جامعة الملك سعود
King Saud University

MEDICINE

436

MEDICINE
KING SAUD UNIVERSITY

Epidemiology of Diabetes mellitus

OBJECTIVES :

1. To list the types of Diabetes Mellitus.
2. To describe the prevalence of Diabetes Mellitus.
3. To recognize the importance of diagnostic criteria for estimating the prevalence of diabetes mellitus.
4. To discuss the risk factors and complications of type II diabetes mellitus.

MEDICINE
436 's TEAMWORK

Editing file

IMPORTANT

NOTES

EXTRA

تمت المراجعة
شوق الأحمري & عبدالعزيز العنقري

Diabetes mellitus

Definition :

A metabolic disorder of multiple aetiology characterized by chronic hyperglycaemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action or both.

Main Types of diabetes :

Type 1 (5-10%)	sudden onset absolute deficiency in insulin. Usually affects younger age group (not always)
Type 2 (90-95%) Most common	gradual onset of relative insulin insensitivity. Usually older age group (not always)

Other types :

Gestational diabetes	Secondary diabetes	Pre-diabetes
Gestational diabetes mellitus (GDM) is defined as any degree of glucose intolerance with onset or first recognition during pregnancy .	The diabetes is not the main illness, a secondary condition that results because of the main illness. If it is possible to treat the main illness successfully the diabetes may/will disappear e.g. cystic fibrosis, chronic pancreatitis, infections. (Also steroid drugs)	Impaired glucose tolerance - a person with pre-diabetes has a blood sugar level higher than normal, but not high enough for a diagnosis of diabetes; & is at higher risk for developing type 2 diabetes. May remain undiagnosed for years; risk of complications same as for T2DM

هذي المرحلة اللي تهمنا اكثر في public health لأنهم اكثر ناس نقدر نطبق عليهم preventive measures

Diagnosis of diabetes:

Symptoms

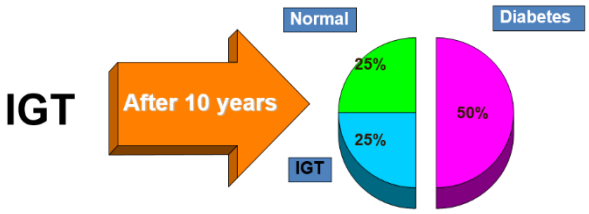
- Thirst
- Passing lots of urine
- Malaise
- Infections (thrush)
- Weight loss
- BUT – many years of pre-diabetes (type 2) before these symptoms appear!

Biochemical tests

- Random plasma glucose
- Fasting plasma glucose
- Oral glucose tolerance test – 2h glucose

*Important

Natural History of IGT



Fasting Blood sugar (FBS) :

Non diabetic: FBS< 110 mg/dl (6.1m mol/dl)

Glucose Intolerance: FBS 110 -125 mg/dl (6.1-6.9 m mol/dl). (Increased risk of DM) .

Diabetic: FBS >126 mg/dl (>7 m mol/dl) OR Random BS >200 mg/dl (>11.1m mol/dl) .

WARN

Diagnosis based on :

Glucose Tolerance Test 2 hr post 75 gm glucose

If < 7.8 mmol/L = normal GTT

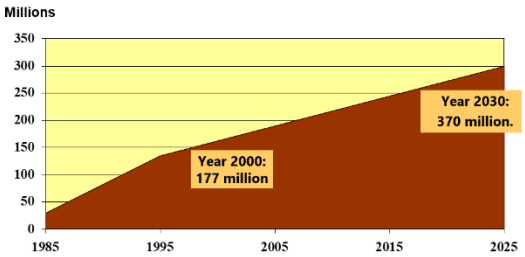
If ≥ 7.8 mmol/L and < 11.1 mmol/L = Impaired GTT

If ≥ 11.1 mmol/L = provisional diagnosis of Diabetes

Why is diabetes so important ?

Prevalence of 30% worldwide are Diabetic patient , but not all age , 30 years and above .

Prevalence of diabetes



The burden to patients, careers, NHS

Complications :

Cardiovascular

Eyes

Renal - Hypertension, renal failure

Feet

Cost

Skin, infections, sexual, psycho-sexual, depression

Quality of life

Premature mortality

Studies have shown that diabetes is a costly disease .

Type 2 diabetes accounted for between 3% and 6% of total healthcare expenditure in eight European countries .

Hospital in-patient costs are the largest single contributor to direct healthcare costs .

Family history is a huge risk factor for having Diabetes Mellitus

- Urbanization and lifestyle changes

- increased numbers of people being diagnosed with type 2 diabetes, and enhanced survival rates of those diagnosed will increase prevalence

- Longevity

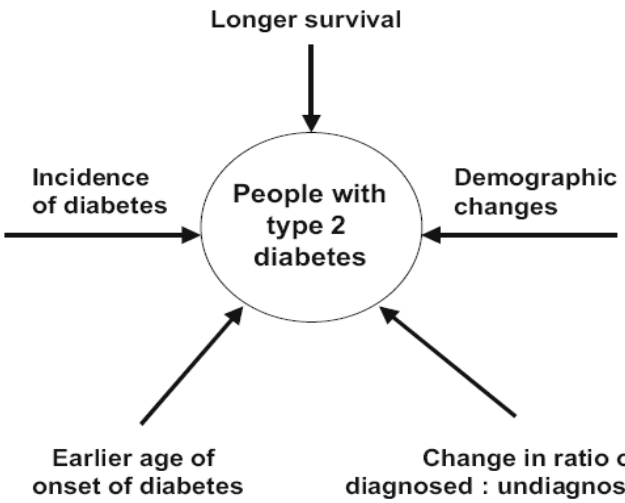


Fig. 1 Diabetes epidemiological model. Factors directly affecting the prevalence of diabetes included in the present analysis

Epidemiology of diabetes :

Prevalence worldwide is increasing:

2.8% in 2000

4.4% in 2030 worldwide

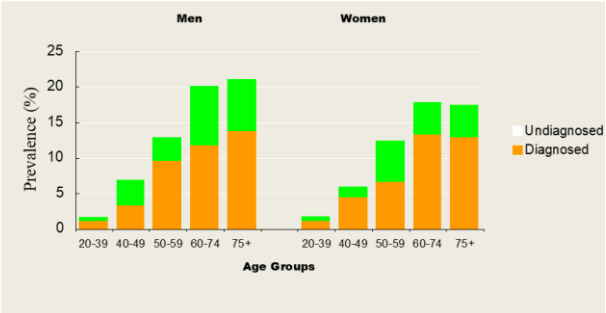
177 million in 2000; 370 million in 2030

-Greatest rise in developing world

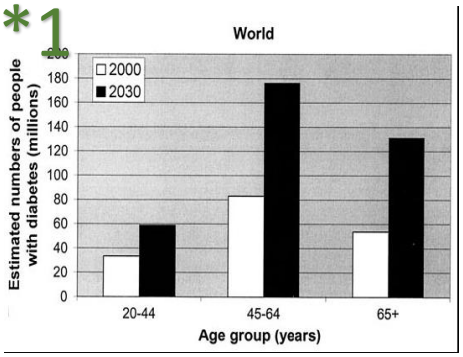
- Prevalence estimates only include reported and diagnosed persons

- There is a large % that is undiagnosed as well as a large % at high risk of developing DM

Diagnosed and Undiagnosed Prevalence of Diabetes by Age in the US (NHANES III)



*1



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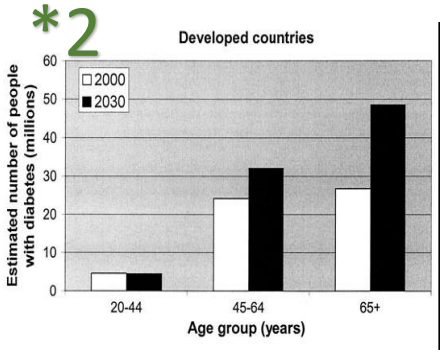

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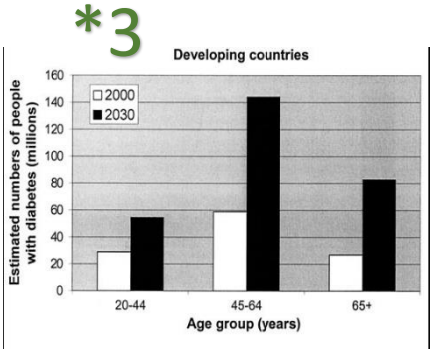
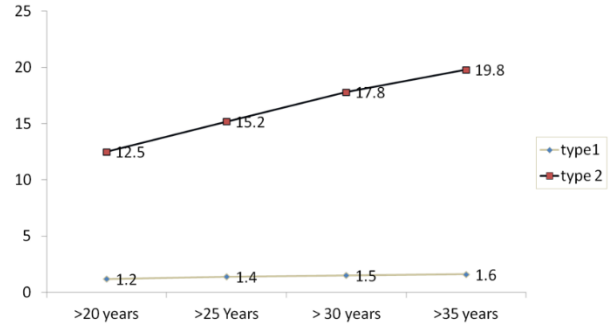


Epidemiology of Diabetes in USA:	Annual U.S. Diabetes Burden in 2050:
Diabetes affects 25.8 million people of all ages 8.3% of the U.S. population Diagnosed: 18.8 million Undiagnosed: 7.0 million Leading cause of kidney failure, nontraumatic lower-limb amputation, & new cases of blindness among adults Major cause of heart disease and stroke Seventh leading cause of death	By 2050, prevalence of total diabetes (diagnosed & undiagnosed) is projected to increase from 1 in 10 adults to between 1 in 5 and 1 in 3 adults Largely attributed to three key factors : 1 Aging of the U.S. population 2 Increasing size of higher-risk minority populations 3 Declining mortality among those with diabetes

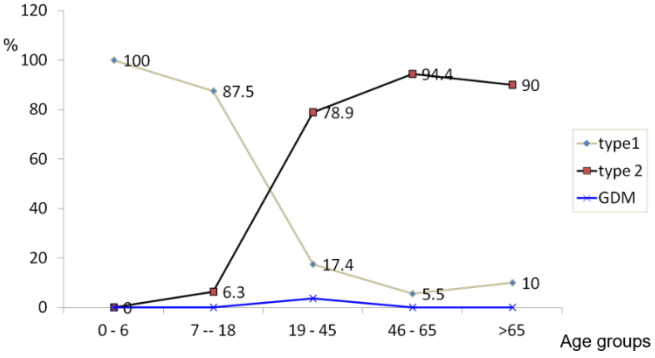
* (1) its age related , with increase age there will be increase perveance . +65 decrease because of deaths .

* (2) in developed countries have lower incednce of diabetes mellitus , because they are catching up in developing new strategies in lowering it not like (3) the developing countries .

Diabetes mellitus & age distribution in KSA



Types of DM and age in KSA



Type I is much lower compared to Type II , and they can survive in shallah up to 35 and more .

((Type I 100% start at age 0-6 , and decrease within age))(يعني كلما كبر قلت نسبه يجيه هذا النوع)

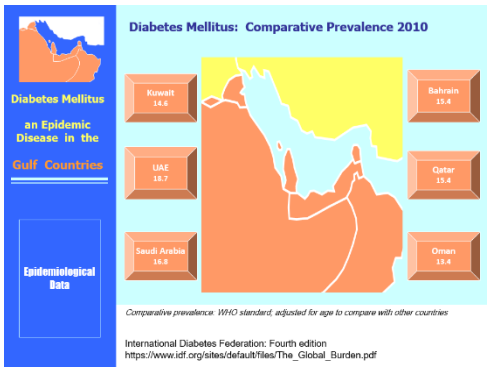
But Type II comes mostly after 20 up to 90 , not childhood

Stepwise Approach to Non Communicable Diseases WHO data from some EM countries

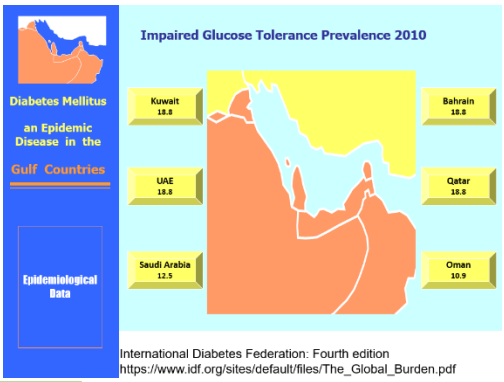
Country	Year of field work	Diabetes %	Hypertension %	Overweight & Obesity %
Iraq	2006	10.4	40.4	66.9
Jordan	2007	16	25.5	67.4
Saudi Arabia	2005	17.9	26	
Syrian Arab Republic	2003	19.8	28.8	56.3
Kuwait	2005	16.7	24.6	81.2
Egypt	2005	16.5	33.4	76.4
Sudan	2005	19.2	23.6	53.9

Stepwise Approach to Non Communicable Diseases WHO data from some EM countries

Country	Year of field work	Hyper-cholestrolemia %	Smoking %	Low physical activity %	Low intake fresh fruit vegetables %
Iraq	2006	37.5	21.6	56.7	92.3
Jordan	2007	26.2	29	5.2	14.2
Saudi Arabia	2005	19.3	12.9	33.8	91.6
Syrian Arab Republic	2003	33.5	24.7	32.9	95.7
Kuwait	2005	42	15.7	91.5	89
Egypt	2005	24.2	21.8	50.4	79
Sudan	2005	19.8	12	86.8	1.7/day



International Diabetes Federation: Fourth edition
https://www.idf.org/sites/default/files/The_Global_Burden.pdf



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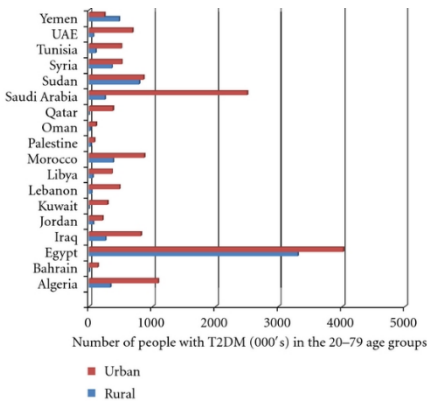


This diagram shows KSA as the 2nd country in row .

But in fact KSA considered the 1st because this data depend on number , and Egypt have around 30 million in compare to KSA which have around 30 million .

- In KSA urban areas have higher prevalence of diabetes.

Estimated Number of People with Diabetes Worldwide, 2010 and 2030

	Country/Territory	2010 Millions		Country/Territory	2030 Millions
1	India	50.8	1	India	87.0
2	China	43.2	2	China	62.6
3	USA	26.8	3	USA	36.0
4	Russian Federation	9.6	4	Pakistan	13.8
5	Brazil	7.6	5	Brazil	12.7
6	Germany	7.5	6	Indonesia	12.0
7	Pakistan	7.1	7	Mexico	11.9
8	Japan	7.1	8	Bangladesh	10.4
9	Indonesia	7.0	9	Russian Federation	10.3
10	Mexico	6.8	10	Egypt	8.6

Diabetic complications :

Neuropathy will increase with time in type 2 more than type 1 diabetes, why?

Because it is present in the patient before the diagnosis so, when the diagnosis done there will be high peak of complications.

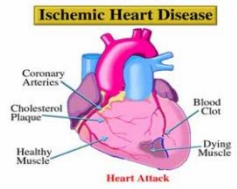
* Diabetes accounts for more than 5% of the global deaths, which are mostly due to CVD. Most Important complication

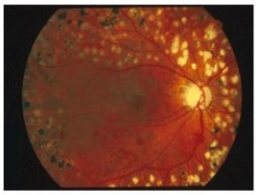
* Diabetes is responsible for over one third of end-stage renal disease requiring dialysis.

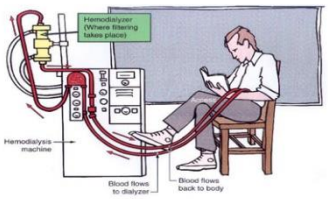
* Amputations are at least 10 times more common in people with diabetes.

* A leading cause of blindness & visual impairment. Diabetics are 20 times more likely to develop blindness than non-diabetics.

Diabetic complications



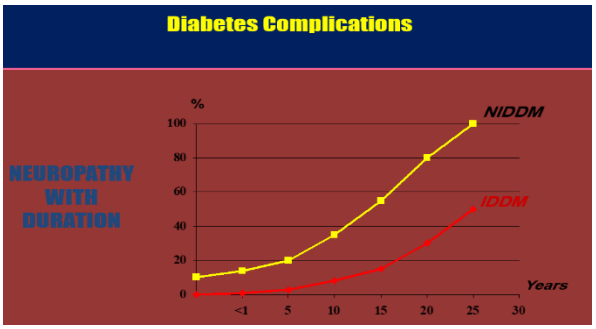




NEUROPATHY

Chronic complication of diabetes in North Africa 1995-2012

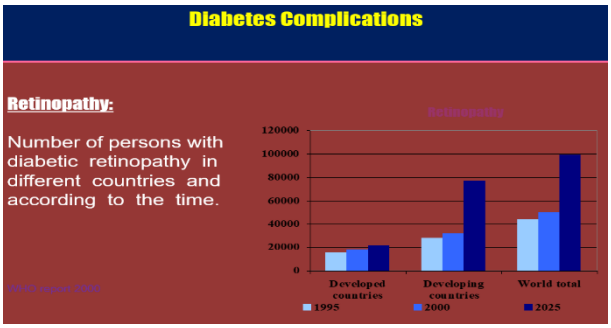
Author (year)	Location	Sample	Setting	Type of Diabetes	Prevalence %
Herman 1998	Egypt	1451	Clinic	Mixed	21.9
Kadiki 1999	Libya	960	Outpatient	Type 2	45. 7
Elmagir. 1998	Sudan	128	Outpatient	Mixed	36.7
Harzallah 2006	Tunisia	370	Inpatient/ clinic	Mixed	24.3

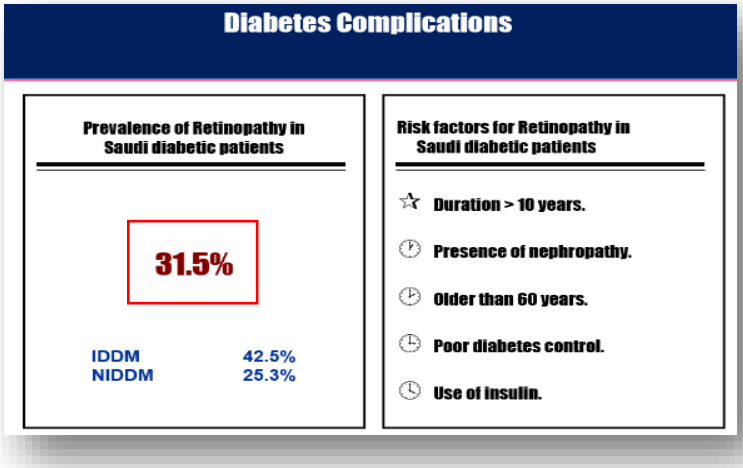


RETINOPATHY

Chronic complication of diabetes in North Africa 1995-2012

Author (year)	Location	Sample	Setting	Type of Diabetes	Prevalence %
Macky 2011	Egypt	1325	Clinic	Mixed	20.5
Kadiki 1999	Egypt	960	Clinic	Type 2	30.5
Elbagir 1995	Sudan	91	Clinic	Mixed	43
Harzallah 2006	Tunisia	370	Inpatient /clinic	Mixed	8.1





Risk Factors :

*** Risk factors for Type 2 DM are complex including obesity, genetic and life style factors (overfeeding and sedentary life). There is patho- physiological changes (weight gain insulin resistance and reduction of insulin secretion) may lead to glucose intolerance and diabetes.**

*** Important factors are physical inactivity, dietary imbalance**

*** Genetic factors may play a part in development of all types; autoimmune disease and viral infections may be risk factors in Type I DM.**

*** Physiologic or emotional stress: causes prolonged elevation of stress hormone levels (cortisol, epinephrine, glucagon and growth hormone), which raises blood glucose levels, placing increased demands on the pancreas.**

Obesity:

Contributes to the resistance to endogenous insulin.

RR risk of DM in females (ref. BMI < 22) not Important :

- **22-23 3.0**
- **24-25 5.0**
- **> 31 40**

Predisposing factors	
• Pregnancy	• Medications (that are known to antagonize the effects of insulin)
causes weight gain and increases levels of estrogen and placental hormones, which antagonize insulin	thiazide diuretics, adrenal corticosteroids, oral contraceptives

Diabetes and Obesity:

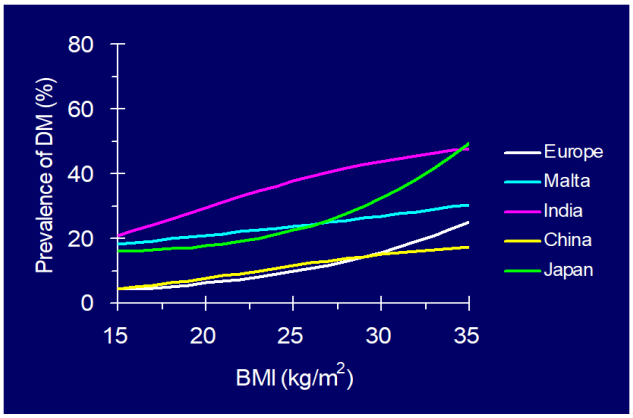
*** Females of BMI >35 has 93 times the risk of developing diabetes compared to those with BMI<21**

*** Increase in mean weight by one kg increase the risk of diabetes by 4.5% (recent data - 9%)**

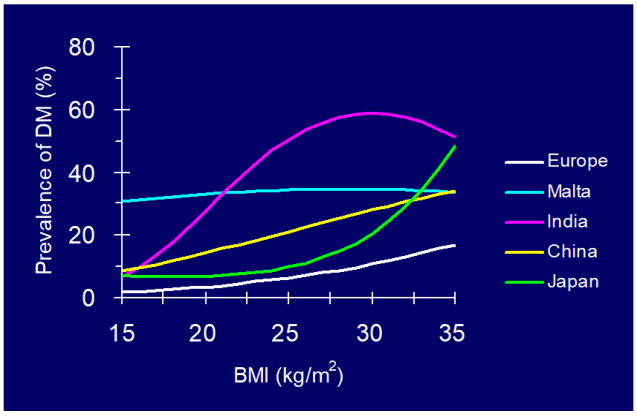
*** Ethnic populations, changed lifestyles, become more obese- diabetes**

*** Not all obese have diabetes, but most of people with diabetes have excess weight**

Prevalence of DM in 60 years old Men



Prevalence of DM in 60 years old Women



Future Directions:

- Tackling environmental factors and lifestyle
- Appropriate use of screening tools to control diabetes mellitus
- Early interventions in high risk populations
- Therapeutic and management choices and updated criteria for treatment
- Rehabilitation services for complications

Summary

Diabetes mellitus: A metabolic disorder of multiple etiology characterized by chronic hyperglycaemia with disturbances of carbohydrate, fat and protein metabolism resulting from defects in insulin secretion, insulin action or both

Type 1 (5-10%) : sudden onset . Absolute deficiency in insulin. Usually affects younger age group (not always)

Type 2 (90 - 95%) :gradual onset of relative insulin insensitivity. Usually older age group (not always)

Gestational (GDM) : glucose intolerance with onset or first recognition during pregnancy.

Secondary diabetes :diabetes is a secondary condition that results because of the main illness. If treat the main illness the diabetes may disappear e.g. cystic fibrosis, chronic pancreatitis, infections,

Pre-diabetes : Impaired glucose tolerance May remain undiagnosed for years. a person with pre-diabetes has a blood sugar level higher than normal, but not high enough for a diagnosis of diabetes. risk of complications same as for Type 2 Diabetes mellitus .

Symptoms:

- Thirst (polydipsia)
- Passing lots of urine (polyuria)
- Malaise
- Infections (thrush)
- Weight loss

Risk factors:

- Obesity
- genetic factor
- life style factor
- Infections
- Pregnancy and medications

Questions

1- What is the most common type of diabetes ?

a-type I

b-type II

c-Gestational

d-secondary diabetes

2- witch of the following hormones is not an antagonist of insulin :

a-cortisol

b-ADH

c-growth hormone

d-glucagon

3- the most serious complication of diabetes and eventually leading to death:

a-amputation and gangrene

B-Acute Renal Failure

C-Retinopathy and Blindness

D-Cardiovascular diseases.

4- A fasting blood glucose test level of …… indicates diabetes.

A-50 mg/dl to 69 mg/dl

B-70 mg/dl to 99 mg/dl

C-100 mg/dl to 125 mg/dl

D-126 mg/dl or higher

5- What is the most common type of Diabetes in subject under 18?

A-diabetes insipidus

B-gestational diabetes

C-type 1 diabetes mellitus

D-type 2 diabetes mellitus

6- When a pregnant woman develops diabetes mellitus it is called _____.

A-diabetes insipidus

B-gestational diabetes

C-type 1 diabetes mellitus

D-type 2 diabetes mellitus

Answers:

1-A
2-B
3-D
4-D
5-C
6-B

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THANK YOU

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Male & Female slides