

Prevalence of Diabetes Mellitus in Patients Attending Zambuk General Hospital

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Abstract: The prevalence studies of diabetes among 207 volunteers at General hospital Zambuk was carried out from the month of January – August 2012. Blood samples obtained from volunteers were screened using the fasting blood sugar technique. From the 207 blood samples obtained, 84 (40.6%) were positive. The prevalence rate was 17 (34%) for males and 8 (23.5%) for females within the age group 21-40, 33 (66%) for males and 26 (76.4%) for females within the age group 41 and above. However, none of the samples obtained within the age group 0-21 was positive. This high prevalence rate within the age range of 41 and above is an indication that diabetes is much more evident in the older generation, and control measures need to be in place to check this menace.

Keyword: Age, Gender, Diabetes mellitus

I. Introduction

Diabetes describes as a group of metabolic diseases in which the person has a high blood glucose or blood sugar. Also as defined by Medical Encyclopedia, (2011), diabetes is a lifelong (chronic) disease in which there are high levels of sugar in the blood. Diabetes was one of the first diseases described in an Egyptian manuscript from 1500 BC as "too great emptying of the urine" (Leonid, 2009). Indian physicians around the same time identified the disease and classified it as *madhumeha* or "honey urine", noting the urine would attract ants (Leonid, 2009). The term "diabetes" or "to pass through" was first used in 230 BC by the Greek Apollonius of Memphis (Leonid, 2009). The disease was considered as rare during the time of the Roman Empire, with Galen commenting he had only seen two cases during his career (Leonid, 2009). This is possibly due the diet and life-style of the ancient people, or because the clinical symptoms were observed during the advanced stage of the disease. Type 1 and type 2 diabetes were identified as separate conditions for the first time by the Indian physicians Sushruta and Charaka in 400-500 AD with type 1 associated with youth and type 2 with being overweight. (Leonid, 2009). The term "mellitus" or "from honey" was added by the Briton John Rolle in the late 1700s to separate the condition from diabetes insipidus, which is also associated with frequent urination (Leonid, 2009). While many measures were tried, effective treatment was not developed until the early part of the 20th century, when Canadians Frederick Banting and Charles Herbert Best developed insulin in 1921 and 1922 respectively (Leonid, 2009). This was followed by the development of the long-acting insulin NPH in the 1940's (Leonid, 2009). Diabetes is of different types, but for the sake of this study we will consider only Diabetes mellitus. **Diabetes mellitus**, often simply referred to as **diabetes**, is a group of metabolic diseases in which a person has high blood sugar, either because the body does not produce enough insulin, or because the cells do not respond to the insulin that is produced (Gardner et. al., 2011). This high blood sugar produces the classical symptoms of polyuria (frequent urination), polydipsia (increased thirst) and polyphagia (increased hunger).

The three main types of diabetes mellitus (DM) are:

- Type 1 DM results from the body's failure to produce insulin, and presently requires the person to inject insulin. This usually develops in children or young adults but can occur at any age (Joshin diabetes center, 2007). (Also referred to as insulin-dependent diabetes mellitus (IDDM) or "juvenile" diabetes) (Medilexon International, 2012)
- Type 2 DM (Formerly called adult onset) results from insulin resistance, a condition in which cells fail to use insulin properly, sometimes combined with an absolute insulin deficiency. (Formerly referred to as noninsulin-dependent diabetes mellitus (NIDDM) or "adult-onset" diabetes), (Medilexon International, 2012).

Other forms of diabetes mellitus include congenital diabetes, which is due to genetic defects of insulin secretion, cystic fibrosis-related diabetes, steroid diabetes induced by high doses of glucocorticoids, and several forms of monogenic diabetes. Gestational diabetes is when pregnant women, who have never had diabetes before, have a high blood glucose level during pregnancy due to their bodies' failure to produce enough insulin

to transport all of the glucose to their cells (Medilexon International, 2012). It may precede development of type 2 DM. It occurs in about 2%–5% of all pregnancies and may improve or disappear after delivery. Gestational diabetes is fully treatable, but requires careful medical supervision throughout the pregnancy. About 20%–50% of affected women develop type 2 diabetes later in life.

Type 1 diabetes mellitus is characterized by loss of the insulin-producing beta cells of the islets of Langerhans in the pancreas, leading to insulin deficiency. This type can be further classified as immune-mediated or idiopathic. The majority of type 1 diabetes is of the immune-mediated nature, in which beta cell loss is a T-cell-mediated autoimmune attack (Rother, 2007). There is no known preventive measure against type 1 diabetes, which causes approximately 10% of diabetes mellitus cases in North America and Europe. Most affected people are otherwise healthy and of a healthy weight when onset occurs. Sensitivity and responsiveness to insulin are usually normal, especially in the early stages. Type 1 diabetes can affect children or adults, but was traditionally termed "juvenile diabetes" because a majority of these diabetes cases were in children (Merck Manual Professional, 2010). There are many different reasons for type 1 diabetes to be accompanied by irregular and unpredictable hyperglycemias, frequently with ketosis, and sometimes serious hypoglycemias, including an impaired counterregulatory response to hypoglycemia, occult infection, gastroparesis (which leads to erratic absorption of dietary carbohydrates), and endocrinopathies (e.g., Addison's disease). (Merck Manual Professional, 2010). These phenomena are believed to occur no more frequently than in 1% to 2% of persons with type 1 diabetes. (Dorner et. al., 1977). Type 2 diabetes mellitus is characterized by insulin resistance, which may be combined with relatively reduced insulin secretion (Gardner et. al., 2011). The defective responsiveness of body tissues to insulin is believed to involve the insulin receptor. However, the specific defects are not known. Type 2 diabetes is the most common type. In the early stage of type 2, the predominant abnormality is reduced insulin sensitivity. 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. T2DM has already become a threatening epidemic. (Yang et al, 2010). Humans are capable of digesting some carbohydrates, in particular those most common in food; starch, and some disaccharides such as sucrose, are converted within a few hours to simpler forms, most notably the monosaccharide glucose, the principal carbohydrate energy source used by the body. The rest are passed on for processing by gut flora largely in the colon. Insulin is released into the blood by beta cells (β -cells), found in the islets of Langerhans in the pancreas, in response to rising levels of blood glucose, typically after eating. Insulin is used by about two-thirds of the body's cells to absorb glucose from the blood for use as fuel, for conversion to other needed molecules, or for storage. Insulin is also the principal control signal for conversion of glucose to glycogen for internal storage in liver and muscle cells. Lowered glucose levels result both in the reduced release of insulin from the β -cells and in the reverse conversion of glycogen to glucose when glucose levels fall. This is mainly controlled by the hormone glucagon, which acts in the opposite manner to insulin. Glucose thus forcibly produced from internal liver cell stores (as glycogen) re-enters the bloodstream; muscle cells lack the necessary export mechanism. Normally, liver cells do this when the level of insulin is low (which normally correlates with low levels of blood glucose). If the amount of insulin available is insufficient, if cells respond poorly to the effects of insulin (insulin insensitivity or resistance), or if the insulin itself is defective, then glucose will not have its usual effect, so it will not be absorbed properly by those body cells that require it, nor will it be stored appropriately in the liver and muscles. The net effect is persistent high levels of blood glucose, poor protein synthesis, and other metabolic derangements, such as acidosis. When the glucose concentration in the blood is raised beyond its renal threshold (about 10 mmol/L, although this may be altered in certain conditions, such as pregnancy), reabsorption of glucose in the proximal renal tubuli is incomplete, and part of the glucose remains in the urine (glycosuria). This increases the osmotic pressure of the urine and inhibits reabsorption of water by the kidney, resulting in increased urine production (polyuria) and increased fluid loss. Lost blood volume will be replaced osmotically from water held in body cells and other body compartments, causing dehydration and increased thirst. Patient education, understanding, and participation is vital, since the complications of diabetes are far less common and less severe in people who have well-managed blood sugar levels. Nathan DM, Cleary PA, Backlund JY et al. (December 2005) The goal of treatment is an HbA1C level of 6.5%, but should not be lower than that, and may be set higher (The Diabetes Control and Complications Trial Research Group). Attention is also paid to other health problems that may accelerate the deleterious

II. Complications

All forms of diabetes increase the risk of long-term complications. These typically develop after many years (10–20), but may be the first symptom in those who have otherwise not received a diagnosis before that time. The major long-term complications relate to damage to blood vessels. Diabetes doubles the risk of cardiovascular disease (Emerging Risk Factors Collaboration 2010). The main "macrovascular" diseases (related to atherosclerosis of larger arteries) are ischemic heart disease (angina and myocardial infarction), stroke and

peripheral vascular disease. Acute complications include: hypoglycaemia, diabetic ketoacidosis, and non-ketotic hyperosmolar coma, (Wikipedia, 2012).

III. Material and Method

Study area

This study was conducted at the General Hospital Zambuk, Yamaltu-Deba local Government area of Gombe State, from January to August 2012.

Study Population

The populations used for this study were 207 volunteers whose informed consent were sorted for and agreed to participate in the study.

Sample collection

Blood samples were collected using the standard vein-puncture method and the fasting blood sugar test procedure as described by Monica Cheesbrough, (2000) was followed.

IV. Result and Discussion

Table 1: Total number that were screened for diabetes

Age Group	Male	Female	Total
0 -20	4	0	4
21 – 40	25	31	56
41 –Above	81	66	147
Total	110	97	207

Table 2: Total number that were screened positive for diabetes

Age Group	Male	Female	Total
0 -20	0	0	0
21 – 40	17	8	25
41 – Above	33	26	59
Total	50	34	84

Table 3: Percentage Prevalence for those that are diabetes Positive

Age Group	Male (%)	Female (%)
0 -20	0	0
21 – 40	34	23.5
41 – Above	66	76.4
Total	59.5	40

The total percent prevalence of diabetes in Zambuk General Hospital is =

$$84/207 \times 100 = 40.5\%$$

V. Epidemiology

As at 2010, an estimated 285 million people had diabetes globally, with type 2 diabetes making up about 90% of the cases (Williams's textbook of endocrinology (12th ed.) Its incidence is increasing rapidly, and by 2030, this number is estimated to double (Wild et. al. 2004). Diabetes mellitus occurs throughout the world, but is more common (especially type 2) in the more developed countries. According to Wild (2004), the greatest increase in prevalence is, however, expected to occur in Asia and Africa, where most patients will probably be found by 2030. This is in-line with this study which reveals a considerably high prevalence rate among adult males and females. The increase in incidence in developing countries follows the trend of urbanization and lifestyle changes, perhaps most importantly a "Western-style" diet. This has suggested an environmental (i.e., dietary) effect, but there is little understanding of the mechanism(s) at present, though there is much speculation, some of it are most compelling. In the last 20 years, diabetes rate in North America has been increasing substantially. In 2010, nearly 26 million people have diabetes in the United States, 7 million people remain undiagnosed and another 57 million people estimated to have pre diabetes (Center for Disease Control and Prevention. 2011). According to the American Diabetes Association (2005), about 18.3% (8.6 million) of Americans age 60 and above have diabetes. The prevalence of Diabetes mellitus increases with age, and the number of older persons with diabetes are expected to grow as the elderly population increases in number. The National Health and Nutrition Examination Survey (NHANES III), illustrated that, in the population over 65 years of age, 18% to 20% have diabetes, with 40% having either diabetes or its precursor form of impaired glucose tolerance. These data supports the findings of this study which shows 40.5% total prevalence mostly among the age group 41 and above.

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