2 Diabetes and pregnancy and Residence

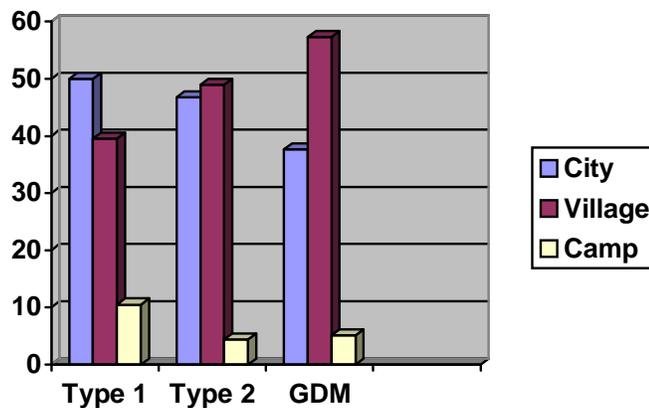
Table (3.1.2) Frequency and percentage of diabetes mellitus and residence.

				Residence			Total
				City	Village	Camp	
Diabetes mellitus	Pre-gestational diabetes	Type 1	Count	19	15	4	38
			% within DM	50%	39.5%	10.5%	100%
		Type 2	Count	21	22	2	45
			% within DM	46.7%	48.9%	4.4%	100%
	Gestational diabetes	Count		44	67	6	117
		% within DM		37.6%	57.3%	5.1%	100%
Total			Count	84	104	12	200
			% within DM	42%	52%	6%	100%

The table shows that 50% of those who had Type1 diabetes had lived in the city, and 39.5% lived in villages, and 10.5% had lived in camps. In contrast, 46.7% of those who had Type 2 diabetes had lived in the city, 48.9% had lived in villages, and 4.4% had lived in camps

Pertaining to gestational diabetes, 37.6% had lived in the city, 57.3% had lived in villages, and 5.1% had lived in camps.

Bar chart(1) Bar chart of the percentage of diabetes mellitus and residence.



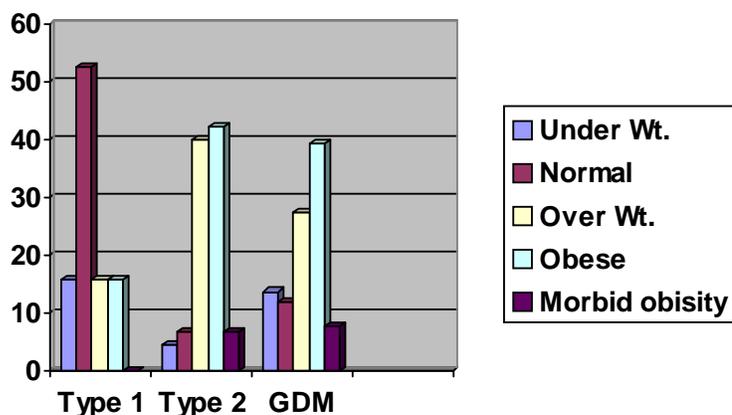
3. 2 Diabetes and Pregnancy and Body Mass Index

Table (3.2) Frequency and percentages of diabetes mellitus and BMI.

			BMI categorized					Total	
			under 20 (under wt)	20-25 (normal)	25.1-29.9 (over wt)	30 - 39.9 (obese)	more than 40 (morbid obesity)		
Diabetes mellitus	Pre- gestational diabetes	Type 1	Count	6	20	6	6	0	38
			% within DM	15.8%	52.6%	15.8%	15.8%	0	100%
		Type 2	Count	2	3	18	19	3	45
			% within DM	4.4%	6.7%	40%	42.2%	6.7%	100%
	Gestational diabetes		Count	16	14	32	46	9	117
			% within DM	13.7%	12.0%	27.4%	39.3%	7.7%	100%
Total		Count	24	37	56	71	12	200	
		% within DM	12.0%	18.5%	28.0%	35.5%	6.0%	100%	

P value <0.05

The table shows that 15.8% of those who had Type 1 were BMI underweight, 52.6% had normal BMI...15.8% were overweight, 15.8% obese, there were no cases of Type 1 had morbid obesity. About 4.4% of Type 2 were BMI underweight, 6.7% had normal BMI. 40% were overweight, 42.2% were obese and 6.7% had morbid obesity. And, 13.7% of gestational diabetes were under weight, 12% had normal BMI, 27.4% were overweight, 39.3% were obese and 7.7% morbid obesity.

Bar chart (2) Bar chart of the percentages of diabetes mellitus and BMI.

3. 3 Diabetes and Pregnancy and Age of Onset

Table(3.3) Frequency and percentages of diabetes mellitus and age of onset.

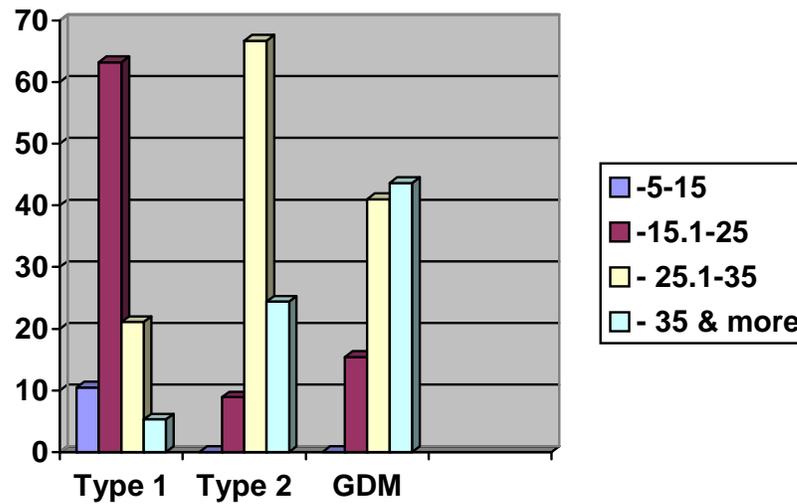
				Age of onset categorized				Total
				5-15	15.1- 25	25.1- 35	35 and more	
Diabetes mellitus	Pre-gestational diabetes	Type 1	Count	4	24	8	2	38
			% within DM	10.5%	63.2%	21.1%	5.3%	100%
		Type 2	Count	0	4	30	11	45
			% within DM	0	8.9%	66.7%	24.4%	100%
	Gestational diabetes	Count	0	18	48	51	117	
		% within DM	0.0%	15.4%	41.0%	43.6%	100.0%	
Total	Count	4	46	86	64	200		
	% within DM	2.0%	23.0%	43.0%	32.0%	100.0%		

P value <0.05

The table indicates that of those who had Type1, 10.5% the age of onset was between 5-15, 63.2% the age was between 15.1-25, 21.1% the age was between 25.1-35 and 5.3% were between 35 and more, of those

who had Type 2, 8.9% were between 15.1-25, 66.7% age between 25.1-35, and 24.4% were 35 and more. The table shows also that the age of onset of 15.4% of those who had gestational diabetes were between 15.1-25, 41.0% between 25.1-35 and 43.6% were 35 and more.

Bar chart(3) Bar chart of the percentages of diabetes mellitus and age of onset.



3. 4 Diabetes and Pregnancy and Family History:

Table (3.4) Frequency and percentages of diabetes mellitus and family history of diabetes

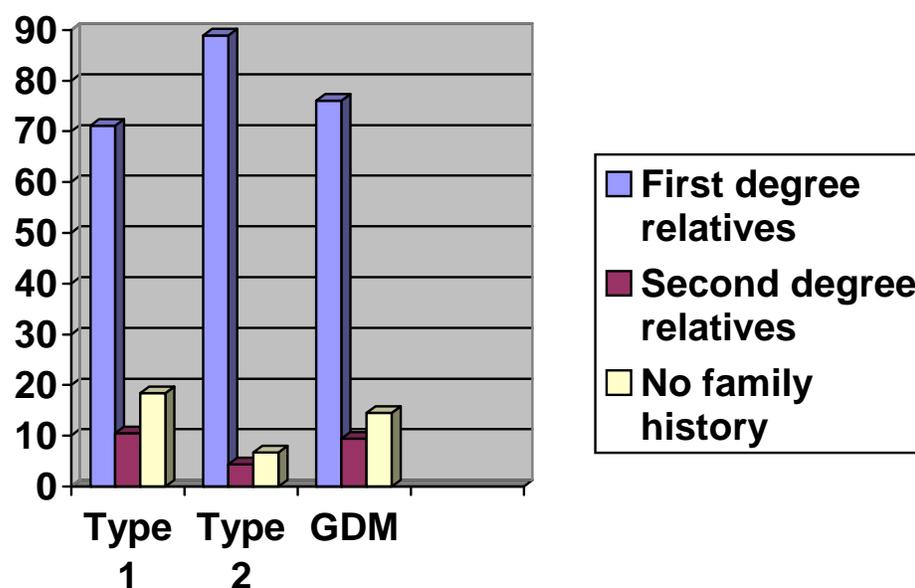
				Family history of diabetes			Total
				First degree relatives	Second degree relatives	No family history	
Diabetes mellitus	Pre-gestational diabetes	Type 1	Count	27	5	7	38
			% within DM	71.1%	10.5%	18.4%	100%
		Type 2	Count	40	2	3	45
			% within DM	88.9%	4.4%	6.7%	100%
	Gestational diabetes	Count		89	11	17	117
		% within DM		76.1%	9.4%	14.5%	100.0%
Total		Count		156	17	27	200
		% within DM		78.0%	8.5%	13.5%	100.0%

P value <0.05

As the table indicates, 71.1% of Type1 had first degree relatives, 10.5% second degree relative and 18.4% no family history, of those who had Type 2, 88.9% of them had first degree relatives, 4.4% second degree relatives and 6.7% no family history.

And of those who had gestational diabetes, 76.1% of them had first degree relatives, 9.4% second degree relatives, and 14.5% had no family history.

Bar chart (4) Bar chart of the percentages of diabetes mellitus and family history of diabetes.



3.5 Diabetes and Pregnancy and Other Diseases.

Table (3.5) Frequency and percentages of diabetes mellitus and other diseases

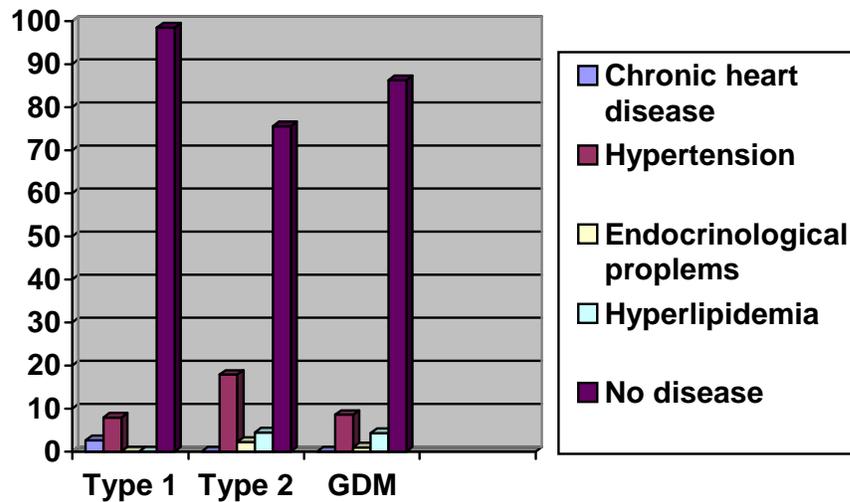
				Other disease					Total
				Chronic Heart disease	Hyper-tension	Endocri-nological problems	Hyper-lipidemia	No disease	
Diabetes mellitus	Pre-gestational diabetes	Type 1	count	1	3	0	0	34	38
			% within DM	2.6%	7.9%	0.0%	0.0%	89.5%	100%
		Type 2	count	0	8	1	2	34	45
			% within DM	0.0%	17.8%	2.2%	4.4%	75.6%	100%
	Gestational diabetes	Count	0	10	1	5	101	117	
		% within DM	0.0%	8.5%	0.9%	4.3%	86.3%	100.0%	
Total		Count	1	21	2	7	169	200	
		% within DM	0.5%	10.5%	1.0%	3.5%	84.5%	100.0%	

P value >0.05

This table shows that of those who had Type 1, 2.6% of them had chronic heart disease, 7.9% had hypertension, and 89.5% had no diseases, and of those who had Type 2, 17.8% had hypertension, 2.2% endocrinological problems, 4.4% hyperlipidemia but 75.6% had no diseases.

And of those who had Gestational diabetes, 0.9% of them had endocrinological problems, 8.5% had hypertension, 4.3% hyperlipidemia, but 86.3% had no diseases.

Bar chart (5) Bar chart of the percentages of diabetes mellitus and other diseases.



3. 6 Diabetes and Pregnancy and Smoking

Table (3.6) Frequency and percentages of diabetes mellitus and smoking

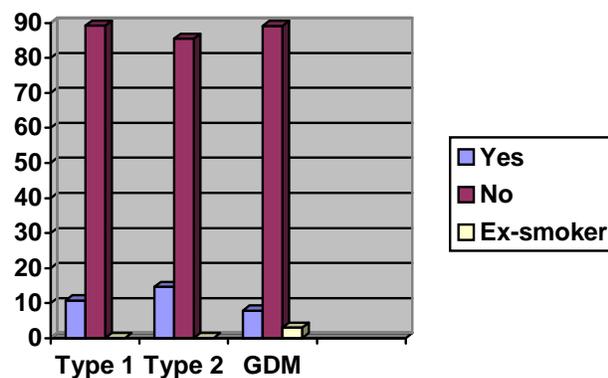
				Smoking			Total
				Yes	No	Ex-smoker	
Diabetes mellitus	Pre-gestational diabetes	Type1	Count	4	33	0	37
			% within DM	10.8%	89.2%	0.0%	100%
		Type2	Count	6	35	0	41
			% within DM	14.6%	85.4%	0.0%	100%
	Gestational diabetes	Count		8	90	3	101
		% within DM		7.9%	89.1%	3.0%	100.0%
Total		Count		18	158	3	179
		% within DM		10.0%	88.3%	1.7%	100.0%

P value >0.05

The table indicates that of those had Type1, 10.8% of them were smokers and 89.2% were not smokers. Of those who had Type 2, 14.6% of them were smokers and 85.4% were not smokers.

And of those who had gestational diabetes, 7.9% of them were smokers, 89.1% were not smokers, and only 3% were ex-smokers.

Bar chart (6) Bar chart of the percentages of diabetes mellitus and smoking



3.7 Diabetes and Pregnancy and Obstetric History:

Table (3.7, A) Frequency and percentages of diabetes mellitus and number of parities.

			No. of Parities			Total	
			0-3	3-7	>7		
Diabetes mellitus	Pre-gestational diabetes	Type1	Count	29	9	0	38
			%within DM	76.3%	23.7%	0%	100%
	Type2	Count	9	25	11	45	
		%within DM	20%	55.6%	24.4%	100%	
	Gestational diabetes	Count	29	65	23	117	
		%within DM	24.8%	55.6%	19.6%	100%	
Total			Count	67	99	34	200
			%within DM	22.5%	49.5%	17%	100%

P value <0.05

The table clearly shows that of those who had pre-gestational diabetes (Type1), 76.3% of the cases of the number of parities were between 0-3, and 23.7% of them the number of parities were between 3-7. Of those who had pre-gestational diabetes (Type2), 20% of them, the number of parities was between 0-3 and in 55.6%of them, the number of parities was between 3-7, and in 24.4% of them, the number of parities was more than 7.

And of those who had gestational diabetes, in 24.8% of them the number of parities was between 0-3, in 55,6% of them, the number of parities was between 3-7 and in 19.6% of them, the number of parities was more than 7.

Bar chart (7) Bar chart of the percentages of diabetes mellitus and number of parities.

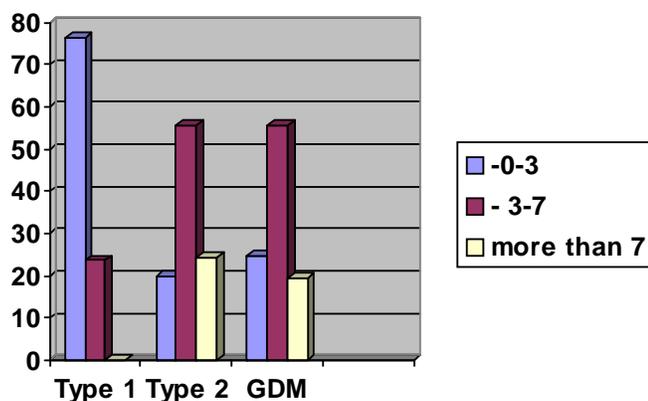


Table (3.7,B) Frequency and percentages of diabetes mellitus and miscarriage.

				Miscarriages			Total
				0.0	1-3	>3	
Diabetes mellitus	Pre-gestational diabetes	Type1	Count	30	8	0	38
			%within DM	78.9%	21.1%	0%	100%
	Type2	Count	25	20	0	45	
		%within DM	55.6%	44.4%	0%	100%	
	Gestational diabetes	Count	62	48	7	117	
		%within DM	53%	41.0%	6%	100%	
Total			Count	117	76	7	200
			%within DM	58.5%	38%	3.5%	100%

P value <0.05

The table shows that of those who had pre-gestational diabetes (Type1), 78.9% of the cases had no history of miscarriages and in 21.1% of them, the miscarriages were between 1-3 and of those who had pre-gestational diabetes (Type2), 55.6% of them had no history of miscarriages, in 44.4% of them, the miscarriages were between 1-3.

Of those who had gestational diabetes, 53% of them had no history of miscarriages, in 41.0% of them the miscarriages were between 1-3 and in 6% of them, the miscarriages were more than 3.

Bar chart(8) Bar chart of the percentages of diabetes mellitus and miscarriage.

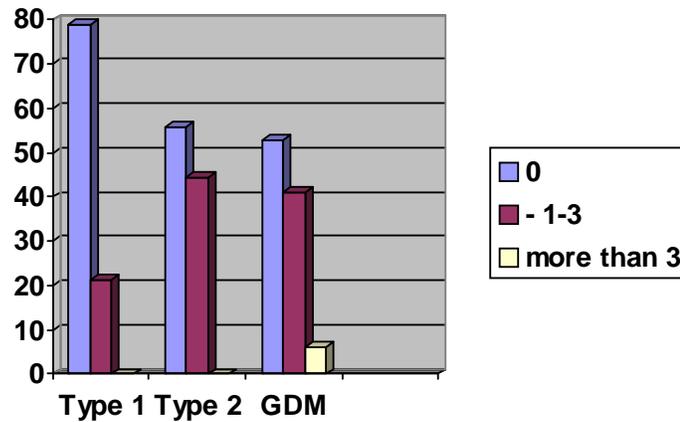


Table (3.7,C) Frequency and percentages of the diabetes mellitus and stillbirth.

				Stillbirth		Total
				0.0	stillbirth	
Diabetes mellitus	Pre-gestational diabetes	Type1	Count	37	1	38
			% within DM	97.4%	2.6%	100%
		Type2	Count	39	6	45
			% within DM	86.7%	13.3%	100%
	Gestational diabetes		Count	106	11	117
			% within DM	90.6%	9.4%	100%
	Total		Count	182	18	200
			% within DM	91%	9%	100%

P value >0.05

As the table shows, of those who had pre-gestational diabetes (Type1), 2.6% of the cases had history of stillbirth baby in previous pregnancies. Of those who had Type 2 diabetes, 13.3% of them had history of stillbirth baby in previous pregnancies. Of those who had gestational diabetes, 9.4% of them had history of stillbirth baby in previous pregnancies.

Bar chart (9) Bar chart of the percentages of the diabetes mellitus and stillbirth.

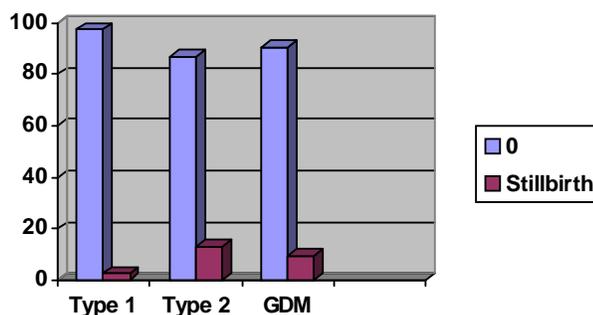


Table (3.7, D) Frequency and percentages of diabetes mellitus and baby weight of more than 4kgs in previous pregnancies.

				Baby weight more than 4kg		Total
				0.0	> 4	
Diabetes mellitus	Pre-gestational diabetes	Type1	Count	33	5	38
			% within DM	86.8%	13.2%	100%
		Type2	Count	36	9	45
			% within DM	80%	20%	100%
	Gestational diabetes		Count	86	31	117
			% within DM	73.5%	26.5%	100%
Total			Count	155	45	200
			% within DM	77.5%	22.5%	100%

P value >0.05

This table indicates that of those who pre-gestational diabetes (Type1), 13.2% of the cases had history of giving birth to baby weighing more than 4 kgs in previous pregnancies. Of those who had Type 2, 20% of them had history of giving birth to baby weighing more than 4 kgs in previous pregnancies.

Of those who had gestational diabetes, 26.5% of them had history of giving birth to baby with weight of more than 4kgs in previous pregnancies.

Bar chart (10) Bar chart of the percentages of diabetes mellitus and baby weight of more than 4kgs in previous pregnancies.

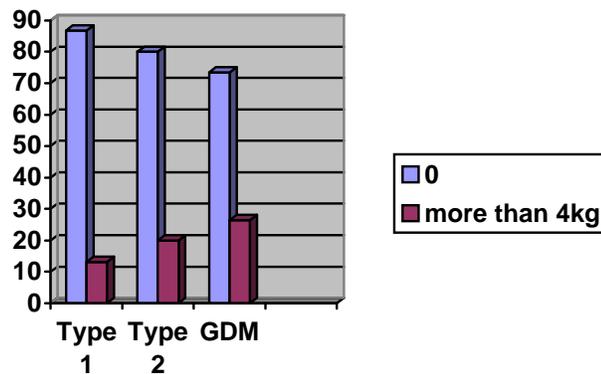


Table (3.7, E) Frequency and percentages of diabetes mellitus and baby weight less than 2.5kg in previous pregnancies.

				Baby weight Lees than 2.5kg		Total
				0.0	< 2.5	
Diabetes mellitus	Pre-gestational diabetes	Type1	Count	35	3	38
			% within DM	92.1%	7.9%	100%
		Type2	Count	43	2	45
			% within DM	95.6%	4.4%	100%
	Gestational diabetes		Count	108	9	117
			% within DM	92.3%	7.7%	100%
Total			Count	186	14	200
			% within DM	93%	7%	100%

P value >0.05

This table indicates that of those who had pre-gestational diabetes (Type1), 7.9% of the cases had history of giving birth to baby weighing less than 2.5 kgs in previous pregnancies. Of those who had Type 2, 4.4% of them had history of giving birth to baby with weight of less than 2.5 kgs in previous pregnancies

Of those who had gestational diabetes, 7.7% of them had history of giving birth to baby weighing less than 2.5 kgs in previous pregnancies.

Bar chart (11) Bar chart of the percentages of diabetes mellitus and baby weight less than 2.5kg in previous pregnancies.

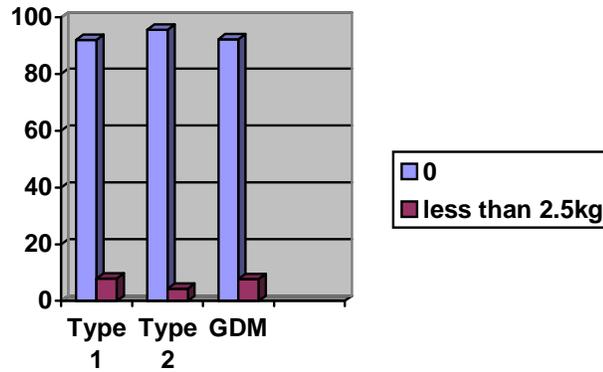


Table (3.7, F) Frequency and percentages of diabetes mellitus and caesarian section delivery in previous pregnancies.

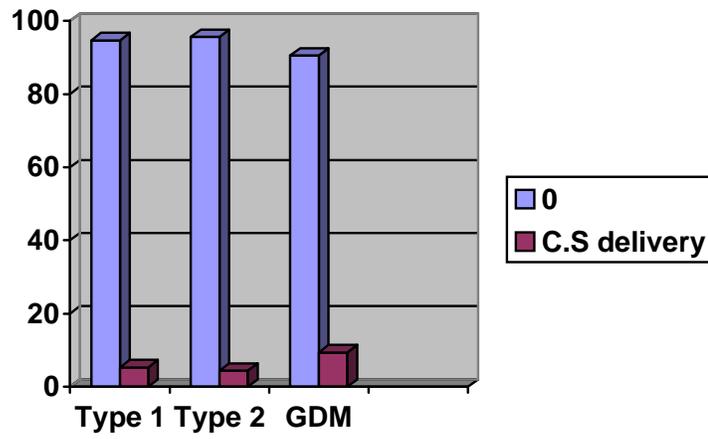
				Caesarian section delivery		Total
				0.0	C.S	
Diabetes mellitus	Pre-gestational diabetes	Type1	Count	36	2	38
			%within DM	94.7%	5.3%	100%
		Type2	Count	43	2	45
			%within DM	95.6%	4.4%	100%
	Gestational diabetes		Count	106	11	117
			%within DM	90.6%	9.4%	100%
Total			Count	185	15	200
			%within DM	92.5%	7.5%	100%

P value >0.05

This table shows that of those who had pre-gestational diabetes (Type1), 5.3% of the cases had history of caesarian section delivery in previous pregnancies. Of those who had Type 2, 4.4% of them had history of caesarian section delivery in previous pregnancies.

Of those who had gestational diabetes, 9.4%of them had history of caesarian section delivery in previous pregnancies.

Bar chart (12) Bar chart of the percentages of diabetes mellitus and caesarian section delivery in previous pregnancies.



3.8 The Effect of Maternal Diabetes on Pregnancy

3.8.1 Effects of diabetes on the mother

Table (3.8.1, A) Frequency and percentages of the pre-gestational diabetes and maternal complications.

		Maternal complications									Total
		Abortion	Hypoglycemia	Pre-eclampsia	Polyhydramnios	Urinary tract infection	Preterm- labor	Caesarian delivery	No recorded complications		
Pre- gestational diabetes	Good glycemic control	Count	0	1	0	1	0	0	5	2	9
		% Within pre-gestational diabetes	0 %	11.1 %	0 %	11.1 %	0 %	0 %	55.6 %	22.2 %	100 %
	Poor glycemic control	Count	14	9	2	5	7	2	18	12	69
		% Within pre-gestational diabetes	20.3 %	13 %	2.9 %	7.2 %	10.1 %	2.9 %	26.1 %	17.4 %	100 %
Total	Count	14	10	2	6	7	2	23	14	78	
	% Within pre-gestational diabetes	18 %	12.8 %	2.6 %	7.7 %	8.9 %	2.6 %	29.5 %	17.4 %	100 %	

As the table shows, good glycemic control patient who had pre-gestational diabetes reported complications, 11.1% of them had hypoglycemia, 11.1% of them had polyhydramnios, and 55.6% had caesarian delivery, and 22.2% no recorded complications.

Pertaining to poor glycemic control patient, who had pre-gestational diabetes, 20.3% had abortion, 13% had hypoglycemia, 2.9% had pre-eclampsia, 7.2% polyhydroamnios, 10.1% had urinary tract infection, , 2.9% had preterm labor, 26.1% had caesarian delivery, and 17.4% no recorded complications.

Bar chart (13) Bar chart of the percentage of the pre-gestational diabetes and maternal complications.

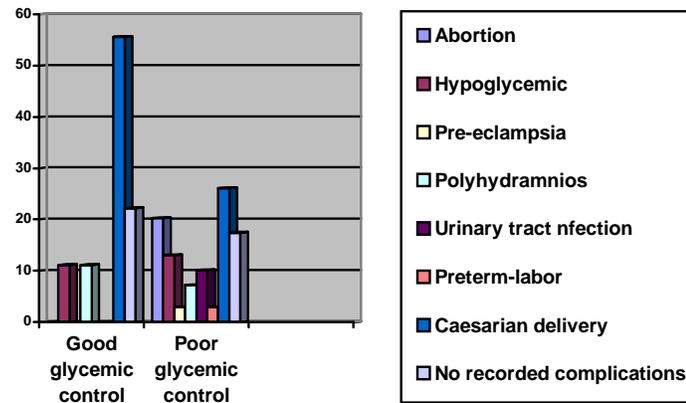


Table (3.8.1,B) Frequency and percentages of the gestational diabetes and maternal complications

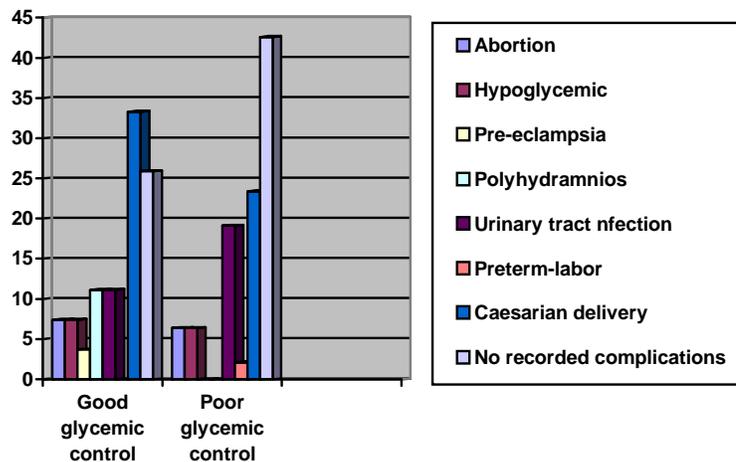
		Maternal complications									Total
		Abortion	Hypoglycemia	Pre-eclampsia	Polyhydramnios	Urinary tract infection	Preterm- labor	Caesarian delivery	No recorded complications		
Gestational diabetes	Good glycemic control	Count	2	2	1	3	3	0	9	7	27
		% Within gestational diabetes	7.4 %	7.4 %	3.7 %	11.1 %	11.1 %	0 %	33.3 %	25.9 %	100%
	Poor glycemic control	Count	3	3	0	0	9	1	11	20	47
		% Within gestational diabetes	6.4 %	6.4 %	0 %	0 %	19.1 %	2.1 %	23.4 %	42.6 %	100%
Total		Count	5	5	1	3	12	1	20	27	74
		% Within gestational diabetes	6.7 %	6.7 %	1.4 %	4.1 %	16.2 %	1.4 %	27 %	36.5 %	100%

The table clearly shows that good glycemic control patient who had gestational diabetes the complications they had experienced during pregnancy, 7.4% of them had abortion, 7.4% of them had hypoglycemia,

3.7% had pre-eclampsia, 11.1% had polyhydroamnios, and 11.1% had urinary tract infection, 33.3% had caesarian delivery, and 25.9% no recorded complications.

Pertaining to poor glycemic control patient who had gestational diabetes the complications they had experienced during pregnancy, 6.4% of them had abortion, 6.4% of them had hypoglycemia, 19.1% had urinary tract infection, in 2.1% had preterm labor, 23.4% had caesarian delivery, and 42.6% no recorded complications.

Bar chart(14) Bar chart of the percentages of the gestational diabetes and maternal complications.



3.8.2 Effects of maternal diabetes on the baby

Table (3.8.2, A) Frequency and percentages of the pre-gestational diabetes and effects of maternal diabetes on the baby

			Effects of maternal diabetes on the Baby							Total
			Hypoglycemia	Respiratory Dysfunction	Jaundice	Stillbirth	Macrosomia	Shoulder Dystocia	No recorded complications	
Pre gestational diabetes	Good glycemic control	Count	1	3	0	1	2	0	2	9
		% Within pre-gestational diabetes	11.1 %	33.3 %	0 %	11.1 %	22.2 %	0 %	22.2 %	100%
	Poor glycemic control	Count	3	6	0	1	7	5	26	48
		% Within pre-gestational diabetes	6.2 %	12.5 %	0 %	2.1 %	14.6 %	10.4 %	54.2 %	100%
Total		Count	4	9	0	2	9	5	28	57
		% Within pre-gestational diabetes	7 %	15.8 %	0 %	3.5 %	15.8 %	8.8 %	49.1 %	100%

As the table shows, the baby of the women who had pre-gestational diabetes had experienced complications, in good glycemic control patients, 11.1% had hypoglycemia, 33% had respiratory dysfunction, 11.1% had still birth, 22.2% had macrosomia, and 22.2% of them no recorded complications. While the babies of poor glycemic control patients 6.2% had hypoglycemia, 12.5% had respiratory dysfunction, 2.1% had still birth, 14.6% had macrosomia, 10.4% had shoulder dystocia, and 54.2% no recorded complications.

Bar chart (15) Bar chart of the percentages of the pre-gestational diabetes and effects of maternal diabetes on the baby

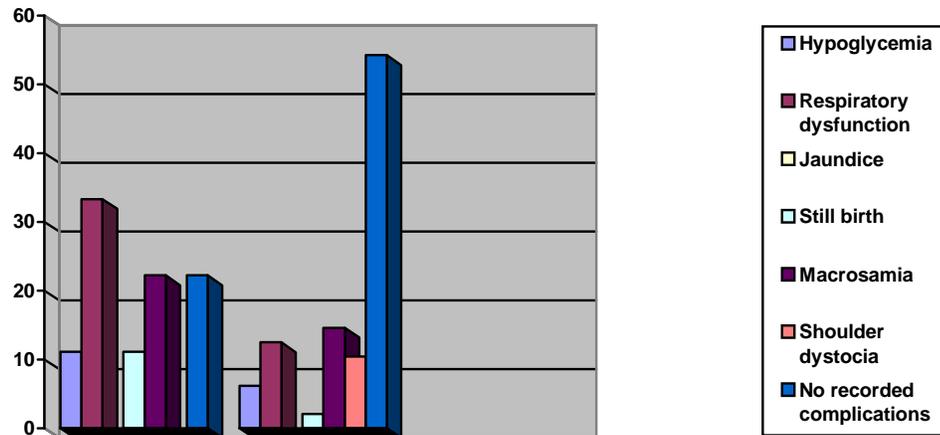
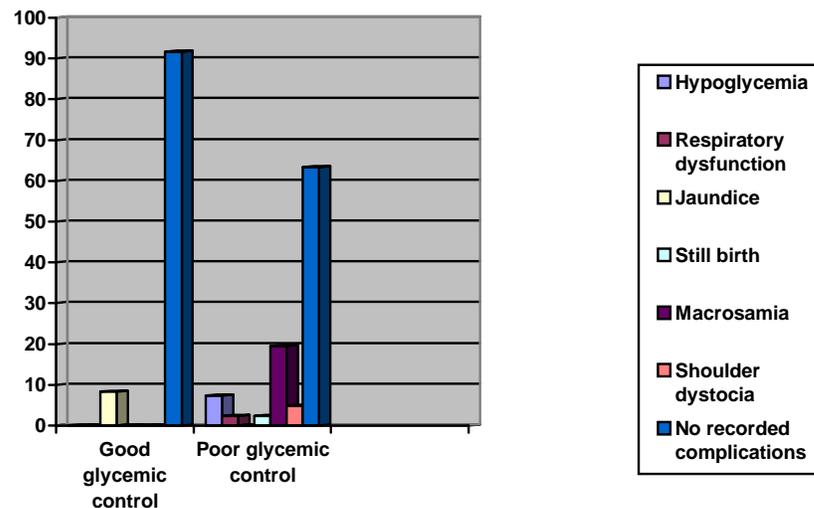


Table 3.8.2, B: Frequency and percentages of the gestational diabetes and effects of maternal diabetes on the baby

			Effects of maternal diabetes on the Baby							Total
			Hypoglycemia	Respiratory dysfunction	Jaundice	Stillbirth	Macrosomia	Shoulder dystocia	No recorded complications	
Gestational diabetes	Good glycemic control	Count	0	0	1	0	0	0	11	12
		% within gestational diabetes	0 %	0 %	8.3 %	0 %	0 %	0 %	91.7 %	100%
	Poor glycemic control	Count	3	1	0	1	8	2	26	41
		% within gestational diabetes	7.3 %	2.4 %	0 %	2.4 %	19.5 %	4.9 %	63.4 %	100%
Total		Count	3	1	1	1	8	2	37	53
		% within gestational diabetes	5.7 %	1.9 %	1.9 %	1.9 %	15.1 %	3.7 %	69.8 %	100%

As the table shows, the baby of the women who had gestational diabetes had experienced complications, in good glycemic control patients, only 8.3% had jaundice and 91.7% of them no recorded complications. While the babies of poor glycemic control patients 7.3% had hypoglycemia, 2.4% had respiratory dysfunction, 2.4% had still birth, 19.5% had macrosomia, 4.9% had shoulder dystocia, and 63.4% no recorded complications.

Bar chart(16) Bar chart of the percentages of the gestational diabetes and effects of maternal diabetes on the baby.



3.9 Diabetes and Pregnancy and Treatment

Table (3.9) Frequency and percentages of diabetes mellitus and treatment.

			Treatment		Total
			Diet	Insulin	
Diabetes mellitus	Pre-gestational diabetes	Count	3	80	83
		% within DM	3.6%	96.4%	100.0%
	Gestational diabetes	Count	46	71	117
		% within DM	39.3%	60.7%	100.0%
Total		Count	49	151	200
		% within DM	24.5%	75.5%	100.0%

As the table indicates, of those who had pre-gestational diabetes, 3.6% of them used diet treatment while 96.4% used insulin treatment.

Of those who had gestational diabetes, 39.3% used diet treatment but 60.7% used insulin treatment.

3.10 Statistics about Gestational Diabetes

Table (3. 10) Statistics about gestational diabetes.

Gestational diabetes		Frequency	Percent
Valid	Disappears and reappears after a while as Type 2	9	7.7%
	Appears in the next pregnancy	25	21.4%
	Disappears after delivery	9	7.7%
	Continues after delivery	46	39.3%
	None of them	28	23.9%
Total		117	100%

The table shows that in 39.3% of women, who had gestational diabetes, diabetes continued after delivery, and in 7.7% of them diabetes disappeared but reappeared after a while, in 21.4% of them, diabetes appeared in the next pregnancy, and in 7.7%, diabetes disappeared after delivery.

3.11 Knowledge

Table (3.11, A) Do you know what diabetes, types, symptoms, and risk factors are?

		Frequency	Percent
Valid	Yes	14	14%
	No	74	74%
	Intermediate	12	12%
	Total	100	100%

As the table indicates, 74% of the subjects answered in the negative, 14% answered in the positive, and 12% had intermediate knowledge.

Table (3.11, B) Do you know which women are most likely to develop gestational diabetes?

		Frequency	Percent
Valid	Yes	5	5%
	No	79	79%
	Intermediate	16	16%
	Total	100	100.0

The table above shows that 79% of the subjects did not know, 16% had intermediate knowledge, and only 5% knew which women are most likely to develop gestational diabetes.

Table (3.11,C) Did you visit diabetes clinic while planning your pregnancy?

		Frequency	Percent
Valid	Yes	37	46.3%
	No	43	53.7%
	Total	80	100. %

As the table shows, 53.7% of the subjects didn't visit a diabetes clinic while planning for pregnancy as opposed to 46.3 % who did.

Table(3.11, D) Did you visit diabetes clinic after delivery?

		Frequency	Percent
Valid	Yes	64	64%
	No	36	36%
	Total	100	100.0

The table above indicates that 36% of the subjects didn't visit a diabetes clinic after delivery as opposed to 64% who did so.

Table (3.11, E) Have you ever read or heard about diabetes and pregnancy in the mass media?

		Frequency	Percent
Valid	Yes	19	19%
	No	56	56%
	Intermediate	25	25%
	Total	100	100.%

The table above shows that 56% of the subjects never read or heard about diabetes and pregnancy in the mass media, 25 % had intermediate

reading and 19% read or heard about diabetes and pregnancy in the mass media.

Table (3.11, F) Frequency and percentages of question number one and educational level.

			Do you know what diabetes disease, its types, its symptoms, and risk factors are?			Total
			Yes	No	Intermediate	
Educational level	Illiterate	Count	0	4	0	4
		% within the educational level	0.0%	100 %	0.0%	100.0%
	Elementary	Count	1	19	0	20
		% within the educational level	5.0%	95.0%	0.0%	100.0%
	Secondary	Count	3	24	2	29
		% within the educational level	10.3%	82.8%	6.9%	100.0%
	High school	Count	3	20	6	29
		% within the educational level	10.3%	69.0%	20.7%	100.0%
	Diploma	Count	0	4	4	8
		% within the educational level		50%	50%	100.0%
	College degree	Count	6	2	2	10
		% within the educational level	60%	20%	20%	100.0%
	Total	Count	13	73	14	100
		% within the educational level	13.0%	73.0%	14.0%	100.0%

P value <0.05

As the table above shows, in the case of illiterate women, 100% of the subjects said no, and of women with elementary educational level, 5.0% said yes, but 95.0% said no. Of women with secondary educational level, 10.3% said yes, and 82.8% said no, and 6.9% said they had intermediate knowledge. Of women with high school educational level, 10.3% of them said yes, 69.0% said no, and 20.7% said they had

intermediate knowledge. Of women with a diploma 50% said no, 50% said they had intermediate knowledge. Of women with college degree, 60% said yes. 20% said no, and 20% said they had intermediate knowledge

Table (3.11, G) Frequency and percentages of question number one and profession.

			Do you know what diabetes disease, its types, its symptoms, and risk factors are?			Total
			Yes	No	Intermediate	
Profession	Housewives	Count	9	69	11	89
		% within profession	10.1%	77.5%	12.4%	100.0%
	Employees	Count	3	8	0	11
		% within profession	27.3%	72.7%	0.0%	100.0%
Total		Count	12	77	11	100
		% within profession	12%	77%	11.0%	100.0%

P value <0.05

The table above indicates that 10.1% of the house wives said yes, 77.5% said no, and 12.4% said they had intermediate knowledge.

Of the employed women, 27.3% said they had knowledge, 72.7% said they had no knowledge.

Chapter Four

Discussion, Conclusion and Recommendations

Discussion, Conclusion and Recommendations

This study was conducted to identify the risk factors causing gestational diabetes and pre-gestational diabetes Type1 and Type 2 diabetes, during child bearing age.

The study also sought to identify the health effects and complications of diabetes on both the pregnant woman and her baby.

And to detect the level of knowledge women have about diabetes and pregnancy.

4.1 Diabetes and pregnancy and Body Mass Index

The results are compatible with the scientific fact that being overweight is one of the most risk factors for diabetes, and gestational diabetes. Being more than 20 percent above ideal body weight or having a Body Mass Index (BMI) greater than or equal to 27 exposes women to higher risk levels.

Obesity, especially with abdominal and visceral fat accumulation, induced insulin resistance. (Pickup J, Williams G. 2003).

Between 80% and 90% of people who develop Type 2 diabetes are over weight, while most people with Type 1 diabetes are at or below their ideal weight.

Body Mass Index (BMI) is a measurement based on a formula that takes into account your weight and your height in determining whether you have a healthy or unhealthy percentage of body fat. (Clavell Mc.2001)

The results of my study: 15.8% of those who had Type 1 were BMI underweight, 52.6% had normal BMI...15.8% were overweight, 15.8% obese, and none of Type 1 cases had morbid obesity. About 4.4% of Type 2 were BMI underweight, 6.7% had normal BMI. 40% were overweight, 42.2% were obese and 6.7% had morbid obesity. And, 13.7% of gestational diabetes were under weight, 12% had normal BMI, 27.4% were overweight, 39.3% were obese and 7.7% morbid obesity. (Table 3.2)

Findings revealed that obesity is a serious problem in our society and perhaps it's one of the most important factors contributing to the emergence of Type 2 diabetes and gestational pregnancy at an early age. Besides, bad eating habits and unhealthy food, lack of exercising and absence of health education programs, significantly contribute to the prevalence of obesity in our society.

The results are statistically significant (p value <0.05), so there is a significant relationship between diabetes and BMI.

4.2 Diabetes and pregnancy and Age of onset

Diabetes is a disease that affects people of all ages. However, the incidence of Type 1 diabetes, Type 2 diabetes and gestational diabetes varies from one age group to another.

Your risk of Type 2 diabetes increases as you grow older, especially beyond the age of 45. Part of the reason is that as people grow older, they tend to become less physically active, lose muscle mass and gain weight. (Clavell Mc.2001)

Recent years, however, have seen a dramatic rise in diabetes among people in their 30s and 40s. And although the prevalence of Type 1 diabetes has remained steady, more children and teenagers are being diagnosed with type 2 diabetes. (Clavell Mc.2001)

Type 1 diabetes is often diagnosed before age 20... Gestational diabetes can affect any pregnant woman at child bearing age.

The result of the study: of those who had Type1, 10.5% the age of onset was between 5-15, 63.2% the age was between 15.1-25, 21.1% the age was between 25.1-35 and 5.3% were between 35 and more, of those who had Type 2, 8.9% were between 15.1-25, 66.7% the age was between 25.1-35, and 24.4% were 35 and more. About 15.4% of those who had gestational diabetes the age of onset were between 15.1-25, 41.0% between 25.1-35 and 43.6% were 35 and more.(Table 3.3)

High Percentage of Type 1 diabetic patients were found between the age 15-25 years, as we all know, Type 1 diabetes is often diagnosed at an early age. Percentage were also high among Type 2 and Gestational diabetes patients between 25-35 and older than 35. Obesity and family history of diabetes are important factors which contribute to the emergence of diabetes at an early age.

These result were statistically significant (p value <0.05), so there is a significant relationship between diabetes and age.

4.3 Diabetes and pregnancy and Family history

The incidence of developing Type 1, and Type2 or gestational diabetes increases in women with family history of diabetes.

There are genetic and environmental influences on the development of Type 1 diabetes. The major susceptibility is associated with human leucocyte antigen, but in more than 90% of cases there is no family history of diabetes. Likely environmental triggers for type 1 diabetes in genetically susceptible individuals include viruses and toxins. (Pickup J, Williams G. 2003).

Type 2 diabetes is a heterogeneous syndrome due to interaction of various environmental factors with multiple diabetogenic genes, which cause various combinations of insulin resistance and B-cell failure. Both defects are partly genetically and environmentally determined and both are exacerbated by hyperglycemia. Genetic predisposition accounts for 40-80% of susceptibility to type 2 diabetes and is polygenic. Genetic factors may influence insulin resistance and/or secretion. (Pickup J, Williams G. 2003).

The results of the study :of women who had Type1, 71.1% of them had family history with diabetes, first degree relatives, 10.5% second degree relative and 18.4% had no family history, of those who had Type 2, 88.9% of them had first degree relatives, 4.4% second degree relatives and 6.7% with no family history. And of women who had gestational diabetes, 76.1% of them had first degree relatives, 9.5% second degree relatives, and 14.5% had no family history. (Table 3.4)

The findings showed that the percentage were very high concerning family history and diabetes. It was found there was a relationship between first degree relatives and Type 2, Type 1, and Gestational diabetes. In the Palestinian society marriage between relatives is on of the most important causes for the inheritance of diabetes especially in the villages.

The results are statistically significant (p value <0.05), so there is a significant relationship between diabetes and family history.

4.4 Diabetes and pregnancy and other Diseases

Diabetes is a powerful risk factor for heart disease among women. Heart disease is the leading cause of death for women with diabetes.

Many women with Type1, and Type 2 diabetes and gestational diabetes already had heart diseases when they were diagnosed or had many of the risk factors such as having abnormal blood lipid levels, such as low HDL cholesterol or high triglycerides and had high blood pressure.

The result of the study: of those who had Type 1, 2.6% of them had chronic heart disease, 7.9% had hypertension, and 89.5% had no diseases, and of those who had Type 2, 17.8% had hypertension, 2.2% had endocrinological problems, 4.4% had hyperlipidemia but 75.6% had no diseases. And of those who had Gestational diabetes, 0.9% of them had endocrinological problems, 8.5% had hypertension, 4.3% hyperlipidemia, but 86.3% had no diseases. .(Table 3.5)

The results were not found to of high percentage pertaining to women and other diseases. Most of the women in the sample were less than 35 years old. It's well known that advanced age contributes to appearance of diabetes and other diseases.

4.5 Diabetes and pregnancy and Smoking

Smoking has been found to be a risk factor for insulin resistance, and earlier onset of diabetes. Insulin resistant patients cannot use their bodily insulin properly, and insulin resistance often leads to diabetes.

Smoking is associated with an increased risk for development of diabetic complications, and diabetic patients who smoke require more insulin than non-smokers. Patients on insulin should be informed that their insulin requirements may change if they are attempting to give up smoking or change their smoking habits. (Patel A.2003)

The results of the study: of women who had Type1, 10.8% of them were smokers and 89.2% were not smokers. Of those who had Type2, 14.6% of them were smokers and 85.4% were not smokers. And of those who had gestational diabetes, 7.9% of them were smokers, 89.1% were not smokers, and only 3% were ex-smokers. (Table 3.6)

The percentage of women smokers, in the sample, was low given the traditions and values of the society particularly in the village. All the women from the villages were found to be non-smokers.

4.6 Diabetes and Pregnancy and Obstetric history

Other risk factors which put women at high risk for developing gestational diabetes and Type 2 diabetes are number of parities, miscarriages, and stillbirth. big baby, weighing more than 4kg, in previous pregnancies. In this research, I studied the obstetric history of the women who had developed gestational diabetes and women who had Type 1 and Type 2 diabetes.

Number of parities before onset of diabetes is risk factor that puts women at high risk for developing diabetes.

Of all women who had pre-gestational diabetes (Type1), 76.3% of the cases of the number of parities were between 0-3, and 23.7% of them

the number of parities were between 3-7. Of all women who had pre-gestational diabetes (Type2), 20% of them, the number of parities was between 0-3 and in 55.6%of them, the number of parities was between 3-7, and in 24.4% of them, the number of parities was more than 7. Of all women who had gestational diabetes, in 24.8% of them the number of parities was between 0-3, in 55,6% of them, the number of parities was between 3-7 and in 19.6% of them; the number of parities was more than 7. (Table 3.7,A)

These results are statistically significant (p value <0.05), so there is a significant relationship between diabetes and number of parities.

I also studied the risk of miscarriages before onset of diabetes as a risk factor that puts women at high risk for developing diabetes.

Of all women who had pre-gestational diabetes (Type1), 78.9% of the cases had no history of miscarriages and in 21.1% of them, the miscarriages were between 1-3 and, of all women who had pre- gestational diabetes (Type2), 55.6% of them had no history of miscarriages, in 44.4% of them, the miscarriages were between 1-3. Of all women who had gestational diabetes, 53% of them had no history of miscarriages, in 41.0% of them the miscarriages were between 1-3 and, in 6% of them, the miscarriages were more than 3. (Table 3.7,B)

Another important risk factor is the risk of giving birth to a stillbirth baby in previous pregnancy

Of all women who had pre-gestational diabetes Type1, 2.6% of the cases had history of stillbirth baby in previous pregnancies .Of all women who had Type 2 diabetes, 13.3% of them had history of stillbirth baby in

previous pregnancies. Of all women who had gestational diabetes, 9.4% of them had history of stillbirth baby in previous pregnancies. (Table 3.7,C)

As for the risk of giving birth to a big baby, babies weighing more than 4 kg in previous pregnancies before the onset of diabetes.

Of all women who had pre-gestational diabetes (Type1), 13.2% of the cases had history of giving birth to baby weighing more than 4 kgs in previous pregnancies. Of all women who had Type 2, 20% of them had history of giving birth to baby weighing more than 4 kgs in previous pregnancies. Of all women who had gestational diabetes, 26.5% of them had history of giving birth to baby with weight of more than 4kgs in previous pregnancies. (Table 3.7,D)

I also studied the risk of giving birth to babies weighing less than 2.5kg in previous pregnancies before the onset of diabetes.

Of all women who had pre-gestational diabetes (Type1), 7.9% of the cases had history of giving birth to baby weighing less than 2.5 kgs in previous pregnancies. Of all women who had Type 2, 4.4% of them had history of giving birth to baby with weight of less than 2.5 kgs in previous pregnancies. Of all women who had gestational diabetes, 7.7% of them had history of giving birth to baby weighing less than 2.5 kgs in previous pregnancies. (Table 3.7,E)

I also studied the risk of having a history of cesarean section delivery in previous pregnancies before the onset of diabetes the results were as follows :

Of all women who had pre-gestational diabetes (Type1), 5.3% of the cases had history of caesarian section delivery in previous pregnancies. Of all women who had Type 2, 4.4% of them had history of caesarian section delivery in previous pregnancies. Of all women who had gestational diabetes, 9.4%of them had history of caesarian section delivery in previous pregnancies. (Table 3.7,F)

In my study of the obstetric history of women before catching diabetes, I found a relationship between number of parities and number of abortions (miscarriages) and diabetes. This relation maybe due to women's weight increase several times, and hormone changes during pregnancy and women's ageing.

However, pertaining to the sample , it was found that there was no clear relationship between birth delivery to baby weighing more than 4kgs or lees than 2.5kgs or caesarean section delivery or stillbirth baby before catching diabetes.

4.7 Effect of Maternal Diabetes on Pregnancy

4.7.1 Effects of diabetes on the mother

The aim of diabetic control is to establish normoglycemia, both fasting and before and after meals, poor control of diabetes in a pregnant woman increases the incidence of birth defects and other problems for the baby. It might also cause serious complications for the mother.

Diabetic mother may develop several problems during pregnancy, such as hypoglycemia, hyperglycemia polyhydramnios, pre-eclampsia, preterm labor, Urinary tract infection, abortion, and caesarian delivery.

Hyperglycemia can lead to diabetic coma, both hyperglycemia and hypoglycemia can be very serious and even fatal if not treated quickly. These problems are more common when there is poor glycemic control.

Polyhydramnios may be defined as a four-quadrant liquor volume, as measured by ultrasound ('amniotic fluid index'), that is greater than the 90th percentile for gestational age. It may be due to fetal polyuria secondary to fetal hyperglycaemia. (Pickup J and Williams G. 2003)

Miscarriage: Poor glycaemic control is assumed to increase the incidence of spontaneous miscarriage.

Pre-eclampsia, an important obstetric complication, is dangerous for both mother and fetus; the prenatal mortality rate for diabetic pre-eclamptic pregnancies is 60 per 1,000, compared to 3.3 per 1,000 for normotensive diabetic pregnancies.

Long duration of diabetes, poor glycaemic control and pre-existing microalbuminuria are other independent risk factors.

Preterm labor, is important because of increased perinatal morbidity and mortality. Spontaneous preterm delivery is significantly associated with poor glycaemic control after mid pregnancy and with urogenital infection. (Pickup J. and Williams G .2003)

If the fetus is suspected to be large, the timing and mode of delivery must be considered in order to prevent shoulder dystocia. (John S.2005)

Cesarean section in diabetic women, as in all women, should only be performed for obstetric indication. Cesarean section rate tends to be much higher for diabetic women than for the general population. (Enkin M.,

Keirse M. I.N.C., Neilson J., Crowther C., Duley L., Hodnett E., Hofmeyr J., 2000)

GDM is not of itself an indication for cesarean delivery or for delivery before completing 38 weeks of gestation. Prolongation of gestation past 38 weeks increases the risk of fetal macrosomia without reduction of cesarean rates, so that delivery during the 38th week is recommended unless obstetric considerations dictate otherwise. (Gestational diabetes mellitus,2004)

Women who had pre-gestational diabetes had experienced complications, in good glycemic control patient, 11.1% of them had hypoglycemia, 11.1% of them had polyhydraminos, and 55.6% had caesarian delivery, and 22.2% no recorded complications. Pertaining to poor glycemic control patient, who had pre-gestational diabetes, 20.3% had abortion, 13% had hypoglycemia, 2.9% had pre-eclampsia, 7.2% polyhydroamnios, 10.1% had urinary tract infection, 2.9% had preterm labor, 26.1% had caesarian delivery, and 17.4% no recorded complications. (Table 3.8.1, A)

Women who had gestational diabetes the complications they had experienced during pregnancy, in good glycemic control patients, 7.4% of them had abortion, 7.4% of them had hypoglycemia, 3.7% had pre-eclampsia, 11.1% had polyhydroamnios, and 11.1% had urinary tract infection, 33.3% had caesarian delivery, and 25.9% no recorded complications. Pertaining to poor glycemic control patient who had gestational diabetes the complications they had experienced during pregnancy, 6.4% of them had abortion, 6.4% of them had hypoglycemia,

19.1% had urinary tract infection, in 2.1% had preterm labor, 23.4% had caesarian delivery, and 42.6% no recorded complications. (Table 3.8.1, B)

One of the problems which I faced during my data collection, was the diabetic women's failure to visit diabetes clinics regularly. There fore, I couldn't find out the complications women have experienced during pregnancy. Most of the women whom I followed up belonged to the poor glycemetic control. Complications were found to be more common among women with pre-gestational diabetes due to their exposure to diabetes for longer time.

4.7.2 Effects of maternal diabetes on the baby

Infant of the diabetic mother is prone to develop several problems in the neonatal period, such as respiratory dysfunction, hypoglycemia (less than 30 mg/dl), polycythaemia and jaundice. These problems are more common when there is poor maternal glycemetic control, but are usually treatable and often resolve within a few hours or days.

Hypoglycemia is a common problem among babies of women with diabetes. It occurs in up to 50% of neonates and is especially common in those with macrosomia and hyperinsulinaemia.

Respiratory dysfunction: The risk of respiratory distress syndrome is six times higher for women with diabetes. Jaundice occurs in over 60% of babies and is more common among macrosomic babies (Pickup J., Williams G .2003)

Macrosomia: occurs in 15 to 45 percent of diabetic pregnancies compared to 10 % in the non-diabetic population. Macrosomia is still more

common in the infants of diabetic mothers than on those of non-diabetic mothers, even with best diabetic control currently available. (Enkin M., Keirse M. I.N.C., Neilson J., Crowther C., Duley L., Hodnett E., Hofmeyr J., 2000)

Macrosomia is associated with diabetes and cardiovascular disease in later life but the immediate significance of macrosomia is the risk of birth trauma, higher rates of operative delivery, and of neonatal problems (hypoglycemia, polycythemia, hypocalcemia and heart failure related to cardiac hypertrophy) birth trauma , shoulder dystocia in particular is perhaps the most serious. One study found that the incidence of shoulder dystocia in babies of mother with diabetes rose to 31% with birth weight greater than 4000g. (John S.2005)

Stillbirth rate remain about four times higher than in non-diabetic pregnancies.

Babies of the women who had pre-gestational diabetes had experienced complications, in good glycemic control patients, 11.1% had hypoglycemia, 33% had respiratory dysfunction, 11.1% had still birth, 22.2% had macrosomia, and 22.2% of them no recorded complications. While the babies of poor glycemic control patients 6.2% had hypoglycemia, 12.5% had respiratory dysfunction, 2.1% had still birth, 14.6% had macrosomia, 10.4% had shoulder dystocia, and 54.2% no recorded complications. (Table 3.8.2, A)

Babies of the women who had gestational diabetes had experienced complications, in good glycemic control patients, in good glycemic control patients, only 8.3% had jaundice and 91.7% of them no recorded

complications. While the babies of poor glycemic control patients 7.3% had hypoglycemia, 2.4% had respiratory dysfunction, 2.4% had still birth, 19.5% had macrosomia, 4.9% had shoulder dystocia, and 63.4% no recorded complications. (Table 3.8.2, B)

In addition, I couldn't determine the size of the real problem or its multiplications diabetic mother's babies are exposed to due to their failure to follow up or visit diabetes clinics during pregnancy or after birth delivery. Therefore, some percentages contradict scientific facts.

4.8 Diabetes and pregnancy and Treatment:

Type 1 and Type 2 diabetes often are present before a woman gets pregnant. If not controlled, before and during pregnancy, Type 1 and Type 2 diabetes can cause serious complications for both the mother and her baby, including birth defects and several health problems to the mother, thus causing her problems to worsen if they are already present. These problems include high blood pressure, kidney disease, nerve damage, heart disease and blindness.

Type 1 diabetes must be controlled with a balance of diet, exercise, and insulin. Type 2 diabetes might be controlled with diet and exercise. If that cannot be done, then the use of insulin is recommended.

Gestational diabetes, if not controlled, can cause the baby to grow extra large and lead to problems, during the delivery, for the mother and the baby. Gestational diabetes might be controlled with diet and exercise. If that cannot be done, then the use of insulin is recommended.

The results of my study: of those who had pre-gestational diabetes, 3.6% of them used diet treatment (Type 2), while 96.4% used insulin

treatment. Of those who had gestational diabetes, 39.3% used diet treatment but 60.7% used insulin treatment. (Table 3.9)

4.9 Statistics about Gestational Diabetes

Women with GDM have a 30-percent risk of developing Type 2 diabetes during their lifetime compared to a 10-percent risk in the general population. A small percentage of women with GDM may develop Type 1 diabetes during their life. These women have a slowly developing form of Type 1 that is 'unmasked' during pregnancy.

The requirement for insulin in pregnancy, obesity and further weight gain postpartum are all associated with an increased risk of future diabetes, mostly Type2. Other predictors are a family history of type 2 diabetes, especially on the maternal side. (Pickup J. Williams G .2003).

In most cases, gestational diabetes disappears after delivery. However, a diagnosis puts women at a greater risk for developing it again during another pregnancy. Sometimes gestational diabetes does not go away after delivery, and these women have converted to Type 2 diabetes.

The results of my study: in 39.3% of women, who had gestational diabetes, diabetes continued after delivery, and in 7.7% of them diabetes disappeared but reappeared after a while, in 21.4% of them, diabetes appeared in the next pregnancy, and in 7.7%, diabetes disappeared after delivery. (Table 3.10)

One of the eye-catching findings is that 39.3%of diabetic pregnant women continued to have the disease after delivery. I believe that a large

percentage of them had had the disease before pregnancy, however, it was failed to detect or diagnosed except during pregnancy period.

4.10 Knowledge:

The sample included only 100 women in this part, as a result of the various obstacles I faced during data collection

Education of diabetic pregnant women is the cornerstone of management of diabetes during pregnancy. It plays a very significant role in treatment and decreasing the progression of such complications.

In this study, I tried to find level of knowledge about diabetes between diabetic pregnant women by asking them questions about diabetes.

- 1- Do you know what diabetes, types, symptoms, and risk factors are? In an answer to this question, 74% of the subjects answered in the negative, 14% answered in the positive, and 12% had intermediate knowledge. (Table 3.11,A)
- 2- Do you know which women are most likely to develop gestational diabetes? In response to this question, 79% of the subjects did not know, 16% had intermediate knowledge, and only 5% knew which women are most likely to develop gestational diabetes. (Table 3.11,B)
- 3- Did you visit diabetes clinic while planning your pregnancy? In response to this question, 53.7% of the subjects didn't visit a diabetes clinic while planning for pregnancy as opposed to 46.3 % who did. (Table 3.11,C)

- 4- Did you visit diabetes clinic after delivery? In response to this question, 36% of the subjects didn't visit a diabetes clinic after delivery as opposed to 64% who did so. (Table 3.11,D)
- 5- Have you ever read or heard about diabetes and pregnancy in any mass media? In an answer to this question, 56% of the subjects never read or heard about diabetes and pregnancy in the mass media, 25 % had intermediate reading and 19% read or heard about diabetes and pregnancy in the mass media. (Table 3.11,E)

I also tried to study the relationship between patient's knowledge and educational level.

Frequencies and percentages between question number one and educational level

In the case of illiterate women, 100% of the subjects said no, and of women with elementary educational level, 5.0% said yes, but 95.0% said no. Of women with secondary educational level, 10.3% said yes, and 82.8% said no, and 6.9% said they had intermediate knowledge. Of women with high school educational level, 10.3% of them said yes, 69.0% said no, and 20.7% said they had intermediate knowledge. Of women with a diploma 50% said no, 50% said they had intermediate knowledge. Of women with college degree, 60% said yes. 20% said no, and 20% said they had intermediate knowledge. (Table 3.11,F)

The result are statistically significant (p value <0.05), so there is a significant relationship between educational level and question number one.

And I also tried to study the relation ship between patient's knowledge and profession

Frequencies and percentage between question number one and profession.

A bout 10.1% of the house wives said yes, 77.5% said no, and 12.4% said they had intermediate knowledge. Of the employed women, 27.3% said they had knowledge, 72.7% said they had no knowledge. (Table 3.11,G)

The result are statistically significant (p value <0.05), so there is a significant relationship between profession and question number one.

It was found that the majority of diabetic pregnant women(74%) did not know what diabetes is, what its causes are and what its symptoms are, although the subjects had had Type 1 and Type 2 diabetes for a considerable time. Further, 56% of the sample said they never heard or read about diabetes in the mass media.

Pertaining to the level of educations and knowledge, it was found that most diabetic women failed to complete high school, most of them were housewives and their knowledge of the disease was meager.

In contrast, those women who had a higher level of education had a good knowledge of the illness. However, they were only a minority. One major reason for lack of knowledge about the disease was the absence of appropriate educational awareness programs at schools, universities, and on the mass media.

4.11 Conclusion

In this study, several important facts have been found concerning the risk factors associated with diabetes in child bearing age. The major risk factors found in the study were obesity, age, family history, and the number of parities. These risk factors were proven to be directly associated with developing diabetes.

A diabetic pregnant woman and her baby face several health complications during this period, which is due to the irregular visits of a large number of diabetic pregnant women to the governmental postnatal health clinics and diabetic health clinics after delivery, thus preventing collection of data on complications which women were subjected to during birth delivery and complications the baby was exposed to after delivery.

I also tried to evaluate the level of awareness and knowledge among the diabetic pregnant women visiting the diabetes clinics; I found that there was a serious problem concerning this issue since there was a serious lack of knowledge and very poor awareness about this disease.

4.12 Recommendations

In order to improve health services provided to women, attending governmental diabetic clinics, and to decrease complications for the pregnant woman and her baby, I recommend the following:

1. Joint efforts between diabetes clinics and obstetric care centers are highly recommended. Establishment of health clinics, combining the services provided and the teams available in both units can be an ideal solution for many of the complications facing the pregnant women and their newborn babies. The team should consist of a diabetologist, an obstetrician, a neonatologist, (a doctor who specializes in the care of newborn infants), a diabetes educator, and a registered dietitian as were midwives and nurses.
2. Conducting periodic health education programs in diabetic health clinics and encouraging public awareness programs and campaigns using all means possible, and employing mass media to achieve these goals.
3. Cooperation between the Ministry of Health and the Ministry of Education to improve health awareness among girls in high schools and universities.
4. Encouraging pre-pregnancy management using different tools and methods such as: preconception counseling.
5. Training the health service providers in MCH centers on how to deal with those women and emphasizing the importance of early screening for GDM in MCH centers.

6. Encouraging pregnant women to adopt healthy lifestyle choices. Such as eating a balanced diet, exercising regularly and appropriately and maintaining a normal body weight.
7. Developing a registration process to know the size of this problem in Palestine.

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جامعة النجاح الوطنية
كلية الدراسات العليا

تحسين الخدمات الصحية للنساء الحوامل المصابات بمرض السكري المراجعات
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العليا في جامعة النجاح الوطنية، نابلس، فلسطين.

2006م

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الملخص

كثيرا ما يصيب النساء مرض السكري في عمر الإنجاب مما يؤثر على صحة الأم والطفل، إن ضعف المتابعة وعدم السيطرة على هذا المرض يزيد فرص إنجاب أطفال مصابين بعيوب و مشاكل صحية متنوعة، وقد تتعرض الأم لمضاعفات صحية خطيرة. إن الرعاية الصحية المناسبة قبل وخلال فترة الحمل سوف يساعد في منع حدوث مشاكل صحية عند الأم و الطفل.

لقد تم دراسة العوامل المؤثرة المرتبطة بالإصابة بمرض السكري للنساء خلال فترة الحمل و الإنجاب في محافظتي نابلس و جنين، كما تم دراسة المضاعفات التي يواجهها الطفل و الأم وتقييم مستوى المعرفة بمرض السكري لدى النساء.

تم اختيار عينة عشوائية من 200 امرأة مصابة بمرض السكري 117 من النساء أصيبوا بسكري الحمل، 38 مصابات بمرض السكري من النوع الأول، 45 مصابات بمرض السكري من النوع الثاني.

المعلومات التي تم جمعها بهدف تعبئة الاستمارات المعدة لهذا الهدف من خلال الملفات الطبية المتوفرة في عيادات السكري التابعة لمديريات الصحة الحكومية.

و تشمل المعلومات: معلومات شخصية، معلومات عن التاريخ الإنجابي، ومعلومات عن الوضع الصحي.

تم استخدام برنامج SPSS الإحصائي لتحليل المعلومات و إيجاد النتائج.

النتائج المتعلقة بالكتلة الجسمية BMI للنساء المصاب بمرض السكري من النوع الأول: 15.8% من النساء كانوا يعانون من الوزن الزائد، 15.8% يعانون من البدانة. النتائج المتعلقة بالعمر عند الإصابة: 10.5% من العينة كان العمر عند الإصابة بين 5-15 سنة، 63.2% العمر عند الإصابة بين 15.1-25، 21.1% العمر عند الإصابة كان بين 25.1-35 و 5.3% العمر عند الإصابة 35 وأكثر. النتائج المتعلقة بالتاريخ العائلي لمرض السكري 71.1% لديهم قرابة من الدرجة الأولى لمرض للسكري.

النساء المصابات بالسكري من النوع الثاني: النتائج المتعلقة بالكتلة الجسمية BMI 40% يعانون من الوزن الزائد، 42.2% يعانون من البدانة 6.7% يعانون من البدانة المرضية. النتائج المتعلقة بالعمر عند الإصابة: 8.9% العمر عند الإصابة بين 15.1-25 و 66.7% العمر عند الإصابة بين 25.1-35 و 24.4% العمر عند الإصابة 35 وأكثر. والنتائج المتعلقة بالتاريخ العائلي لمرض السكري 88.9% لديهم قرابة من الدرجة الأولى لمرض للسكري.

النساء المصابات بسكري الحمل: النتائج المتعلقة بالكتلة الجسمية BMI: 27.4% يعانون من الوزن الزائد، 39.3% يعانون من البدانة، و 7.7% يعانون من البدانة المرضية النتائج المتعلقة بالعمر عند الإصابة 15.4% العمر عند الإصابة بين 15.1-25 و 4% العمر عند الإصابة بين 25.1-35 و 43.6% العمر عند الإصابة 35 وأكثر، والنتائج المتعلقة بالتاريخ العائلي لمرض السكري 76.1% لديهم قرابة من الدرجة الأولى لمرض للسكري.