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“A review on history of diabetes mellitus”

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Abstract:

Clinical features resembling those of diabetes mellitus were described by the ancient Egyptians 3,000 years ago. The term "diabetes" was first coined by Aretus of Cappodocia (AD 81-133). Later Thomas added the word mellitus (honey sweet). Willis (Britain) in 1675 after rediscovering the sweetness of patients' urine and blood (first observed by ancient Indians). It was not until 1776 that Dobson (Great Britain) first confirmed the presence of excess sugar in the urine and blood as the cause of

In modern times, the history of diabetes coincided with the rise of experimental medicine. An important milestone in the history of diabetes is the establishment of the liver's role in glycogenesis and the concept that diabetes results from excess glucose production. Claude Bernard (France) in 1857. The role of the pancreas in the pathogenesis of diabetes was discovered by Mering and Minkowski (Austria) in 1889.

This discovery later formed the basis for the isolation and clinical use of insulin by Banting and Best (Canada) in 1921. Attempts to create an orally administered hypoglycemic agent ended successfully with the first commercialization of Tolbutamide and Carbutamide in 1955 This report also provides an overview of the history of dietary control and the acute and chronic complications

•Introduction :

Over 3,000 years ago, the historical Egyptians noted a situation that looks to had been kind 1. It featured immoderate urination, thirst, and weight loss. historical India, human beings found that they might use ants to check for diabetes via way of means of offering urine to them. If the ants got here to the urine, this changed into a signal that it contained excessive sugar levels. They known as the situation madhumeha, that means honey urine. By the 5th century C.E., human beings in India and China had labored out that there has been a distinction among kind 1 and kind 2 diabetes. They stated that kind 2 diabetes changed into greater not unusualplace in heavy, rich human beings than in different human beings. At that time, this could have implied that those people ate greater than different human beings and have been much less active. The time period diabetes mellitus comes from the Greek word “diabetes” (to siphon or byskip through) and the Latin word “mellitus” (honey or sweet) By the early nineteenth century, there have been no facts approximately how not unusualplace diabetes changed into, there has been no powerful treatment, and those typically died inside weeks to months of first displaying symptoms. Your frame breaks down maximum of the meals you consume into sugar (glucose) and releases it into your bloodstream. When your blood sugar is going up, it alerts your pancreas to launch insulin. Insulin acts like a key to allow the blood sugar into your frame’s cells to be used as energy. With diabetes, your frame doesn’t make sufficient insulin or can’t use it as properly because it should. When there isn’t sufficient insulin or cells forestall responding to insulin, an excessive amount of blood sugar remains to your bloodstream. Over time, that could purpose severe fitness problems, consisting of coronary heart disease, imaginative and prescient loss, and kidney disease.

•Type 1 DM:

Introduction:

Type 1 diabetes mellitus (T1DM) is an autoimmune disorder that results in the destruction of insulin-generating pancreatic beta cells. Insulin is an crucial anabolic hormone that exerts a couple of results on glucose, lipid, protein, and mineral metabolism, in addition to growth. Importantly, insulin permits glucose to go into muscle and adipose cells, stimulates the liver to shop glucose as glycogen and synthesize fatty acids, stimulates the uptake of amino acids, inhibits the breakdown of fats in adipose tissue, and stimulates the uptake of potassium into cells. People with T1DM require life-lengthy insulin substitute therapy. Without insulin, diabetic ketoacidosis (DKA) develops and is life-threatening.

•Treatment:

All sufferers with T1DM require insulin therapy. Multiple day by day insulin injections (MDI) the use of a basal/bolus insulin routine or non-stop subcutaneous insulin infusion via an insulin pump are the desired treatment. The patient's weight in kilograms is accelerated via way of means of 0.5 to 0.6 devices to calculate the preliminary general day by day insulin dose (TDD) in an adult. In general, 40% to 50% of the entire day by day dose incorporates the patient's long-performing insulin needs, and the alternative 1/2 of approximates the day by day short-performing insulin needs, to take delivery of earlier than or with meals. Dosing is changed primarily based totally on many factors, consisting of food plan and bodily activity. Adjustments also can be made primarily based totally on self-tracking of blood glucose or non-stop glucose tracking results. When possible, sufferers must be trained carbohydrate counting and told to apply insulin to carbohydrate ratio that approximates the grams of carbohydrates with the intention to be included via way of means of one unit of insulin. If carbohydrate counting isn't practical because of negative numeracy or different reasons, a carbohydrate-constant food plan is helpful. Patients must be trained which meals include carbohydrates and advantage from assembly with a dietician. It is likewise encouraged to calculate a correction factor, which may be first of all predicted the use of the system 1800 divided via way of means of the TDD. This estimates the autumn in blood glucose for each 1 unit of insulin given. Type 1 diabetes mellitus (T1DM) is an autoimmune disorder that ends in the destruction of insulin-generating pancreatic beta cells.

Medication for type 1 DM:

If you have type 1 diabetes, your body can't make its own insulin. The goal of treatment is to replace the insulin that your pancreas can't make.

1. Insulin:

Insulin is the most common type of medication used to treat type 1 diabetes. More than 20 species are sold in the United States. It is given as an infusion under the skin (using an insulin pump) or as an injection. The type of insulin you need depends on your body's sensitivity to insulin and the severity of your insulin deficiency.

These include:

2. Short-acting insulin:

: Regular or "short-acting" insulin can enter the bloodstream 30 minutes after injection and reach its peak 2 to 3 hours later. These injections also work for up to 3 to 6 hours.

Types of regular insulin include:

- Humulin R U-100
- Novolin R FlexPen

- Novolin R ReliOn
- Novolin R FlexPen ReliOn

3.Fast-acting insulin:

As the name suggests, fast-acting insulin works in 15 minutes. The maximum time is 1-2 hours after application, and the drug lasts 2-4 hours.

Types of fast-acting insulin available include: •

Inhaled insulin (Afrezza)

- Insulin aspart (Fiasp, Fiasp FlexTouch, Fiasp PenFill, NovoLog, NovoLog FlexPen, NovoLog FlexTouch, NovoLog PenFill, ReliOn NovoLog, ReliOn NovoLog FlexPen)
- Insulin glulisin (Apidra, Apidra SoloStar), which is only available as a brand name medication•Insulin lispro (Admelog, Admelog SoloStar, Humalog, Humalog KwikPen, Humalog Junior KwikPen)•Insulin lispro-aabc (Lyumjev, Lyumjev KwikPen)

4. Intermediate-acting insulin :

Intermediate-acting insulin works approximately 2 to 4 hours after administration, with an average peak time of 12 hours.

You can expect this type of insulin to last 12 to 18 hours. Examples include: • Isophane insulin (Humulin N U-100, Humulin N KwikPen, Novolin N, Novolin N FlexPen, Novolin N ReliOn, Novolin N FlexPen ReliOn)

5. Long-acting insulin:

Long-acting insulin helps lower insulin levels in the blood for up to 24 hours or longer, although it enters the bloodstream more slowly.

Take the following types of long-acting insulin:

- Insulin degludec (Tresiba, Tresiba FlexTouch)
- Insulin detemir (Levemir)
- Insulin glargine (Basic KwikPen, Lantus, Lantus SoloStar, Toujeo SoloStar, Toujeo Max SoloStar) • Insulin glargine - yfgn (Semglee-yfgn)
- concentrated regular insulin (Humulin R U-500, Humulin R U-500 KwikPen)

Symptoms :

Type 1 diabetes symptoms can appear suddenly and may include:

- Thirstier than usual
- Excessive urination
- Bedwetting in children who have never wet their bed at night
- Being very hungry
- Losing weight without trying

- Irritability or other mood swings
- Fatigue and weakness
- Blurred vision

Causes :

The cause of type 1 diabetes is unknown. Generally, the body's immune system, which normally fights harmful bacteria and viruses, destroys the insulin-producing cells (islets) in the pancreas. Other possible causes are:

- Genetics
- Exposure to viruses and other environmental factors

Pathogenesis:

Type 1 DM is characterised through an absolute deficiency of insulin. This can be because of an autoimmune mediated destruction of pancreatic B cells or can be Idiopathic. The autoimmune procedure is mediated through macrophages and T-lymphocytes with circulating antibodies to diverse B mobileular antigens. The maximum typically detected antibody related to kind 1 is islet mobileular antibody. Others encompass insulin vehiclemobile antibodies; antibodies direct in opposition to glutamic and decarboxylase; antibodies in opposition to islet tyrosine phosphate (IA2 & IA2 β) organ precise vehiclemobile immune ailment together with Graves sickness; Addison's sickness and Thyroiditis. Many tissues comprise insulin receptors to which insulin binds reversibly. The organic reaction of insulin may be altered through both a alternate in receptor affinity for insulin or a alternate within side the overall wide variety of receptors. Changes withinside the receptors can arise because of weight problems and persistent publicity to excessive insulin levels. they result in growth withinside the wide variety of receptors, down regulation. Acute deficiency of insulin ends in unstrained hepatic Glycogenolysis and gluconeogenesis with a effect growth in hepatic glucose out put. Glucose uptake is reduced in insulin –touchy tissues & hyperglycemia ensures The improvement of T1DM takes place in three stages. Stage 1 is asymptomatic and characterised through ordinary fasting glucose, ordinary glucose tolerance, and the presence of extra than or identical to two pancreatic autoantibodies. Stage 2 diagnostic standards encompass the presence of extra than or identical to two pancreatic autoantibodies and Dysglycemia: impaired fasting glucose (glucose of a hundred to a hundred twenty five mg/dl) or impaired glucose tolerance (2-hour PG of one hundred forty to 199 mg/dL) or a hemoglobin A1c among 5.7% to 6.4%. Individuals stay asymptomatic. In level three, there may be diabetes or hyperglycemia with scientific signs and or greater pancreatic autoantibodies.[34,35,36]

•Type 2 DM :

Introduction :

Type 2 diabetes mellitus (T2DM) is a ailment that impacts extra than four hundred million human beings across the world. In 2040, there might be extra than 640 million human beings with diabetes worldwide[1]. The incidence of T2DM is anticipated to double in the subsequent 20 years, because of the boom of the age, weight problems and the variety of ethnic businesses of excessive chance withinside the population[2], with widespread will increase in cardiovascular ailment[3], end-degree renal ailment (ESRD)[4], retinopathy and neuropathy. Additionally, to obtain correct metabolic manipulate in diabetes and maintain lengthy term, a mixture of adjustments in life-style and pharmacological remedy is necessary. Achieving near-ordinary glycated hemoglobin (HbA1c) drastically decreases chance of macrovascular and microvascular complications[4]. However, simplest approximately 50% of diabetic sufferers attain their HbA1c target[5]. Algorithms for the remedy of diabetes spotlight the want for correct glycaemic manipulate to lessen the improvement or development of diabetes complications. In latest years has multiplied the variety hypoglycaemic sellers to be had for the remedy of T2DM. A latest function announcement of the American Diabetes Association (ADA) and the European Association for the Study of (EASD) on a patient-targeted method

withinside the manipulate of patients with T2DM[6] gives a pinnacle degree view on how wonderful conditions and co-morbidities may also moreover have an effect on the choice of numerous Hypoglycaemic sellers. The ADA/EASD suggests that initial intervention ought to reputation on manner of lifestyles changes. Moreover, changes in manner of lifestyles have examined to be beneficial[7], but for masses patients is a fear preserve prolonged term, due to differing research or perceptions[8]. In general, drug treatment includes now now not only initial Hypoglycaemic sellers, but special intensification strategies to keep Glycaemic manipulate over time, regularly requiring severa pills with wonderful mechanisms of action[9]. Physicians ought to be familiar with the wonderful varieties of gift pills for the treatment of diabetes and pick the most effective, steady and better tolerated with the resource of the usage of patients. [19,20,21,22,23,24,]

•Treatment:

Treatment of T2DM have to be targeted on reducing headaches in youngsters and adolescents. Few research exist in youngsters with T2DM; however, statistics from research in youngsters with T1DM and adults with T2DM recommend that tight glycemic manipulate reduces the danger of microvascular headaches.1 A1c and fasting blood sugar (BS) goals (<7% and 70–a hundred thirty mg/dL, respectively) are the equal for youngsters and adults with T2DM.1 Most scientific proof surrounding T2DM and pediatric sufferers entails using metformin and insulin. However, many sufferers will continue to be out of control with those medications. The following phase opinions way of life modifications. In addition, every of the drug instructions and their ability function on this unique affected person populace may be addressed. [5]

Medication for type 2 DM:

If you've got got kind 2 diabetes, your frame makes insulin however now not makes use of it well. Your frame can't make sufficient insulin to preserve your blood sugar tiers inside an top of the line range. The intention of your remedy is to assist your frame use insulin higher or to cast off greater glucose to your blood. Most medicinal drugs for kind 2 diabetes are oral drugs. However, insulin or injectables will also be used. Some of those medicinal drugs are mixtures of multiple diabetes drug.

1. Insulin:

: Some humans with kind 2 diabetes may additionally want to take insulin. The equal forms of insulin used to deal with kind 1 diabetes also can deal with kind 2 diabetes. A medical doctor can also additionally propose the aforementioned forms of insulin utilized in kind 1 diabetes remedy for kind 2 diabetes. As with kind 1 diabetes, this relies upon at the sort of insulin wanted and the way extreme your insulin deficiency is. See the above forms of insulin to speak about with a medical doctor.

2. Biguanides:

- metformin-Alogliptin (Kazano)
- metformin-canagliflozin (Invokamet)
- metformin-dapagliflozin (Xigduo XR)
- metformin-empagliflozin (Synjardy)
- metmorfin-ertugliflozin (Segluromet)
- metformin-glipizide
- metformin-glyburide (Glucovance)
- metformin-linagliptin (Jentadueto, Jentadueto XR)
- metformin-pioglitazone (Actoplus Met, Actoplus Met XR)
- metformin-repaglinide (PrandiMet)
- metformin-rosiglitazone (Avandamet)

- metformin-saxagliptin (Kombiglyze XR)
- metformin-sitagliptin (Janumet, Janumet XR)

3. Sodium-glucose transporter (SGLT) 2 inhibitors:

- canagliflozin (Invokana)
- canagliflozin-metformin (Invokamet, Invokamet XR)
- dapagliflozin (Farxiga)
- dapagliflozin-metformin (Xigduo XR)
- dapagliflozin-saxagliptin (Qtern)
- empagliflozin (Jardiance)
- empagliflozin-linagliptin (Glyxambi)
- empagliflozin-linagliptin-metformin (Trijardy XR)
- empagliflozin-metformin (Synjardy, Synjardy XR)
- ertugliflozin (Steglatro)

4. Sulfonylureas:

- glimepiride (Amaryl)
- glimepiride-pioglitazone (Duetact)
- gliclazide
- glipizide
- glipizide ER (Glipizide XL, Glucotrol XL)
- glipizide-metformin • glyburide (Glynase)

5. Thiazolidinediones:

rosiglitazone pioglitazone-alogliptin (Oseni) pioglitazone-glimepiride (Duetact) pioglitazone-metformin (Actoplus Met, Actoplus Met XR)

6. Dipeptidyl peptidase-4 (DPP-4) inhibitors:

- alogliptin (Nesina)
- alogliptin-metformin (Kazano)
- linagliptin (Tradjenta)
- linagliptin-empagliflozin (Glyxambi)
- linagliptin-metformin (Jentadueto, Jentadueto XR)
- saxagliptin (Onglyza)
- saxagliptin-metformin (Kombiglyze XR)
- sitagliptin (Januvia)
- sitagliptin-metformin (Janumet and Janumet XR)

•sitagliptin and simvastatin (Juvisyne)

Symptoms:

The signs and symptoms of type 2 diabetes often develop slowly. In fact, you can live with type 2 diabetes for years without even knowing it. If signs and symptoms are present, they may include:

- Increased thirst
- Frequent urination

- Increased hunger
- Unintentional weight loss
- Fatigue
- Blurred vision
- Slow healing wounds
- Common infections
- Numbness or tingling in the hands or feet
- Areas of darker skin, usually in the armpits and neck

Causes :

Type 2 diabetes is primarily the result of two interrelated problems:

- Muscle, fat and liver cells become insulin resistant. Because these cells don't interact normally with insulin, they don't absorb enough sugar. The pancreas can't produce enough insulin to control blood sugar levels.

The exact reason for this is unknown, but obesity and inactivity are major contributing factors.

•Pathogenesis :

Type 2 DM is characterised via way of means of insulin insensitivity due to insulin resistance, declining insulin production, and eventual pancreatic beta-cell failure.^{28,29} This ends in a lower in glucose shipping into the liver, muscle cells, and fats cells. There is an growth withinsid the breakdown of fats with hyperglycemia. The involvement of impaired alpha mobileula characteristic has currently been diagnosed withinside the pathophysiology of kind 2 DM. As a end result of this disorder, glucagon and hepatic glucose stages that upward thrust throughout fasting aren't suppressed with a meal. Given insufficient stages of insulin and accelerated insulin resistance, hyperglycemia results. The incretins are crucial intestine mediators of insulin release, and withinside the case of GLP-1, of glucagon suppression. Although GIP pastime is impaired in people with kind 2 DM, GLP-1 insulinotropic outcomes are preserved, and for that reason GLP-1 represents a probably useful healing option.³⁰ However, like GIP; GLP-1 is hastily inactivated via way of means of DPP-IV in vivo. Two healing strategies to this hassle were developed: GLP-1 analogues with accelerated half-lives, and DPP-IV inhibitors, which save you the breakdown of endogenous GLP-1 in addition to GIP.³⁰ Both lessons of dealers have proven promise, with ability now no longer most effective to normalize fasting and postprandial glucose stages however additionally to enhance beta-cellular functioning and mass. Studies are ongoing at the function of mitochondrial disorder withinside the improvement of insulin resistance and etiology of kind 2 DM.³¹ Also very crucial is adipose tissue, as endocrine organ speculation (secretion of diverse Adipocytokines, i.e., leptin, TNF-alpha, resistin, and adiponectin implicated in insulin resistance and probably beta-cell dysfunction). A majority of people tormented by kind 2 DM are obese, with imperative visceral adiposity. Therefore, the adipose tissue performs a important function withinside the pathogenesis of kind 2 DM. Although the essential principle used to give an explanation for this hyperlink is the portal/visceral speculation giving a key function in multiplied non-esterified fatty acid concentrations, new rising are the ectopic fats garage syndrome (deposition of triglycerides in muscle, liver and pancreatic cells). These hypotheses represent the framework for the have a look at of the interaction among insulin resistance and beta-cellular disorder in kind 2 DM in addition to among our obesogenic surroundings and DM hazard withinside the subsequent decade.

In type 2 patients the pancreatic β :

-mobileular, are genetically liable to injury, main too elevated mobileular tumor and untimely aging, and in the end to a modest discount in β –mobileular mass. Chronic hyper glycemias can also additionally decorate the capping potential of β -mobileular to feature because of continual β -mobileular stimulation. [32,33]

•Gestational DM:

Introduction :

Introduction

Diabetes, inclusive of being pregnant prompted hypertension, macrosomia, congenital malformations, and neonatal Hypoglycaemia, were said in numerous massive scale research. The HAPO observe did now no longer alter for a few confounders, however, inclusive of maternal frame mass index, and did now no longer record on stillbirths and neonatal breathing misery syndrome, elevating uncertainty approximately those consequences. Other essential being pregnant consequences, inclusive of preterm delivery, neonatal death, and coffee Apgar rating in gestational diabetes mellitus, had been poorly said. No complete observe has assessed the relation among gestational diabetes mellitus and numerous maternal and fetal unfavorable consequences after adjustment for confounders. Also, a few cohort research had been limited to precise scientific centres and regions, restricting their generalisation to greater various populations. By collating the to be had evidence, we performed a scientific evaluation and meta-evaluation to quantify the fast time period consequences in pregnancies complex with the aid of using gestational diabetes mellitus. We evaluated adjusted institutions among gestational diabetes mellitus and numerous unfavorable with consequences of being pregnant. [6,7,8,9,10,11,12,]

Treatment:

If you have been diagnosed with gestational diabetes, the chances of having problems during your pregnancy can be reduced by keeping your glucose levels in the target range.

This can be done by:

- eating a healthy diet
- exercising for at least 30 minutes every day
- managing your weight gain during pregnancy
- taking medication, if necessary.

You'll be closely monitored during pregnancy and labour to check if treatment is working and for any problem.[17]

Causes:

Some women may develop symptoms if their blood glucose levels get high. These include:

- going to the toilet a lot, especially at night
- being really thirsty
- feeling more tired than usual
- losing weight without trying to
- general itching or thrush.

Some of these symptoms are common during pregnancy so may not be a sign of gestational diabetes. But it is best to find out as soon as possible. Tell your midwife or GP if you have any concerns.

Try to remember that if you are diagnosed with gestational diabetes, careful management can reduce the risk of any complications.

Conclusion :

For more than 3000 years physicians quested the causes and treatment of diabetes mellitus . However, an important progress has been made over the last two centuries thanks to the development of chemistry, physics and pharmacology. Over the next years scientists continued to make significant discoveries: The structure of insulin was delineated in 1955 by the Nobel laureate Fred Sanger (1918-2013); in 1967 proinsulin was discovered by Donald Steiner (1930-2014) and with his colleagues he produced the radioimmunoassay for C-peptide which is used today to measure endogenous insulin production; in the same year, the first pancreas transplant in a human was performed by William Kelly, Richard Lillehei (1927-1981) and colleagues at the University of Minnesota; in 1972 the U100 insulin was introduced to promote better accuracy in administration; ten years later, in 1982, recombinant human insulin became available and in early 1990's insulin pen delivery devices become popular following by the discoveries of short (1996) and long (2001) acting insulin analogues.

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