Ministry of Higher Education and Scientific Research Al-Furat Al-Awsat Technical University A-Mussaib Technical Institute Department of Medical Laboratory Techniques



Some Haematology and biochemistry study of Diabetes Mellitus

مقدم الى مجلس المعهد التقني المسيب/قسم تقنيات المختبرات الطبية كجزء من متطلبات نيل شهادة الدبلوم الفني في تقنيات المختبرات الطبية

> الاستاذ المشرف امد. هشام عطوان سوادي

> > اعداد الطلبة:

احمد شريف عبيد اشرف حامد خضر الحسين فلاح عبد الحسن امير غازي جريان ايمان محمد خليل حسين رحيم عنكود زينب احمد حسين صادق كريم على احمد حسين على حسن هاشم على راسم عبد الساده طالب محمد هاشم محمد حميد عبدالله

2021 -2020 م

1442 **-**1441 •

بسم الله الرحمن الرحيم

(قُلْ بِفَضْلِ اللَّهِ وَبِرَحْمَتِهِ فَبِذَلِكَ فَلْيَفْرَحُوا هُوَ خَيْرٌ مِمَّا يَجْمَعُونَ))

صدق الله العلي العظيم

سورة يونس (الاية58)

إلى من أشتاق إليه بكل جوارحي.... وطني الغالي. إلى مثال التفاني والإخلاص.... أبى الحبيب. إلى من قدَّمت سعادتي وراحتي على سعادتها... أمي الفاضلة. إلى من لم يبخلوا بمساعدتي يوم ما.... اساتذتي الاعزاء أهديكم ذلك العمل المتواضع.....

Contains				
CHAPTER ONE				
Indroduction				
Diabetes Mellitus	1			
Blood sugar	1			
Types of Diabetes	2			
Symptoms of Diabetes Mellitus	3			
Complications of diabetes	5			
Diagnosis of Diabetes Mellitus	5			
Screening for diabetes	7			
Treatment of Diabetes Mellitus	8			
Prevention of diabetes complications				
CHAPTER TWO				
Material and Methods				
Blood Glucose Meter	12			
How to do a PCV, Hb analysis using an electronic device	13			
The tools for performing a cholesterol analysis	13			
The tools for performing a triglyceride analysis	14			

CHAPTER THREE			
RESULTS and DISCUSSION			
BLOOD SUGAR	15		
HAEMATOLOGICAL TESTS	16		
BIOCHEMICAL TEST	18		
CHAPTER FOUR			
Conclusions and Recommendations			
Conclusions	19		
Recommendations	19		
References	20		

متكر يوقيريم

نحمد الله عز وجل الذي وفقنا في اتمام هذا البحث العلمي، والذى ألهمنا الصحة العافية والعزيمة فلحمد للله حمد كثبر أ

نتقدم بجزيل الشكر والتقدير الى عمادة المعهد التقني المسيب المتمثلة بالسيد الأستاذ الدكتور جبار عباس جابر عميد المعهد التقني ورئيس قسم تقنيات المختبرات الطبية الأستاذ الدكتور جواد كاظم علي والى كافة تدريسي ومنتسبي قسم تقنيات المختبرات الطبية لما قدموا لنا من معلومات علمية وعملية طيلة مدة الدراسة في المعهد كما نتقدم بالشكر والتقدير الى الأستاذ المساعد الدكتور المشرف "هشام عطوان سوادي" على كل ما قدمه لنا من توجيهات ومعلومات قيمه حيث قدم لي كل النصح والارشاد طيلة فترة الاعداد فله منا جزيل الشكر

INTRODUCTION

1- Diabetes Mellitus

Diabetes mellitus, commonly known as just diabetes, is a group of metabolic disorders characterized by a high blood sugar level over a prolonged period of time.

Urination and thirst are increased, and people may lose weight even if they are not trying to. Diabetes damages the nerves and causes problems with sensation. Diabetes damages blood vessels and increases the risk of heart attack, stroke, chronic kidney disease, and vision loss. Doctors diagnose diabetes by measuring blood sugar levels. People with diabetes need to follow a healthy diet that is low in refined carbohydrates (including sugar), saturated fat, and processed foods. They also need to exercise and usually take drugs to lower blood sugar levels.

Diabetes mellitus is a disorder in which the amount of sugar in the blood is elevated. Doctors often use the full name diabetes mellitus, rather than diabetes alone, to distinguish this disorder from diabetes insipidus. Diabetes insipidus is a relatively rare disorder that does not affect blood glucose levels but, just like diabetes mellitus, also causes increased urination (1).

2- Blood sugar

The three major nutrients that make up most food are carbohydrates, proteins, and fat. Sugars are one of three types of carbohydrates, along with starch and fiber.

There are many types of sugar. Some sugars are simple, and others are complex. Table sugar (sucrose) is made of two simpler sugars called glucose and fructose. Milk sugar (lactose) is made of glucose and a simple sugar called galactose. The carbohydrates in starches, such as bread, pasta, rice, and similar foods, are long chains of different simple sugar molecules. Sucrose, lactose, carbohydrates, and other complex sugars must be broken down into simple sugars by enzymes in the digestive tract before the body can absorb them.

Once the body absorbs simple sugars, it usually converts them all into glucose, which is an important source of fuel for the body. Glucose is the sugar that is transported through the bloodstream and taken up by cells. The body can also make glucose from fats and proteins. Blood "sugar" really means blood glucose.

Insulin

Insulin, a hormone released from the pancreas (an organ behind the stomach that also produces digestive enzymes), controls the amount of glucose in the blood. Glucose in the bloodstream stimulates the pancreas to produce insulin. Insulin helps glucose to move from the blood into the cells. Once inside the cells, glucose is converted to energy, which is used immediately, or the glucose is stored as fat or the starch glycogen until it is needed.

The levels of glucose in the blood vary normally throughout the day. They rise after a meal and return to pre-meal levels within about 2 hours after eating. Once the levels of glucose in the blood return to pre-meal levels, insulin production decreases. The variation in blood glucose levels is usually within a narrow range, about 70 to 110 milligrams per deciliter (mg/dL), or 3.9 to 6.1 millimoles per liter (mmol/L) of blood in healthy people. If people eat a large amount of carbohydrates, the levels may increase more. People older than 65 years tend to have slightly higher levels, especially after eating.

If the body does not produce enough insulin to move the glucose into the cells, or if the cells stop responding normally to insulin (called insulin resistance), the resulting high levels of glucose in the blood and the inadequate amount of glucose in the cells together produce the symptoms and complications of diabetes (2).

3- Types of Diabetes

a- Prediabetes

Prediabetes is a condition in which blood glucose levels are too high to be considered normal but not high enough to be labeled diabetes. People have prediabetes if their fasting blood glucose level is between 100 mg/dL (5.6 mmol/L) and 125 mg/dL (6.9 mmol/L) or if their blood glucose level 2 hours after a glucose tolerance test is between 140 mg/dL (7.8 mmol/L) and 199 mg/dL (11.0 mmol/L). Prediabetes carries a higher risk of future diabetes as well as heart disease.

Decreasing body weight by 5 to 10% through diet and exercise can significantly reduce the risk of developing future diabetes.

b- Type 1 diabetes

results from failure of the pancreas to produce enough insulin due to loss of beta cells. This form was previously referred to as "insulin-dependent diabetes mellitus" (IDDM) or "juvenile diabetes".The loss of beta cells is caused by an autoimmune response. The cause of this autoimmune response is unknown.

c- Type 2 diabetes

begins with insulin resistance, a condition in which cells fail to respond to insulin properly. As the disease progresses, a lack of insulin may also develop. This form was previously referred to as "non insulin-dependent diabetes mellitus" (NIDDM) or "adult-onset diabetes". The most common cause is a combination of excessive body weight and insufficient exercise.(3h)

4- Symptoms of Diabetes Mellitus

The two types of diabetes can have very similar symptoms if the blood glucose is significantly elevated.

The symptoms of high blood glucose levels include

Increased thirst

Increased urination

Increased hunger

When the blood glucose level rises above 160 to 180 mg/dL (8.9 to 10.0 mmol/L), glucose spills into the urine. When the level of glucose in the urine rises even higher, the kidneys excrete additional water to dilute the large amount of glucose. Because the kidneys produce excessive urine, people with diabetes urinate large volumes frequently (polyuria). The excessive urination creates abnormal thirst (polydipsia). Because excessive calories are lost in the urine, people may lose weight. To compensate, people often feel excessively hungry.

Other symptoms of diabetes include

Blurred vision

Drowsiness

Nausea

Decreased endurance during exercise

a- Type 1 diabetes

In people with type 1 diabetes, the symptoms often begin abruptly and dramatically. A serious condition called diabetic ketoacidosis, a complication in which the body produces excess acid, may quickly develop. In addition to the usual diabetes symptoms of excessive thirst and urination, the initial symptoms of diabetic ketoacidosis also include nausea, vomiting, fatigue, and—particularly in children—abdominal pain. Breathing tends to become deep and rapid as the body attempts to correct the blood's acidity (see Acidosis), and the breath smells fruity and like nail polish remover. Without treatment, diabetic ketoacidosis can progress to coma and death, sometimes very quickly.

After type 1 diabetes has begun, some people have a long but temporary phase of near-normal glucose levels (honeymoon phase) due to partial recovery of insulin secretion.

b- Type 2 diabetes

People with type 2 diabetes may not have any symptoms for years or decades before they are diagnosed. Symptoms may be subtle. Increased urination and thirst are mild at first and gradually worsen over weeks or months. Eventually, people feel extremely fatigued, are likely to develop blurred vision, and may become dehydrated.

Sometimes during the early stages of diabetes, the blood glucose level is abnormally low at times, a condition called hypoglycemia.

Because people with type 2 diabetes produce some insulin, ketoacidosis does not usually develop even when type 2 diabetes is untreated for a long time. Rarely, the blood glucose levels become extremely high (even exceeding 1,000 mg/dL [55.5 mmol/L]). Such high levels often happen as the result of some superimposed stress,

such as an infection or drug use. When the blood glucose levels get very high, people may develop severe dehydration, which may lead to mental confusion, drowsiness, and seizures, a condition called hyperosmolar hyperglycemic state. Many people with type 2 diabetes are diagnosed by routine blood glucose testing before they develop such severely high blood glucose levels.

5- Complications of diabetes

Diabetes damages blood vessels, causing them to narrow and therefore restricting blood flow. Because blood vessels throughout the body are affected, people may have many complications of diabetes. Many organs can be affected, particularly the following:

Brain, causing stroke

Eyes (diabetic retinopathy), causing blindness

Heart, causing heart attack

Kidneys (diabetic nephropathy), causing chronic kidney disease

Nerves (diabetic neuropathy), causing decreased sensation in feet

High blood glucose levels also cause disturbances in the body's immune system, so people with diabetes mellitus are particularly susceptible to bacterial and fungal infections (4).

6- Diagnosis of Diabetes Mellitus

Measuring the level of glucose in the blood

The diagnosis of diabetes is made when people have abnormally high levels of glucose in the blood. Doctors do screening tests on people who are at risk of diabetes but have no symptoms.

a- Blood glucose measurement

Doctors check blood glucose levels in people who have symptoms of diabetes such as increased thirst, urination, or hunger. Additionally, doctors may check blood glucose levels in people who have disorders that can be complications of diabetes, such as frequent infections, foot ulcers, and yeast infections.

To accurately evaluate blood glucose levels, doctors usually use a blood sample taken after people have fasted overnight. Diabetes can be diagnosed if fasting blood glucose levels are higher than 125 mg/dL (6.9 mmol/L). However, it is possible to use blood samples taken after people have eaten. Some elevation of blood glucose levels after eating is normal, but even after a meal the levels should not be very high. Diabetes can be diagnosed if a random (not done after fasting) blood glucose level is higher than 199 mg/dL (11.0 mmol/L).

b- Hemoglobin A1C

Doctors can also measure the level of a protein, hemoglobin A1C (also called glycosylated or glycolated hemoglobin), in the blood. Hemoglobin is the red, oxygen-carrying substance in red blood cells. When blood is exposed to high blood glucose levels over a period of time, glucose attaches to the hemoglobin and forms glycosylated hemoglobin. The hemoglobin A1C level (reported as the percentage of hemoglobin that is A1C) reflects long-term trends in blood glucose levels rather than rapid changes.

Measurements of hemoglobin A1C can be used to diagnose diabetes when testing is done by a certified laboratory (not by instruments used at home or in a doctor's office). People with a hemoglobin A1C level of 6.5% or more have diabetes. If the level is between 5.7 and 6.4, they have prediabetes.

c- Oral glucose tolerance test

Another kind of blood test, an oral glucose tolerance test, may be done in certain situations, such as screening pregnant women for gestational diabetes or testing older people who have symptoms of diabetes but normal glucose levels when fasting. However, it is not routinely used for testing for diabetes because the test can be very cumbersome.

In this test, people fast, have a blood sample taken to determine the fasting blood glucose level, and then drink a special solution containing a large, standard amount of glucose. More blood samples are then taken over the next 2 to 3 hours and are tested to determine whether the glucose in the blood rises to abnormally high levels.

7- Screening for diabetes

Blood glucose levels are often checked during a routine physical examination. Checking the levels of glucose in the blood regularly is particularly important in older people because diabetes is so common in later life. People may have diabetes, particularly type 2 diabetes, and not know it.

Doctors do not do routine tests to screen for type 1 diabetes even in people at high risk of type 1 diabetes (such as siblings or children of people who have type 1 diabetes). However, it is important to do screening tests in people at risk of type 2 diabetes, including those who

Are over 45 years old

Have prediabetes

Are overweight or obese

Have a sedentary lifestyle

Have high blood pressure and/or a lipid disorder such as high cholesterol

Have cardiovascular disease

Have a family history of diabetes

Have had diabetes during pregnancy or had a baby who weighed more than 9 pounds (4,000 grams) at birth

Have polycystic ovary disease

Are of African American, Hispanic, Asian American, or American Indian ethnicity

People with these risk factors should be screened for diabetes at least once every three years. Diabetes risk can be estimated using online risk calculators. Doctors may measure fasting blood glucose levels and hemoglobin A1C level, or do an oral glucose tolerance test. If the test results are on the border between normal and abnormal, doctors do the screening tests more often, at least once a year (5).

8-Treatment of Diabetes Mellitus

Diet

Exercise

Weight loss

Education

In type 1 diabetes, insulin injections

In type 2 diabetes, often drugs by mouth and sometimes insulin or other drugs by injection

Diet, exercise, and education are the cornerstones of treatment of diabetes and often the first recommendations for people with mild diabetes. Weight loss is important for people who are overweight. People who continue to have elevated blood glucose levels despite lifestyle changes, or have very high blood glucose levels and people with type 1 diabetes (no matter their blood glucose levels) also require drugs.

Because complications are less likely to develop if people with diabetes strictly control their blood glucose levels, the goal of diabetes treatment is to keep blood glucose levels as close to the normal range as possible.

Treatment of high blood pressure and high cholesterol levels, which can contribute to circulation problems, can help prevent some of the complications of diabetes as well. A low dose of aspirin taken daily is recommended in people with risk factors for heart disease. All people with diabetes who are between 40 and 75 years are given a statin (a drug to decrease cholesterol levels) regardless of cholesterol levels. People younger than 40 or older than 75 years and with an elevated risk of heart disease also should take a statin.

It is helpful for people with diabetes to carry or wear medical identification (such as a bracelet or tag) to alert health care practitioners to the presence of diabetes. This information allows health care practitioners to start life-saving treatment quickly, especially in the case of injury or change in mental status. Diabetic ketoacidosis and hyperosmolar hyperglycemic state are medical emergencies because they can cause coma and death. Treatment is similar for both and centers around giving intravenous fluids and insulin.

Diabetes treatment goals

Experts recommend that people keep their blood glucose levels

Between 80 and 130 mg/dL (4.4 and 7.2 mmol/L) fasting (before meals)

Less than 180 mg/dL (10.0 mmol/L) 2 hours after meals

Hemoglobin A1C levels should be less than 7%.

Because aggressive treatment to reach these goals increases the risk that blood glucose might go too low (hypoglycemia), these goals are adjusted for some people in whom hypoglycemia is particularly undesirable, such as older people.

Some other goals are keeping systolic blood pressure less than 140 mm Hg and diastolic blood pressure less than 90 mm Hg. For diabetic people who have heart disease or are at high risk for heart disease, the blood pressure goal is less than 130/80 mm Hg.

General treatment of diabetes

People with diabetes benefit greatly from learning about the disorder, understanding how diet and exercise affect their blood glucose levels, and knowing how to avoid complications. A nurse trained in diabetes education can provide information about managing diet, exercising, monitoring blood glucose levels, and taking drugs.

People with diabetes should stop smoking and consume only moderate amounts of alcohol (up to one drink per day for women and two for men).

Diet for people with diabetes

Diet management is very important in people with both types of diabetes mellitus. Doctors recommend a healthy, balanced diet and efforts to maintain a healthy weight. People with diabetes can benefit from meeting with a dietitian or a diabetes educator to develop an optimal eating plan. Such a plan includes avoiding simple sugars and processed foods, increasing dietary fiber, limiting portions of carbohydrate-rich, and fatty foods (especially saturated fats). People who are taking insulin should avoid long periods between meals to prevent hypoglycemia. Although protein and fat in the diet contribute to the number of calories a person eats, only the number of carbohydrates has a direct effect on blood glucose levels. The American Diabetes Association has many helpful tips on diet, including recipes. Even when people follow a proper diet, cholesterol-lowering drugs are needed to decrease the risk of heart disease.

People with type 1 diabetes and certain people with type 2 diabetes may use carbohydrate counting or the carbohydrate exchange system to match their insulin dose to the carbohydrate content of their meal. "Counting" the amount of carbohydrate in a meal is used to calculate the amount of insulin the person takes before eating. However, the carbohydrate-to-insulin ratio (the amount of insulin taken for each gram of carbohydrate in the meal) varies for each person, and people with diabetes need to work closely with a dietician who has experience in working with people with diabetes to master the technique. Some experts have advised use of the glycemic index (a measure of the impact of an ingested carbohydrate-containing food on the blood glucose level) to delineate between rapid and slowly metabolized carbohydrates, although there is little evidence to support this approach.

Exercise for people with diabetes

Exercise, in appropriate amounts (at least 150 minutes a week spread out over three days), can also help people control their weight and improve blood glucose levels. Because blood glucose levels go down during exercise, people must be alert for symptoms of hypoglycemia. Some people need to eat a small snack during prolonged exercise, decrease their insulin dose, or both.

Weight loss for people with diabetes

Many people, especially those with type 2 diabetes, are overweight or obese. Some people with type 2 diabetes may be able to avoid or delay the need to take drugs by achieving and maintaining a healthy weight. Weight loss is also important in these people because excess weight contributes to complications of diabetes. When people with diabetes have trouble losing weight with diet and exercise alone, doctors may give weight-loss drugs or recommend bariatric surgery (surgery to cause weight loss).

9- Prevention of diabetes complications

Proper care of feet and regular eye examinations can help prevent or delay the onset of complications of diabetes. People with diabetes are vaccinated against Streptococcus pneumoniae, and doctors usually recommend they receive annual flu vaccination because people with diabetes are at risk of infection (6).

Prevention of Diabetes Mellitus

Type 1 diabetes

No treatments prevent the onset of type 1 diabetes mellitus. Some drugs may induce remission of early type 1 diabetes in some people, possibly because they prevent the immune system from destroying the cells of the pancreas. However, these drugs cause side effects that limit their use.

Type 2 diabetes

Type 2 diabetes can be prevented with lifestyle changes. People who are overweight and lose as little as 7 percent of their body weight and who increase physical activity (for example, walking 30 minutes per day) can decrease their risk of diabetes mellitus by more than 50%. Metformin and acarbose, drugs that are used to treat diabetes, may reduce the risk of diabetes in people with impaired glucose regulation (7).

1- Blood Sugar Test :

Materials:

What you need to use the ACC-CHEK Active blood glucose meter

- 1. Medical alcohol (or soap and water if you have access to the sink)
- 2. Lancet
- 3. Test strip
- 4. Notebook for recording results

Method:

♦Instructions for using the blood glucose meter

put your glucose meter, test strip and alcohol preparation pad on.
Wash your hands to prevent infection. If you're not near the sink, it's OK to only use an alcohol swab. If you are near the sink and wash your hands well, there is no need to use an alcohol swab.
Sometimes it helps to warm your hands first to facilitate blood flow. You can quickly rub your hands together or run them under warm water - just make sure to dry them well as wet hands can dilute the blood sample, leading to a lower number and an error in the result.

2. turn on the glucometer and place a test strip in the device when the device is ready. Observe the indicator of blood application on the strip. Make sure your hand is dry and wipe the area you marked with the alcohol preparation pad and wait for the alcohol to evaporate.

3.pierce the tip of the patient's finger for which are using. Place the drop of blood on or next to the tape.

4.the blood glucose meter will take a few moments to calculate your blood sugar reading. Follow your doctor's orders for any blood sugar reading you get.

You can use an alcohol prep pad to clean the place where you drew blood if it is still bleeding.

5.write your results. Keeping a record makes it easy for you and your

doctor to develop a good treatment plan. Some glucose meters can store your results in memory to facilitate record keeping. Note, keep a record of your results.

2,3 haemoglobin and packed cells volume test :

Materials:

Test slide for the device

cotton

alcohol

lancet

Method:

1. Turn on the electronic device

2. Take cotton and alcohol to sterilize the finger from which the blood sample will be taken.

- 3. Make a hole (beet) in the finger and put the drop inside the slide.
- 4. Put the chip inside the device.
- 5. Wait 3-5 minutes to read the result

4-Cholesterol:

Materials:

The tools for performing a cholesterol analysis are as follows: -

- 1.syringe
- 2.medical alcohol
- 3.tourniquet
- 4.tube
- 5.spectrophotometer

6.Centrifuge.

Method:

1- Take 3 tubes and write on each of them:

- a. Blank It is used for zeroing. We just put 1ml of R1 in it.
- B. Sample (the serum) and also put 1ml of R1 in it and add 10
- microliters of the serum to it.
- c. Standard In it we also put 1ml of R1 and add 10ml of Chol to
- it. Standard or working solution.

2- Mix well and leave it for 10 minutes at room temperature or for (5) five minutes at 37 degrees Celsius.

3- We click on the spectrometer with a wavelength of 505 nm for the Sample and Standard against the Blank, meaning it whistles on it as mentioned above.

4- Calculate T/S * S concentration, we get mg/dl where the standard concentration is 200 mg/dl.

5- If you want to get mmol/L, we multiply the result by 0.026

5- Triglyceride:

Materials:

- 1. Syringe
- 2- Medical alcohol
- 3 tourniquet
- 4. Tube
- 5. Spectrophotometer
- 6. Centrifuge.

Method:

- 1- Take 3 tubes and write on each of them:
- a. Blank is used for zeroing. We just put 1 ml of R1 in it.

b- To his sample (serum) 1 ml of R1 was also added to it and 10 μl of serum was added to it.

c. Standardly we also put 1 ml of R1 and add 10 ml of Chol to

it. Standard or practical solution.

2- Mix well and leave for 10 minutes at room temperature or for (5) five minutes at 37° C.

3- We press the spectrometer whose wavelength is 505 nm for the sample and the standard against the vacuum, meaning that it beeps on it as mentioned above

4- Calculate the T / S * S concentration, we get mg / dl where the standard concentration is 200 mg / dl.

5- If you want to get mmol/L, we multiply the result by 0.0114

1- BLOOD SUGAR:

Blood samples were examined from 35 male and female employees of the Mussaib Technical Institute, whose ages ranged between 18-65 years, for the period from 14-2-2021 to 14-4-2021 to detect the incidence of diabetes, comparing some haematological and biochemistry tests among people. Patients and non-diabetics such as Hb, PCV, Cholesterol and Triglycerides in the laboratories of the Middle Euphrates Technical University - Mussaib Technical Institute - Department of Medical Laboratory Technologies.

Where 35 people of different ages and both sexes were examined, and the number of diabetics was 7, with a 20% infection rate. As in Table No. (1)

Table (1) incidence of diabetes mellitus (random blood sugar above 140 mg/dl) in patients according to age.

Age group (years)	The number of people	number of	Percentage (%)
	examined	patients	
18-22	4	0	0
23-27	6	0	0
28-32	3	0	0
33-37	2	0	0
38-42	5	0	0
43-47	4	1	25
48-52	3	1	33
53-57	2	1	50
58-62	3	2	66
63-65	3	2	66
Total	35	7	20

Table No. (1) shows the incidence of diabetes according to the age group, where it is noted that the ages of less than 42 years, the incidence rate was 0, while the ages from 58 to 65 years recorded the highest incidence of 66%.

Table (2) incidence of diabetes mellitus (random blood sugar above 140 mg/dl) in patients according to gender.

Gender	The	number	of	people	number of patients	Percentage (%)
	exam	ined				
Male	27				2	7.40
Female	8				5	62.50
Total	35				7	20

Table No. (2) shows the incidence of diabetes mellitus according to the gender of the patient, where the incidence of females was higher than the incidence of males (62.50 and 7.40%), respectively.

2- HAEMATOLOGICAL TESTS:

Table 3 shows a comparison of some haematological tests such as hemoglobin (Hb) and packed cells volume (PCV) between people with diabetes and people without diabetes.

Haematological	without diabetes		with diabetes	
tests				
Hb gm/dl	Male	15.6-17.7	Male	11.3-14.2
		(16.54)		(13.24)
	Female	13.6-14.8	Female	11-11.6
		(14.27)		(11.33)
PCV%	Male	46-52 (48.22)	Male	33-42(39.47)
	Female	39-44(39.48)	Female	33-38 (36.82)

Table (3) comparison hemoglobin (Hb) and packed cells volume (PCV) between people with diabetes and people without diabetes.

By examining the concentration of hemoglobin, it was noted that there is a difference in the ratio between people with diabetes and people without diabetes, where the lowest hemoglobin percentage was recorded in the unaffected males 15.6 gm/dl and the highest 17.7gm/dl, and in females the lowest percentage was 13.6gm/dl and the highest 14.8gm/dl, while the lowest hemoglobin percentage was recorded in people Males with diabetes recorded 11.3gm/dl and the highest percentage with diabetes recorded 11.3gm/dl and the highest percentage was 14.2gm/dl, and in females with diabetes, the lowest hemoglobin percentage was 11gm/dl and the highest percentage was 11.6gm/dl.

While PCV percentage was noted that there is a difference in the ratio between people with diabetes and people without diabetes, where the lowest hemoglobin percentage was recorded in the unaffected males 46% and the highest 52%, and in females the lowest percentage was 39% and the highest 44%, while the lowest hemoglobin percentage was recorded in people Males with diabetes recorded 33% and the highest percentage 42%, and in females with diabetes, the lowest hemoglobin percentage was 33 and the highest percentage was 38.

3- BIOCHEMICAL TEST:

Table (3) comparison cholesterol and triglyceride between people with diabetes and people without diabetes.

biochemical	without diabetes	with diabetes
test		
Cholesterol	62-180 (97.3)	109-195(155.5)
gm/dl		
Triglyceride	75-198 (128.5)	134-205 (171.5)
gm/dl		

As for biochemical tests, the results showed that cholesterol tests in non-affected people recorded the lowest concentration of 62, while the highest concentration was 180. The cholesterol concentration in people with diabetes was higher than in people without diabetes, where the lowest concentration of cholesterol was 109 and the highest concentration was 195. Likewise in the triglyceride test, there is a difference between those with and without diabetes, where the concentration of triglycerides was higher in people with diabetes than in people without diabetes, where the results in non-diabetics were the lowest level of triglycerides 75 and the highest concentration of 198, while the results of fats were Triglycerides in infected persons, the lowest concentration is 134 and the highest concentration is 205 show table (3).

Conclusions

1- The incidence of diabetes was 20% of the people whose blood samples were examined

2- People with diabetes suffered from anemia where Hb and PCV were low

3- There was an increase in cholesterol and triglycerides in people with diabetes

Recommendations

1- General health, nutrition and psychological stress must be taken care of in order to reduce the high rate of diabetes

2- Blood tonics should be taken for people who suffer from diabetes and are under diet

3- It is necessary to take lipid-regulating medicines to control high lipids in people with diabetes in order to avoid heart disease

References

1- Kitabchi AE, Umpierrez GE, Miles JM, Fisher JN (July 2009). <u>"Hyperglycemic crises in adult patients with diabetes"</u>. Diabetes Care. 32 (7): 1335–1343.

2- Krishnasamy S, Abell TL (July 2018). <u>"Diabetic Gastroparesis: Principles</u> and Current Trends in Management". Diabetes Therapy. 9 (Suppl 1): 1–42

3-Saedi, E; Gheini, MR; Faiz, F; Arami, MA (15 September 2016). <u>"Diabetes</u> <u>mellitus and cognitive impairments"</u>. World Journal of Diabetes. 7 (17): 412– 422.

4- Ripsin, CM; Kang, H; Urban, RJ (January 2009). <u>"Management of blood</u> <u>glucose in type 2 diabetes mellitus"</u> (PDF). American Family Physician. 79 (1): 29–36.

5- Kenny C (April 2014). <u>"When hypoglycemia is not obvious: diagnosing and</u> <u>treating under-recognized and undisclosed hypoglycemia"</u>. Primary Care Diabetes. 8 (1): 3–11.

6- Poretsky, Leonid, ed. (2009). <u>Principles of diabetes mellitus</u> (2nd ed.). New York: Springer. p. 3.

7- Meisinger C, Thorand B, Schneider A, et al. (2002). <u>"Sex differences in</u> risk factors for incident type 2 Diabetes Mellitus: The MONICA Augsburg Cohort Study". JAMA Internal Medicine. 162 (1): 82–89.