



**FEDERAL UNIVERSITY OF TECHNOLOGY  
MINNA**

**THERAPIES FOR  
DIABETES MELLITUS:  
MY ROLE**

*By*

**PROFESSOR ABUBAKAR NDAMAN SAIDU**

*(B.Sc UniSok., M.Sc UniJos., Ph.D FUTMinna)*

*Professor of Biochemistry*

**INAUGURAL LECTURE SERIES 62**

**8<sup>TH</sup> MARCH, 2018**



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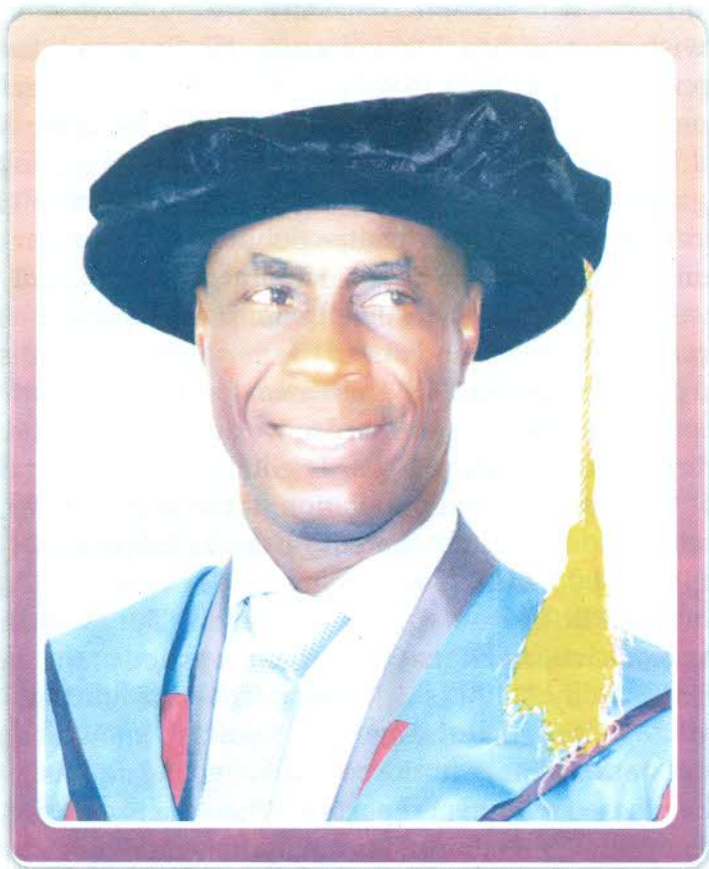
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## INTRODUCTION

I wish to commence my lecture by first and foremost appreciating **ALLAH (SWT)** for his mercies and making it possible for me to witness this special day in my life which I tagged "Inaugural Lecture day". Indeed, this day is special to me having attained the peak of my carrier in the University. Today, I will present my inaugural lecture publicly as a member of the academia which to me is a dream accomplished. Most interestingly, the lecture will dwell extensively on therapies with respect to a worrisome and one of the most devastating diseases known globally - **DIABETES**. This disease attracted my attention because as the fourth killer disease worldwide, any attempt to educate and find solution towards eliminating it will save the lives of the much desired population of the diabetics. Mr. Vice-Chancellor, Sir. Spiritually, there is no doubt that diseases exists as supported by Hadith (Sayings and deeds of the Holy Prophet Mohammed, PBUH) where prophet said that "For every disease there is medicine, and if that medicine is applied to the disease, he will recover by ALLAH's will "And prophet said further" Allah has sent down the cure; the one who knows it, knows it and the one who doesn't know it, doesn't know it." Again, Aisha (May Allah be pleased with her) reported: When the prophet (PBUH) visited any ailing member of his family, he would touch the sick person with his right hand and would supplicate-O Allah! The Robb (Sustainer) of mankind! Remove this disease and cure (him/her).You are the great curer. There is no cure but through you which leaves behind no disease" (Al-Bukhari and Muslim). In view of the title of this lecture and for better understanding, it is pertinent to define the word" **DISEASE**". Therefore, a disease as captured from the Oxford Advanced Learners Dictionary, is

defined to be "a disorder of structure or function in a human, plant or animal especially one that produces specific symptoms or that affects a specific location and is not simply a direct result of physical injury". There are mainly two forms of structural or functional disorders viz: The communicable diseases (**CDs**) and the non communicable diseases (**NCDs**). The former refers to diseases that are caused by microorganisms and consequently invade tissues while the latter are diseases not caused by infectious agents (non infectious or non transmittable). A clear example of CDs include: Malaria, Trypanosomiasis, HIV, Tuberculosis etc. while examples of NCDs include: Diabetes, Hypertension, Cardiovascular diseases, Obesity etc. Thus, this lecture will avail me the opportunity to educate the town and gown on the disease (Diabetes), its treatment and my contribution towards addressing the menace as it affects the diabetics.

## **DIABETES AS A DISEASE**

Essentially, diabetes is a non - communicable disease of endocrine origin and metabolic disorder that affects both adults and children of all races. It is commonly associated with markedly increased morbidity and mortality rates which results in significant financial burden e.g. 92 billion dollars per year in United States (Forster, 1994). Seemingly everywhere, the prevalence of diabetes has increased steadily over the past several decades.

In Nigeria, the literature relating to prevalence of the disease is scarce. However, it was reported that over 5 million people are affected as at 2008 (Daily Trust, September 4<sup>th</sup>, 2009).

In Port-Harcourt for example, it was found to be as high as 23.4% among the high socio - economic group and 16% among the low socio - economic group (Nwafor and Owhoji, 2001). Thus, it

became the most challenging NCD disease of the 21st Century. The Centre for Disease Control and Prevention estimates that 30 million people worldwide had diabetes in 1985. A decade later, the global burden of diabetes was estimated to be 135 million. Although, changes in the definition of diabetes may have affected the number (Acog, 1986). The World Health Organization (WHO) estimate for the number of people with diabetes, worldwide in 2000 was about 177 million. Two major concerns are that, much of this increase will occur in developing countries, due to population growth, ageing, unhealthy diets, obesity, sedentary life-styles and that there will be growing incidence of the disorder. By 2030, while most people with diabetes in developed countries will be aged 65 years or more, in developing countries, the majority will be in the 45 – 65 years age (WHO, 2002). In the United States alone, there are 20.8 million children and adults with diabetes and from the number; 14.6 million have been diagnosed while 6.2 million are unaware that they have the disease. Based on death certificate data, diabetes contributed to 224,092 deaths in 2002 and studies indicate that diabetes is generally under-reported, particularly in cases of older people with multiple chronic conditions such as heart disease and hypertension. As a result, the toll of diabetes is believed to be much higher than officially reported. The total estimated cost of treatment of diabetes in 2007 was 174 billion dollars (Janghorbani *et al*, 2007). Available WHO report as at 2016 indicated that about 422 million people have diabetes worldwide and more than 14 million live in sub-Saharan Africa and by 2040, the figure will double. In Nigeria, more than 1.56 million cases of diabetes was documented only for 2015.

## **CLASSIFICATION OF DIABETES**

It is quite clear that diabetes is not a single disease, but a syndrome (a group of symptoms which consistently occur together) which may be produced by a number of different

factors. It is common practice to generally classify diabetes into two major groups viz: **Diabetes mellitus** and **Diabetes Insipidus**. The World Health Organization recognizes three main forms of diabetes mellitus namely: Type 1, Type 2 and Gestational Diabetes (WHO, 1999). Type 1 diabetes Mellitus is also referred to as juvenile –onset diabetes while type 2 is referred to as adult-onset or maturity-onset diabetes. Recently, a third type has been identified which was formally referred to as “Other types”. Gestational diabetes is similar to type 2 in that it involves insulin resistance which a times disappears with child delivery

### **TYPE 1 DIABETES MELLITUS (INSULIN DEPENDENT DIABETES MELLITUS, IDDM)**

Type 1 diabetes mellitus or juvenile-onset diabetes is characterized by loss or destruction of the insulin-producing beta cells of the islets of Langerhans in the pancreas, leading to a total deficiency of insulin. The main cause of this beta cell loss is a T-cell mediated autoimmune attack (Rother, 2007). There is no known preventive measure that can be taken against type 1, diabetes.

### **TYPE 2 DIABETES MELLITUS (NON INSULIN DEPENDENT DIABETES MELLITUS, NIDDM).**

Type 2 diabetes mellitus arises due to insulin resistance or reduced insulin sensitivity, combined with reduced insulin secretion. The defective responsiveness of body tissues to insulin almost certainly involves the insulin receptor in cell membranes. In the early stage, the predominant abnormality is reduced insulin sensitivity, characterized by elevated levels of insulin in the blood. At this stage, hyperglycemia can be reversed by a variety of measures and medications that improve insulin sensitivity or reduce glucose production by the liver. As the disease progresses, the impairment of insulin worsens and therapeutic replacement of insulin often becomes necessary. Type 2 diabetes may go unnoticed for years because visible



symptoms are typically mild, non-existent or sporadic, and usually no ketoacidotic episodes. However, severe long-term complications can result from unnoticed type 2 diabetes, including renal failure due to kidney damage, vascular disease, vision damage, loss of sensation or pain due to diabetic neuropathy, and, and liver damage from non-alcoholic steatohepatitis.

### **GESTATIONAL DIABETES**

Gestational diabetes mellitus (GDM) resembles type 2 diabetes in several respects, involving a combination of relatively inadequate insulin secretion and responsiveness. Although, gestational diabetes may be transient, if untreated, the health of the foetus or the mother may be terribly affected. Risks to the baby may include macrosomia (high birth weight), congenital cardiac and central nervous system abnormalities, and skeletal muscle malformations. Increased foetal insulin may inhibit foetal surfactant production and cause respiratory distress syndrome. Hyperbilirubinemia may result from red blood cell destruction. In severe cases, death may occur most commonly as a result of poor placental perfusion due to vascular impairment. A cesarean section may be performed if there is marked foetal distress or an increased risk of injury associated with macrosomia (Baron, 1982).

### **TYPE 3 DIABETES**

There are several rare cases of diabetes mellitus that do not fit into type 1, type 2 or GDM but accounts for up to 5% of all cases of diabetes. They are recently termed type 3 diabetes mellitus (Type 3A-3E). In the past, attempts to classify them became controversial. Type 3A may arise as a result of genetic defect in beta cells while 3B may be due to genetically related insulin resistance type 3C and 3D may also arise due to diseases of the pancreas and hormonal defects respectively. Type 3E may be induced by chemicals or drugs (DCCTRG, 1993).

## **DIABETES INSIPIDUS**

This is a condition in which large amounts of very dilute urine sometimes as much as 25 litres per day is secreted. It is entirely unrelated to diabetes mellitus. It may be sub-classified as primary, secondary and nephrogenic. Both secondary and primary diabetes insipidus results from failure of the post-posterior lobe of the pituitary gland to secrete anti diuretic hormone (ADH), which encourages the reabsorption of water by the kidney tubule. In nephrogenic diabetes insipidus, adequate ADH is present but the kidney tubule does not respond to its signal to reabsorb water from the urine. Nephrogenic diabetes – insipidus is a sex-linked recessive disorder. All forms of the disease are characterized by extreme polyuria and polydipsia but no polyphagia (Alice, 1997).

## **AETIOLOGY OF DIABETES**

Heredity and diet are believed to play a major role in the development of diabetes. Diabetes results when the pancreas produces insufficient amounts of insulin to meet the body's needs. It may also arise when the pancreas produces insulin but the cells are unable to efficiently use it (insulin resistance). The excess sugar remains in the blood and is subsequently removed by the kidneys (Edell, 2001). There is at present no universally accepted explanation of the cause for spontaneous diabetes but a variety of factors have been implicated as being of causal importance in the development of diabetes. These include: heredity, virus infections, diet, immunological damages, etc.

### **HEREDITY:**

Heredity plays a prominent role in determining one's risk of diabetes, but only as a predisposing factor and not an absolute determinant. Genetic factors play a much more important role in the Type 2 than the Type 1 diabetes e.g. the identical twin of a person who develops Type 2 diabetes after the age of 40 is almost

