

Study of Classification of Diabetes Mellitus

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Abstract

The epidemic nature of diabetes mellitus in various regions is evaluated. In Middle East and North Africa region diabetes in adults is very common. Different types of diabetes mellitus, type 1, type 2, gestational diabetes and other types of diabetes mellitus are compared in terms of diagnosis, cause and genetics. The molecular genetics of diabetes mellitus gained large amount of attention in current years groups in the medical field. A large arrangement of mutations and single nucleotide polymorphisms in genes play important role in the different steps and pathways of glucose metabolism and the function of pancreatic cells at different levels are analyzed. The major advancement in the molecular understanding of diabetes in comparison to the different types of diabetes is briefly reviewed in this review paper. But the mechanism of diabetes and its complications are still not completely understood. There is need of more extensive research in this field to improve diagnoses, therapy and minimize the chance of development of complications.

Keywords: Hyperglycemia, Polyphagia, Insulin, Polyuria, Polydipsia, Ketoacidosis.

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I. Diabetes Mellitus Definition

Diabetes mellitus is a metabolic diseases that characterized by condition hyperglycemia resulting from defects in secretion of insulin, abnormal functioning of insulin, or both. Metabolic abnormalities in biomolecular like carbohydrates, lipids, and proteins result from the importance of insulin as an anabolic hormone. Low levels of insulin to attain appropriate response and insulin resistance of target tissues like skeletal muscles, adipose tissue, and liver, at the level of insulin receptors, some enzymes or genes are responsible for these metabolic abnormalities. The seriousness of symptoms is because of the different type and duration of diabetes. Some diabetic patients are asymptomatic which means a condition when person show no symptoms which can be seen in those especially with type 2 diabetes during the early years of the disease, others marked with hyperglycemia and especially in children with insulin deficiency may result in polyuria, polydipsia, polyphagia, weight loss, and blurred vision. Uncontrolled diabetes may lead to stupor, coma and if not treated can also leads to death.

II. Classification Of Diabetes

In spite of the fact that classification of diabetes is necessary and has involvement for the treatment, and many patients do not fit into a single class especially younger adults. The classical classification of diabetes was proposed by the American Diabetes Association (ADA). According to ADA diabetes mellitus is classified into four classes which involve type 1, type 2, other types, and gestational diabetes mellitus (GDM). This is the most accepted classification. The difference between the two types of diabetes depends on the tempo, the faster tempo reflecting the more susceptible genotype and therefore, resistance of insulin, becomes the center of the hypothesis. Other forecaster of type 1 diabetes involves increased height growth velocity and weakens glucose sensitivity of β cells. The involvement of increased the amount of free radicals, oxidative stress, and many other metabolic stressors in the development, pathogenesis and complications of diabetes mellitus are very strong and well recorded. The female hormone 17- β estradiol acting through the estrogen receptor is necessary for the development and protection of pancreatic β cell function since it was clearly demonstrated that induced oxidative stress may leads to destruction of β -cell. Recommending a type of diabetes to an individual person much depends on the situation present at the time of diagnosis, and many diabetic patients rarely get fit into a single class. For example, a person with gestational diabetes mellitus may endure to be hyperglycemic after the delivery and perhaps decided to have. On the other hand a person who develops diabetes because of high doses of exogenous steroids may turn into normoglycemic once the glucocorticoids are discontinued, but then might develop diabetes after many years later.

III. Type 1 Diabetes Mellitus

It is also known as autoimmune type 1 diabetes mellitus because of the fact that type 1 diabetes is mainly because of an autoimmune destruction of the pancreatic β cells through T-cell mediated inflammatory

response. Around 5%-10% of people diagnosed with type 1 diabetes because of the destruction of β cells of the pancreas. Type 1 diabetes constitutes 80%-90% in children. The presence of auto antibodies against the pancreatic islet of langerhans cells is the hallmark of type 1 diabetes, although the role of the antibodies in the pathogenesis of the disease is not clear yet. This type 1 diabetes is characterized by the absence of insulin secretion from pancreas and is commonly found in children and adolescents. Type 1 diabetes can develop suddenly and can show symptoms like polydipsia, polyuria, polyphagia, lack of energy, weakness, sudden weight loss, slow-healing process of wounds, recurrent infections and blurred vision, dehydration and ketoacidosis in children and adolescents. The symptoms are more serious in children in comparison to adults. Cell therapy is a capable and developing cure for type 1 diabetes mellitus around a field of great interest. Noticeable effort has been focused on protocols to produce functional and glucose-responsive β cells from embryonic stem cells of human or induced pluripotent stem cells from donors. This way offers the probability of an endless root of β cells that could be liberated in a semi permeable device that would give permission of functional insulin secretion however avoid the requirement for immuno-suppression. Many different small molecules, growth factors, hormones, and nutrients have raised modest β -cell neogenesis and proliferation. But most positive results come from animal models.

IV. Type 2 Diabetes Mellitus

Insulin resistance in type 2 diabetes patients enlarges the demand for insulin in insulin-target tissues. In addition to insulin resistance, the enlarged demand for insulin could not be met by the pancreatic β cells due to faults in the function of these cells. On the other hand, insulin secretion lower down with the growing demand for insulin by time due to the gradual demolition of β cells that could transform some of type 2 diabetes patients from being autonomous to become dependent on insulin. Most type 2 diabetes patients are not dependent on insulin where insulin secretion continues and insulin expending hardly ever occurs. Dependence on insulin is one of the most considerable variance from type 1 diabetes. Other variances involve the absence of ketoacidosis in most patients of type 2 diabetes and autoimmune demolition of β cells does not occur. Both type 1 and type 2 diabetes has genetic vulnerability, although it is dominant in type 2 but the genes are more set apart in type 1. Due to the moderate manifestation of type 2 diabetes in the starting, its diagnosis is usually delayed for years especially in those countries where checkup without clinical manifestation is not part of the routine life. In recent times, a confirmation indicate a link between the intake of soft drinks with obesity and diabetes, resultant from large amounts of high fructose corn syrup depleted in the making of soft drinks, which increase blood glucose levels to very high level. It was also said that diet soft drinks contain glycated chemicals that undoubtedly increase the insulin resistance. Intake of food has been strongly connected with obesity, not only because of quantity of food but also related to the composition and quality of food. Intake of red meat, sweets and fries in high amount can result to the increased risk of insulin resistance and type 2 diabetes mellitus. While in other hand intake of vegetables and type 2 diabetes mellitus have inverse relation. Utilization of fruits and vegetables may reduce the chance of the development of type 2 diabetes mellitus, as they have high amount of nutrients, fiber and antioxidants which are counted as protective barrier against the type 2 diabetes mellitus.

V. Other Types Of Diabetes Mellitus

Delineation of the genetic etiology of diabetes to make able further suitable treatment, better prediction, and counseling. Monogenic diabetes is because of a genetic imperfection in single genes in pancreatic β cells which results in derangement of function of β cell or a deduction in the quantity of β cells. Frequently, monogenic diabetes is classified on the basis of the age of beginning as neonatal diabetes before the age of six months or Maturity Onset Diabetes of the Young (MODY) before the age of 25 years. But some specific familial deficiency is manifested in neonatal diabetes, Maturity Onset Diabetes of the Young or adult forthright diabetes. Others assume that classification of diabetes as Maturity Onset Diabetes of the Young and neonatal diabetes is outmoded and monogenic diabetes is recently used relating specific genetic etiologies with their particular treatment. Differentiation of beta cell depends upon the expression of the homeodomain transcription factor PDX1 where mutation in the gene conclusions in early onset diabetes differentiation and its expression reduce before the onset of diabetes. The angiopoietinlike protein 8 (ANGPTL8) might be constitute a potential "betatrophin" that acts to encourage the proliferation of beta cells, but the studies using mice lacking the ANGPTL8 active gene or over conveyed protein denoted that it did not appear to play a role in beta cells proliferation.

VI. Gestational Diabetes

Hyperglycemia in pregnancy either in the form of type 2 diabetes mellitus identify before or throughout pregnancy or in the form gestational diabetes has an enlarge pitfall of harmful maternal, fetal and neonatal consequence. Mothers with gestational diabetes and babies born to such mothers have enlarged the risk of progressing diabetes later in their life. Hyperglycemia in pregnancy is reliable for the enlarged the threat for

macrosomia, Risk factors for gestational diabetes consist of fatness, person's history of gestational diabetes, and family history of diabetes, maternal age, and openness to toxic factors. Identification of type 2 diabetes before or during pregnancy is depends upon the criteria explained earlier. Although gestational diabetes has been identified at 24-28 week of gestation in women not diagnosed earlier with diabetes using two methodologies: the first methodologies is depends upon the "one-step" International Association of the Diabetes and Pregnancy Study Groups (IADPSG) consensus and currently adopted by WHO. The second methodologies is being utilized in the United States and is depends upon the "two-step" NIH consensus. Mild to serious maternal hyperglycemia in pregnancy has different diabetes-related risks in that there are potential long-term resultants for two person rather than just one: the mother and her baby. Gestational diabetes mellitus has been measured as any degree of glucose intolerance with onset or first identification throughout pregnancy. Like other most unborn babies of women who develop glucose intolerance in pregnancy, those of women who already has diabetes might be exposed to hyperglycemia in the first two trimesters of pregnancy consequencing in a high risk of a range of cardiovascular and many other different abnormalities.

VII. Conclusion

Diabetes mellitus is the pandemic of this century and without efficient diagnostic methods at an initial stage, diabetes will continue to increase. This review studious on the classification of diabetes and the efficient diagnostic methods and criteria to be used for diabetes and prediabetes diagnosis. Apparently, diabetes is a complicated disorder with a large number of genes that are involved in its development. The accurate recognition on the genetic bases of diabetes potentially gives an important tool to enhance the diagnosis, and better efficient genetic counseling. Additionally, our enhanced knowledge and information of the association between medical genetics and the chronic complications of diabetes will give an extra advantage to delay these complications that impose a huge pressure on patient's life and the remarkably increasing cost of health-care indulgences. In addition to more studies are require to recognise the risks and advantages of these, and other, oral hypoglycemic drugs before they can be suggested as first- line drugs for the treatment of pre-gestational and gestational diabetes. But they can surely can be used in circumstances where insulin administration is not achievable or not accepted or confirmed by the patient.

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