A survey on knowledge and attitude towards Diabetes mellitus of diabetic patients in Bangladesh perspective

A dissertation submitted to the Department of Pharmacy, East West University, in partial fulfillment of the requirements for the degree of Bachelor of Pharmacy.

Supervised by

Faculty of Department of pharmacy

NafisaTanjia

Submitted By

Minhaj Ahmad Naved

ID: 2011-1-70-061

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DEDICATION

This Research Paper Is Dedicated

To My Beloved Parents, Who Are My biggest inspiration …

DECLARATION BY THE CANDIDATE

I, Minhaj Ahmad Naved, hereby declare that this dissertation, entitled **"A survey on knowledge and attitude towards Diabetes mellitus of diabetic patients in Bangladesh perspective'"** submitted to the Department of Pharmacy, East West University, in the partial fulfillment of the requirement for the degree of Bachelor of Pharmacy (Honors) is a genuine & authentic research work carried out by me. The contents of this dissertation, in full or in parts, have not been submitted to any other institute or University for the award of any degree or Diploma of Fellowship.

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ENDORSEMENT BY THE CHAIRPERSON

This is to certify that the dissertation, entitled **"A survey on knowledge and attitude towards Diabetes mellitus of diabetic patients in Bangladesh perspective"** is a bona fide research work done by Minhaj Ahmad Naved (ID: 2011-1-70-061), in partial fulfillment of the requirement for the degree of Bachelor of Pharmacy.

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ABSTRACT

Diabetes is a disease caused by flawed carbohydrate metabolism and manifests itself by unusually large amounts of sugar in the blood and urine In Bangladesh, the number diabetic patient has also increased due to lack of knowledge & impropriate attitude. There is little work done on diabetes mellitus as well as knowledge and attitude towards Diabetes mellitus of diabetic patients in Bangladesh. The purpose of our study was to see the current statistics of knowledge and attitude towards Diabetes mellitus of diabetic patients. The study was a survey based study. The survey was performed on 202 diabetic patients in BIRDEM (Bangladesh Institute of Research and Rehabilitation for Diabetes, Endocrine and Metabolic Disorders) at Shahbag, Dhaka, BIRDEM at Rampura,Dhaka and Baridhara park. In this study 51.44% male and 48.55% female participants were found. Patients were selected randomly. We considered factors affecting diabetes knowledge were sex, age, level of education, marital status, profession, and income, mode of diagnosis and duration of diabetes. Only Diabetic patients were selected as study population. Approximately 96.53% of them were married and 3.96% were single. The study also showed that the maximum percentage (20.79%) of normal range of fasting blood glucose level was 4.1-6 mg/ml and the maximum percentage (33.66%) normal range of random blood glucose level was 8.1-12mg/ml. But Knowledge about HbA1c is very poor and maximum (72.27%) of the study population were not even heard of name of HbA1c or glycosylated hemoglobin. In our study showed that 55.44% study population has knowledge about diabetes. Our study also showed that people in Bangladesh frequency of visiting healthcare provider has raised alarmingly, 71.78% patients visit healthcare provider more than twice in a year, 22.77% visit twice in a year and 78.71% of study populations have knowledge about Risk factors of Diabetes. We found that people are more cautious about their diabetes condition. They know the sign and symptoms and management practice of diabetes in hyperglycemic and hypoglycemic condition. In spite of that Government & society should take proper and powerful steps to decrease the number of diabetic patients by creating awareness among mass population.

1.1 Overview

Diabetes is a disease caused by flawed carbohydrate metabolism and manifests itself by unusually large amounts of sugar in the blood and urine (Jacobs & Fishberg, 2002) Over time, diabetes can lead to blindness, kidney failure, and nerve damage. These types of damage are the result of damage to small vessels, referred to as microvascular disease. Diabetes is also an important factor in accelerating the hardening and narrowing of the arteries (atherosclerosis), leading to strokes, coronary heart disease, and other large blood vessel diseases. This is referred to as macrovascular disease. Diabetes affects approximately 26 million people in the United States, while another 79 million have prediabetes. An estimated 7 million people in the United States have diabetes (WHO, 2004).

From an economic perspective, the total annual cost of diabetes in 2012 was estimated to be 245 billion dollars in the United States. This included 116 billion in direct medical costs (healthcare costs) for people with diabetes and another 69 billion in other costs due to disability, premature death, or work loss. Medical expenses for people with diabetes are over two times higher than those for people who do not have diabetes. These numbers reflect only the population in the United States (IDF, 2012).

Diabetes was the 7th leading cause of death in the United States listed on death certificates in 2007 (Seaman, 2014).

As of 2014, an estimated 387 million people have diabetes worldwide, (International Diabetes Federation, 2014) with type 2 diabetes making up about 90% of the cases. This is equal to 8.3% of the adult population,with equal rates in both women and men.In the years 2012 to 2014, diabetes is estimated to have resulted in 1.5 to 4.9 million deaths per year.The number of people with diabetes is expected to rise to 592 million by 2035(International Diabetes Federation, 2014). The global economic cost of diabetes in 2014 was estimated to be $612 billion USD(International Diabetes Federation, 2013). In the United States, diabetes cost $245 billion in 2012 (American Diabetes Association,2013).

1.2Diabetes mellitus

A rapidly growing disease across the world is diabetes, lesser known as diabetes mellitus (Marso & Stern, 2004).Diabetes mellitus is a group of metabolic diseases characterized by

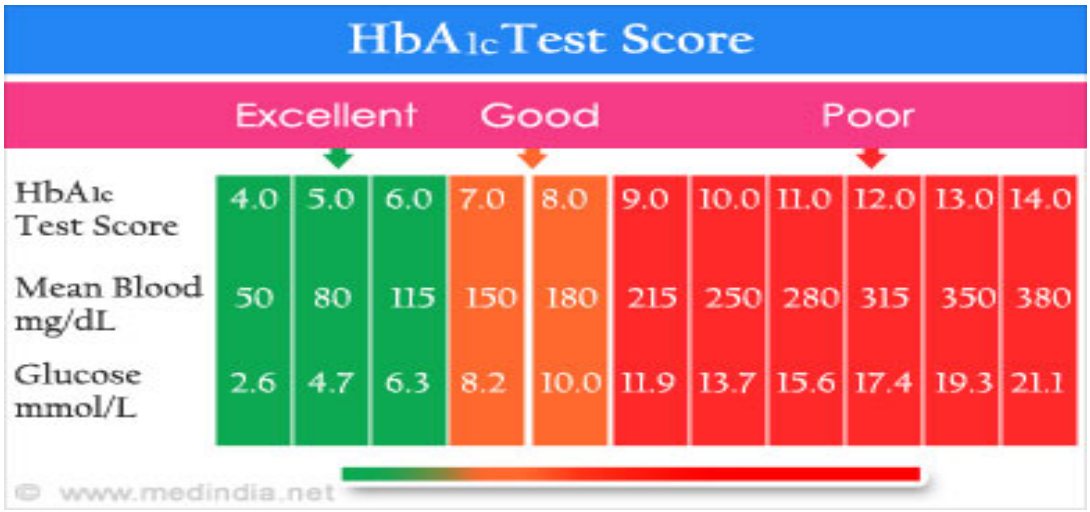
high blood sugar (glucose) levels that result from defects in insulin secretion, or its action, or both. Diabetes mellitus, commonly referred to as diabetes (as it will be in this article) was first identified as a disease associated with "sweet urine," and excessive muscle loss in the ancient world. Elevated levels of blood glucose (hyperglycemia) lead to spillage of glucose into the urine, hence the term sweet urine.

Normally, blood glucose levels are tightly controlled by insulin, a hormone produced by the pancreas. Insulin lowers the blood glucose level. When the blood glucose elevates (for example, after eating food), insulin is released from the pancreas to normalize the glucose level. In patients with diabetes, the absence of insufficient production of, or lack of response to insulin causes hyperglycemia. Diabetes is a chronic medical condition, meaning that although it can be controlled, it lasts a lifetime.

Table 1: Diabetes and Normal Blood Sugar Levels (Medindia.net, 2015)

Blood Sugar Chart			
Category	Fasting Value (mg/dl)		Post Prandial (mg/dl)
	Minimum Value	Maximum Value	Value 2 hours after consuming glucose
Normal	70	100	Less than 140
Early Diabetes	101	126	140 to 200
Established Diabetes	More than 126	-	More than 200

Table 2: Diabetes and HbA1c score (Medindia.net, 2015)



At present, the diagnosis of diabetes or prediabetes is based in an arbitrary cut-off point for a normal blood sugar level. A normal sugar level is currently considered to be less than 100 mg/dL when fasting and less than 140 mg/dL two hours after eating. But in most healthy people, sugar levels are even low (Medindia.net, 2015).

1.3 Classification of Diabetes Mellitus

Diabetes is a syndrome in which the afflicted person has a distorted metabolism. There are three traditional types of diabetes: type 1, type 2, and gestational diabetes. Type 1diabetes is expressed as loss of beta cells that produce insulin, leading to an insulin deficiency. Type 2 is characterized as diabetes due to insulin sensitivity, combined with reduced insulin secretion. Gestational diabetes bears a resemblance to type 2 diabetes in that there is also inadequate insulin responsiveness and secretion.Metformin treatment in adolescents who are obese can modestly reduce risk factors for type 2 diabetes, including elevated body mass index (BMI), fasting insulin levels, and fasting glucose levels (Rodriguez, Shearer, & Slawson, 2007).

1.3.1 Type 1 Diabetes Mellitus

Type 1 diabetes mellitus (DM) is a multisystem disease with both biochemical and anatomic consequences. It is a chronic disease of carbohydrate, fat, and protein metabolism caused by the lack of insulin, which results from the marked and progressive inability of the pancreas to secrete insulin because of autoimmune destruction of the beta cell.Type 1 DM can occur

at any age. It is most common in juveniles but can also develop in adults, especially in those in their late 30s and early 40s (Dansinger, 2014).

Common symptoms of type 1 diabetes include:

- Excessive thirst
- Increased urination (sometimes as often as every hour)
- Unusual weight loss
- Fatigue or tiredness
- Nausea, perhaps vomiting
- Blurred vision
- In women, frequent vaginal infections
- In men and women, yeast infections (thrush)
- Dry mouth
- Slow-healing sores or cuts
- Itching skin, especially in the groin or vaginal area.

Symptoms of type 1 diabetes can develop quickly, over weeks or sometimes days (Dansinger, 2014).

1.3.2Epidemiology and etiology of type 1diabetes

Type 1 diabetes represents around 10% of all cases of diabetes, affecting approximately 20 million people worldwide (American Diabetes Association, 2001).

Although type 1 diabetes affects all age groups, the majority of individuals are diagnosed either at around the age of 4 to 5 years, or in their teens and early adulthood (Blood *et al*, 1975). The incidence of type 1 diabetes is rising. Across Europe, the average annual increase in the incidence in children under 15 years is 3.4% (EURODIAB ACE study Group, 2000), with the steepest rise in those under 5 years old (Karvonen *et al*, 1999).Type1 diabetes is the result of an autoimmune reaction to proteins of the islets cells of the pancreas (Holt, 2004).There is a strong association between IDDM and other endocrine autoimmunity (for example, Addison disease) and an increased incidence of autoimmune diseases are seen in family members of IDDM patients. The three types of autoantibodies known are

Islet cell cytoplasmic antibodies (ICCA): The primary antibodies found in 90% of type 1 diabetics are against islet cell cytoplasmic proteins. The presence of ICCA is a highly accurate predictor of future development of IDDM.

Islet cell surface antibodies (ICSA): Autoantibodies directed against islets cell surface antigens (ICSA) have also been described in as many as 80% of type1 diabetics. Some patients with type 2 diabetes have been identified, whichare ICSA positive.

Specific antigenic targets of islet cells: Antibodies to glutamic acid decarboxylase (GAD) have been identified in over 80% of patients newly diagnosed with IDDM. Anti-GAD antibodies decline over time in type 1 diabetics. The presence of anti-GAD antibodies is a strong predictor of the future development of IDDM in high risk populations. Anti-insulin antibodies (IAAs) have been identified in IDDM patients and in relatives at risk to developingIDDM. These IAAsare detectable even before the onset of insulin therapy in type 1 diabetics. IAA is detectable in around 40% of young children with IDDM (Raju and Raju,2010).

1.3.3Pathophysiology of type 1 diabetes (IDDM)

The autoimmune destruction of pancreatic β-cells, leads to a deficiency of insulin secretion which results in the metabolic derangements associated with IDDM. In addition to the loss of insulin secretion, the function of pancreatic α-cells is also abnormal and there is excessive secretion of glucagons in IDDM patients. Normally, hyperglycemialeads to reduced glucagons secretion, however, in patients with IDDM, glucagons secretion is not suppressed by hyperglycemia (Raju and Raju, 2010).The resultant inappropriately elevated glucagons levels exacerbate the metabolic defects due to insulin deficiency. The most pronounced example of this metabolic disruption is that patients with IDDM rapidly develop diabetic ketoacidosis in the absence of insulin administration. Although insulin deficiency is the primarydefect in IDDM, there is also a defect in the administration of insulin. There are multiple biochemical mechanisms that account for impairment of tissue's responseto insulin. Deficiency in insulin leads to uncontrolled lipolysis and elevated levels of free fatty acids in the plasma, which suppressesglucose metabolism in peripheral tissues such as skeletal muscle (Raju and Raju, 2010).This impairs glucose utilization and insulin deficiency also decreases the expression of a number of genes necessary for target tissues to respond normally to insulin such as glucokinase in liver and the GLUT 4 class of glucose transporters

in adipose tissueThe major metabolic derangements, which result from insulin deficiency in IDDM are impaired glucose, lipid and protein metabolism(Raju and Raju 2010).

1.3.3.1Effects on glucose metabolism

Uncontrolled IDDM leads to increased hepatic glucoseoutput. First, liver glycogen stores are mobilized then hepatic gluconeogenesis is used to produce glucose. Insulin deficiency also impairs non hepatic tissue utilization of glucose. In particular in adipose tissue and skeletal muscle, insulin stimulates glucose uptake. This is accomplished by insulin mediated movement of glucose transporters proteins to the plasma membrane of these tissues. Reduced glucose uptake by peripheral tissues in turn leads to a reduced rate of glucose metabolism. In addition, the level of hepatic glucokinase is regulated by insulin. Therefore, a reduced rate of glucose phosphorylation in hepatocytes leads to increased delivery to the blood. Other enzymes involved in anabolic metabolic metabolism of glucose are affected by insulin. The combination of increased hepatic glucose production and reduced peripheral tissues metabolism leads to elevated plasma glucose levels.When the capacity of the kidneys to absorb glucose is suppressed, glucosuria ensues. Glucose is an osmotic diuretic and an increase in renal loss of glucose is accompanied by loss of water and electrolyte. The result of the loss of water (and overall volume) leads to the activation of the thirst mechanism (polydipsia). The negative caloric balance, which results from the glucosuria and tissue catabolism leads to an increase in appetite and food intake that is polyphagia (Raju and Raju, 2010).

1.3.3.2Effect on lipid metabolism

One major role of insulin is to stimulate the storage of food energy in the form of glycogen in hepatocytes and skeletal muscle, following the consumption of a meal.In addition, insulin stimulates hepatocytes to synthesize and store triglycerides in adipose tissue In uncontrolled IDDM there is a rapid mobilization of triglycerides leading to increased levels of plasma free fatty acids. The free fatty acids are taken up by numerous tissue (except the brain) and metabolized to provide energy. In the absence of insulin, malonyl CoA levels fall, and transport of fatty acyl-CoA into the mitochondria increases. Mitochondrial oxidation of fatty acids generates acetyl CoA that can be further oxidized in the TCA cycle. However, in hepatocytes the majority of the acetyl CoA is not oxidized by the TCA cycle but is metabolized into the ketone bodies (acetoacetate and b-hydroxybutyrate). These ketone bodies are used for energy production by the brain, heart and skeletal muscle. In IDDM, the

increased availability of free fatty acids and ketone bodies exacerbates the reduced utilization of glucose,furthering the ensuing hyperglycemia. Production of ketone bodies in excess of the body's ability to utilize them leads to ketoacidosis. A spontaneous breakdown product of acetoacetate is the acetone that is exhaled by the lungs, which gives a distinctive odor to the breath. Normally, plasma triglycerides are acted upon by lipoprotein lipase (LPL) that requires insulin. LPL is a membrane bound enzyme on the surface of the endothelial cells lining the vessels which allows fatty acids to be taken from circulating triglycerides for storage in adipocytes (Raju and Raju, 2010).

1.3.3.3Effects on protein

Insulin regulates the synthesis of many genes, either positively or negatively, which affect overall metabolism.Insulin has an overall effect on protein metabolism, increasing the rate of protein synthesis and decreasing the rate of protein degradation. Thus insulin deficiency will lead to increased catabolism of protein. The increased rate of proteolysis leads to elevated concentration of amino acids in plasma (Raju and Raju, 2010). Glucogenic amino acids serve as precursors for hepatic and renal glyconeogenesis, which further contributes to the hyper glycaemia seen in IDDM.

1.4Type 2 diabetes mellitus

Diabetes mellitus type 2 (formerly noninsulin-dependent diabetes mellitus (NIDDM) or adult-onset diabetes) is a metabolic disorder that is characterized by hyperglycemia (high blood sugar) in the context of insulin resistance and relative lack of insulin. (Kumar*et al*, 2005).

Rates of type 2 diabetes have increased markedly since 1960 in parallel with obesity. As of 2010 there were approximately 285 million people diagnosed with the disease compared to around 30 million in 1985. (Smyth & Heron, 2006) Long-term complications from high blood sugar can include heart disease, strokes, diabetic retinopathy where eyesight is affected, kidney failure which may require dialysis, and poor blood flow in the limbs leading to amputations. The acute complication of ketoacidosis, a feature of type 1 diabetes, is uncommon, (Fasanmade, Odeniyi &Ogbera,2008).

Common symptoms of type 2 diabetes include:

- Increased thirst
- Increased hunger (especially after eating)
- Dry mouth
- Frequent urination
- Unexplained weight loss (even though you are eating and feel hungry)
- Fatigue (weak, tired feeling)
- Blurred vision
- Headaches
- Loss of consciousness (rare)

Other symptoms of type 2 diabetes may include:

- Slow-healing sores or cuts
- Itching of the skin (usually around the vaginal or groin area)
- Frequent yeast infections
- Recent weight gain or unexplained weight loss
- Velvety dark skin changes of the neck, armpit, and groin, called acanthosis nigricans
- Numbness and tingling of the hands and feet
- Decreased vision
- Impotency

(Dansinger, 2014)

1.4.1 Epidemiology and etiology of type 2 diabetes (NIDDM)

Type 2 diabetes is the predominant form of diabetes and accounts for at least 90% of all cases of diabetes mellitus (Gonzalez et al., 2009). The rise in prevalence is predicted to be much greaterin developing than in developed countries (69 versus 20%) (Shaw et al., 2010).In developing countries, people aged 40 to 60 years are affected most, compared with those older than 60 years in developed countries (Shaw et al.,2010). This increase in type 2 diabetes is inextricably linked to changes towards a Western lifestyle (high diet with reduced physical activity) in developing countries and the rise in prevalence of overweight and obesity (Chan et al., 2009; Colagiuri,2010).There are approximately 1.4 million people with diagnosed type 2 diabetes in the UK (Bennett*et al*, 1995). The incidence of diabetes

increases with age, with most cases being diagnosed after the age of 40 years. This equates to a lifetime risk of developing diabetes of 1 in 10 (Neil et al., 1987). Type 2 diabetes is a heterogeneous disorder caused by a combination of genetic factors related to impaired insulin secretion, insulin resistance and environmental factors such as obesity, overeating, lack of exercise, and stress as well as aging (Kaku, 2010).It is typically a multifactorial disease involving multiple genes and environmental factors to varying extents (Holt, 2004).

Type 2 diabetes is the common form of idiopathic diabetes and is characterized by a lack of the need for insulin to prevent ketoacidosis. Itis not an autoimmune disorder and the susceptible genes that predispose to NIDDM have not been identified in most patients. This could be due to the heterogeneity of the genes responsible for the susceptibility to NIDDM(Shaw et al.,2010).

1.4.2 Environmental factors in the pathogenesis type 2 diabetes

Aging, obesity, insufficient energy consumption, alcohol drinking, smoking, etc. are independent risk factors of pathogenesis of type 2 diabetes. Obesity (particularly visceral fat obesity) due to a lack of exercise is accompanied by a decrease in muscle mass, induces insulin resistance, and is closely associated with the rapid increase in the number of middle and high aged patients. The changes in dietary energy sources, particularly the increase in fat intake, the decrease in starch intake, the increase in the consumption of simple sugars, and the decrease in dietary fiber intake, contribute to obesity and cause deterioration of glucose tolerance. Even mild obesity (Body mass index (BMI) < 25) causes a 4 to 5 fold increase in risk of developing diabetes, if accompanied by the increase in visceral fat mass.

1.4.3 Pathophysiology of type 2 diabetes (NIDDM)

Individuals with NIDDM have detectable levels of circulating insulin, unlike patients with IDDM. On the basis of oral glucose tolerance

Testing the essential elements of NIDDM can be divided into four distinct groups:

i) Those with normal glucose tolerance.

ii) Chemical diabetes (called impaired glucose tolerance).

iii) Diabetes with minimal fasting hyperglycemia (fasting plasma glucose less than 140mg/dl).

iv) Diabetes mellitus in association with overt fasting hyperglycemia (fasting plasma glucose greater than140mg/dl).The individuals with impaired glucose tolerance havehyperglycemia in spite of having highest levels of plasma insulin, indicating that they are resistant to the

action of insulin. In the progression from impaired glucose tolerance to diabetes mellitus, the level of insulin declines indicating that patients with NIDDM have decreased insulin secretion. Insulin resistance and insulin deficiency are common in the average NIDDM patients (Holt, 2004). Insulin resistance is the primary cause of NIDDM, however some researcher contend that insulin deficiency is the primary cause because a moderate degree of insulin resistance is not sufficient to cause NIDDM (Raju and Raju, 2010). Most patients with the common form of NIDDM have both defects. Recent evidence has demonstrated a role for a member of the nuclear hormone receptor super family of proteins in the etiology of type 2 diabetes (Raju and Raju, 2010). Relatively new classes of drugs used to increase the sensitivity of the body to insulin are the thiazolidinedione drugs. These compounds bind to and alter the function of the peroxisome proliferators-activated receptor g(PPARg). PPARg is also a transcription factor and when activated, binds to another transcription factor known as the retinoid x receptor (RXR). When these two proteins are completed a specific set of genes becomes activated. PPARg is a key regulator of adipocyte differentiation;it can induce the differentiation of fibroblasts or other undifferentiated cells into mature fat cells. PPARg is also involved in the synthesis of biologically active compounds from vascular endothelial cells and immune cells (Rajuand Raju, 2010).

1.4.4 The risk factors for type 2

Age and ethnicity: The older people are at higher risk, especially over 40 (for white people), and over 25 (for black, South Asian and some minority groups). It has been found in the UK that black people and people of South Asian origin have five times the risk of developing Type 2 compared to white people.

Diabetes in the family: If a relative has/had diabetes risk might be greater. The risk increases if the relative is a close one.

Bodyweight (and inactivity combined with bodyweight): Four-fifths of people who have Type 2 became so because they were overweight. The more overweight a person is the higher his/her risk will be. The highest risk is for a person who is overweight and physically inactive.

Cardiovascular problems and stroke: A person who has had a stroke runs a higher risk of developing Type 2. This is also the case for people who suffer from hypertension (high

blood pressure), or have had a heart attack. Any diagnosis of a problem with circulation indicates a higher risk of developing Type 2.

Gestational Diabetes: A woman who became temporarily diabetic during pregnancy - gestational diabetes - runs a higher risk of developing Type 2 later on. Women who give birth to a higher weight baby may run a higher risk, too.

Impaired fasting glycaemia (IFG) - Impaired glucose tolerance (IGT): A person who has been diagnosed as having impaired fasting glycaemia or impaired glucose tolerance and does not have diabetes runs a significantly higher risk of eventually developing Type 2. People with IFG or IGT have higher than normal levels of glucose in their blood.

Severe mental health problems: It has been found that people with severe mental health problems are more likely to develop Type 2.

1.5Gestational diabetes

Gestational diabetes mellitus (GDM) is defined as glucose intolerance of various degrees that is first detected during pregnancy. GDM is detected through the screening of pregnant women for clinical risk factors and testing for abnormal glucose tolerance that is usually, but not invariably, mild and asymptomatic. GDM appears to result from the same broad spectrum of physiological and genetic abnormalities that characterize diabetes outside of pregnancy. Indeed, women with GDM are at high risk for having or developing diabetes when they are not pregnant. Thus, GDM provides a unique opportunity to study the early pathogenesis of diabetes and to develop interventions to prevent the disease (Thomas,2005).

1.5.1 Causes

Body digests the food which is eaten to produce sugar (glucose) that enters your bloodstream. In response to pancreas (large gland behind stomach) produces insulin. Insulin is a hormone that helps glucose move from your bloodstream into body's cells, where it's used as energy. During pregnancy, the placenta, which connects baby to blood supply, produces high levels of various other hormones. Almost all of them impair the action of insulin in cells, raising blood sugar. Modest elevation of blood sugar after meals is normal during pregnancy.

As baby grows, the placenta produces more and more insulin-blocking hormones. In gestational diabetes, the placental hormones provoke a rise in blood sugar to a level that can affect the growth and welfare of baby. Gestational diabetes usually develops during the last half of pregnancy — sometimes as early as the 20th week, but generally not until later (Mayo Clinic Staff, 2013).

1.5.2 Risk factors

Woman can develop gestational diabetes, but some women are at greater risk. Risk factors for gestational diabetes include:

Age greater than 25: Women older than age 25 are more likely to develop gestational diabetes. (Mayoclinic.org, 2015)

Family or personal health history: Risk of developing gestational diabetes increases if someone have prediabetes — slightly elevated blood sugar that may be a precursor to type 2 diabetes — or if a close family member, such as a parent or sibling, has type 2 diabetes also more likely to develop gestational diabetes. If anyone had it during a previous pregnancy, delivered a baby who weighed more than 9 pounds (4.1 kilograms), or had an unexplained stillbirth. (Mayoclinic.org, 2015)

Excess weight: More likely to develop gestational diabetes if someone is significantly overweight with a body mass index (BMI) of 30 or higher. (Mayoclinic.org, 2015)

Nonwhite race: For reasons that aren't clear, women who are black, Hispanic, American Indian or Asian are more likely to develop gestational diabetes.(Mayoclinic.org, 2015)

1.5.3 Management of Gestational Diabetes Mellitus

Gestational diabetes mellitus (GDM) is a common metabolic disorder that occurs during pregnancy. GDM can cause significant problems, including maternal complications, perinatal complications, and metabolic disorders in offspring of mothers with GDM. The primary management method for women with GDM is nutritional therapy. Some women with GDM require diet therapy alone, while some women require both diet therapy and insulin therapy. Currently, there is no universal management method for GDM because there are no universal diagnostic criteria and genomic backgrounds differ according to ethnicity. (Mayoclinic.org, 2015)

1.5.4 Gestational diabetes: risks, management and treatment options

Gestational diabetes mellitus (GDM) is commonly defined as glucose intolerancefirst recognized during pregnancy. Diagnostic criteria for GDM have changed over the decades,and several definitions are currently used; recent recommendations may increase the prevalenceof GDM to as high as one of five pregnancies. Perinatal complications associated with GDMinclude hypertensive disorders, preterm delivery, shoulder dystocia, stillbirths, clinical neonatalhypoglycemia, hyperbilirubinemia, and cesarean deliveries. Postpartum complications includeobesity and impaired glucose tolerance in the offspring and diabetes and cardiovascular diseasein the mothers. Management strategies increasingly emphasize optimal management of fetalgrowth and weight. Monitoring of glucose, fetal stress, and fetal weight through ultrasoundcombined with maternal weight management, medical nutritional therapy, physical activity,and pharmacotherapy can decrease comorbidities associated with GDM. Consensus is lackingon ideal glucose targets, degree of caloric restriction and content, algorithms for pharmacotherapy,and in particular, the use of oral medications and insulin analogs in lieu of humaninsulin. Postpartum glucose screening and initiation of healthy lifestyle behaviors, includingexercise, adequate fruit and vegetable intake, breastfeeding, and contraception, are encouragedto decrease rates of future glucose intolerance in mothers and offspring (Kim, 2010).

1.6 Diagnosis of DM

Sugar levels higher than normal mean either diabetes or pre-diabetes is present.

There are several ways diabetes is diagnosed:

- The first is known as a fasting plasma glucose test. A person is said to have diabetes if his or her fasting blood sugar level is higher than 126 mg/dL after not eating fasting for eight hours.
- The second method is with an oral glucose tolerance test. After fasting for eight hours, a person is given a special sugary drink. That person is said to have diabetes if two hours after the drink he or she has a sugar level higher than 200.
- The third way is with a randomly checked blood sugar level. If it is greater than 200, with symptoms of increased urination, thirst, and/or weight loss, that person is said to

have diabetes. A fasting sugar level or oral glucose tolerance test will be needed to confirm the diagnosis(ADA,1997).

A blood sugar higher than normal, but not meeting the above criteria for full-blown diabetes, is called prediabetes.

According to the American Diabetes Association, 79 million people in the U.S. have prediabetes. People with prediabetes are five to six times more likely to develop diabetes over time. Prediabetes also increases the risk for cardiovascular disease, although not as much as diabetes does. It's possible to prevent the progression of prediabetes to diabetes, with diet and exercise (Dansinger, 2014).

The following tests are used for the diagnosis of diabetes:

Table 3: WHO diabetes diagnostic criteria (WHO, 2006)

Condition	2 hour glucose	Fasting glucose	HbA1c	DCCT
Unit	mmol/l(mg/dl)	mmol/l(mg/dl)	mmol/mol	%
Normal	<7.8 (<140)	<6.1 (<110)	<42	<6.0
Impaired fasting glycaemia	<7.8 (<140)	≥ 6.1(≥110) &<7.0(<126)	42-46	6.0–6.4
Impaired glucose tolerance	≥7.8 (≥140)	<7.0 (<126)	42-46	6.0–6.4
Diabetes mellitus	≥11.1 (≥200)	≥7.0 (≥126)	≥48	≥6.5

Positive test results should be confirmed by repeating the fasting plasma glucose test or the oral glucose tolerance test on a different day. When first diagnosed with diabetes, doctor may suggest a zinc transporter 8 autoantibody (ZnT8Ab) test. This blood test -- along with other information and test results -- can help determine if a person has type 1 diabetes and not another type. The goal of having the ZnT8Ab test is a prompt and accurate diagnosis and that can lead to timely treatment.

1.6.1 Fasting Plasma Glucose (FPG) Test

The FPG is the preferred test for diagnosing diabetes and is most reliable when done in the morning. If fasting glucose level is 100 to 125 mg/dl,that is a form of prediabetes called

impaired fasting glucose (IFG), meaning that the more likely to develop type 2 diabetes but do not have it yet. A level of 126 mg/dL or above, confirmed by repeating the test on another day, means that individual have diabetes.

1.6.2 Oral Glucose Tolerance Test (OGTT)

Research has shown that the OGTT is more sensitive than the FPG test for diagnosing prediabetes, but it is less convenient to administer. The OGTT requires fasting for at least eight hours before the test. Plasma glucose is measured immediately before and two hours after drinking a liquid containing 75 grams of glucose dissolved in water. If blood sugar level is between 140 and 199 mg/dL 2 hours after drinking the liquid, have a form of prediabetes called impaired glucose tolerance or IGT, meaning that more likely to develop type 2 diabetes but do not have it yet. A two-hour glucose level of 200 mg/dL or above, confirmed by repeating the test on another day, means that individual have diabetes.

Gestational diabetes is also diagnosed based on plasma glucose values measured during the OGTT. Blood sugar levels are checked four times during the test. If blood sugar levels are above normal at least twice during the test, that means have gestational diabetes.

1.6.3 Random Plasma Glucose Test

A random blood glucose level of 200 mg/dL or more, plus presence of the following symptoms, can mean that individual have diabetes:

- Increased urination
- Increased thirst
- Unexplained weight loss

Other symptoms include fatigue, blurred vision, increased hunger, and sores that do not heal. Doctor will check blood glucose level on another day using the FPG or the OGTT to confirm the diagnosis of diabetes.

Newer guidelines use hemoglobin A1c as a screening tool for prediabetes or diabetes (the test is normally used to measure blood glucose control in diabetes patients over several months). An HbA1c of 5.7% to 6.4% is consistent with prediabetes and marks a time when it can be reversed by lifestyle changes. An HbA1c of 6.5% or higher is consistent with diabetes.

2. Literature review

2.1 A comparison of knowledge of diabetes mellitus between patients with diabetes and healthy adults: A survey from north Malaysia

Shin Yun *et al* (2007)performed a survey on a comparison of knowledge of diabetes mellitus between patients with diabetes and healthy adults in north Malaysia and the results showed that patients with diabetes mellitus were significantly more knowledgeable than the healthy volunteers about risk factors, symptoms, chronic complications, treatment and self-management, and monitoring parameters. Educational level was the best predictive factor for diabetes mellitus and public awareness. Knowledge about diabetes mellitus should be improved among the general population.

2.2 Understanding of Hypo- and Hyperglycemia by Youngsters with Diabetes and Their Parents:

Brenda *et al* conducted a research on Hypo- and Hyperglycemia by Youngsters with Diabetes and their Parents and result showed thatfifty-nine patients with insulin-dependent diabetes and 50 of their parents were asked whether or not they could detect hyperglycemia and hypoglycemia. They then identified from a mixed symptom checklist those symptoms that they used to recognize each state. Patients and parents also rated their subjective judgment of the youngster's current blood glucose level and reported current symptoms. There was a marked discrepancy between the proportion of patients and parents who believed that they could recognize hyperglycemia and hypoglycemia and the proportion who chose physician-selected symptoms as the basis for their judgment. Patients' and parents1 subjective ratings of current blood glucose levels showed no relationship to patients' actual blood glucose levels nor was there a relationship between blood glucose levels and current symptoms reported. On the basis of these findings, several clinical/educational/research interventions are proposed. These include a paradigm for evaluating individual variation in symptomatology and for teaching patients the major symptoms of glycemic states in the context of behavioral patterns and daily life events.

2.3 Improved control of type 2 diabetes mellitus: a practical education/behavior modification program in a primary care clinic:

Ridgeway *et al (*2000) performed this study on determine the efficacy and ease of administration of education/behavior modification classes, provided by a nurse and a dietitian in a primary care clinic for improving control of type 2 diabetes mellitus. Patients were divided randomly into two groups. Eighteen patients completed 6 months of structured, office-based classes, and 20 similar patients served as control subjects. All were patients of the same group practice and had their usual office visits. Glycemic control, lipid levels, body weight, knowledge about diabetes, medication requirements, and symptoms were monitored during the 6 months, with follow-up at 12 months. At the end of 6 months, the intervention group had significant reductions in mean fasting blood glucose, glycosylated hemoglobin, total cholesterol, and low-density lipoprotein cholesterol (LDL-C) values. Their mean body weight was significantly reduced at 12 months, and their knowledge of diabetes was improved. Control patients had significant improvement only in glycosylated hemoglobin and body weight at 6 months. Minimal physician time was required. The education/behavior modification program was clinically worthwhile, and it was easy to administer.

2.4 Knowledge and diabetes self-management

Coates, Jennifer R.P & Boor in 1996 conducted a research on Knowledge and diabetes self-management of diabetes patients and discusses the role of knowledge in the self-management of diabetes mellitus and addresses limitations in the measurement of knowledge in studies which have been undertaken. In addition, the findings of a recent investigation related to knowledge of diabetes in young adults with the condition are reported. The results showed high levels of knowledge and glycosylated hemoglobin values which were acceptable when length of time with diabetes was considered. However, no relationship between knowledge and level of glycemic control was demonstrated. In the light of recent research confirming the need for tighter metabolic control, the implications of these findings in relation to future research and the education of health care professionals are considered. Although this paper relates to diabetes mellitus many of the issues raised are equally applicable to the wider forum of chronic illness management.

2.5 Knowledge, attitude & behavior relating to diabetes and its main risk factors among urban residents in Cameroon

Kiawi *et al* (2006)performed a study to investigate lay knowledge, attitudes, and behaviors relating to diabetes and its main risk factors in urban Cameroonians in 2006. The investigation was an exploratory and descriptive qualitative study Sixty-two interviews were conducted across the four sites. Among those interviewed, 27 were women and 35 were men. Interviewees included 8 religious leaders, 10 teachers, 9 public functionaries, 8 youth leaders, 4 politicians, 11 housewives, 5 retired workers, and 7 restaurant and bar operators or other informal sector businessmen. Two participants were known diabetics, seven known hypertensive, and one had suffered a minor stroke. Seventeen were age 15–39 years, and the rest were $40 years. More than half of the participants were overweight and obese: 40% overweight (BMI .25–30 kg/m2)and 17% obese (BMI .30 kg/m2). Ten percent of the participants had no formal education, 30% had completed primary education, 40% secondary education, and 20% had undertaken post-secondary studies. More than 50% of the participants were in the informal economic sector, 30% were in the formal sector, and the rest were unemployed or under pension schemes. This study provides a basic understanding of diabetes and health beliefs linked to the disease among urban residents in Cameroon.

2.6 Living with Diabetes: Relationship to Gender, Duration and Complications: A Survey in Northern Sweden

Gåfvels,Lithner & Börjeson conducted a survey in 1993 on diabetics patients . The questionnaire was sent to 561 insulin-treated diabetic patients aged 20–50 years living in the province of Västerbotten in Northern Sweden to assess their experience of living with diabetes. The response rate was 87% (n = 488). Differences in the experience of living with diabetes related to gender, age, duration of diabetes, and chronic diabetic complications were reported. Men seemed to underestimate problems related to diabetes more than women. They worried less about long-term complications and hypoglycemia, but were more troubled by the limitation of personal freedom caused by their diabetes. In spite of their worries, women more often than men found positive aspects in having diabetes. Younger patients also had a more positive attitude towards their disease, even though they more often thought that diabetes had negatively affected their relationships with friends. Patients with shorter diabetes duration were more concerned about the management of their diabetes than were

patients with a long duration. Chronic complications most affected patients' views of diabetes, their self-perception, and social life.

2.7 The Relationship between Diabetes-Related Attitudes and Patients' Self- Reported Adherence

Anderson,Fitzgerald & Marys performed a study in 1993 involved 1202 patients who were placed into low adherence or high adherence groups based on their answers to questionnaires. The attitudes of each group were compared for a variety of adherence behaviors. Patients who reported high levels of adherence tended to have attitudes more in accord with diabetes experts. Members of the high adherence group strongly supported the need for special training for health care professionals who treat diabetes, favored team care, accepted the importance of patient compliance, acknowledged the seriousness of non-insulin-dependent diabetes mellitus (NIDDM), and recognized the relationship between glucose control and complications. Differences in attitudes between high- and low adherence groups were more prevalent for difficult adherence areas, eg, diet and exercise, than for easy adherence areas, eg, carrying sweets or diabetic identification. An understanding of patients' attitudes can help diabetes educators and patients develop realistic and relevant self-care plans.

2.8 Knowledge, attitude and practices related to diabetes among community members in four provinces in Kenya: a cross-sectional study

Maina *et al* (2003) examined this cross-sectional study sought to establish the level of knowledge of diabetes among community members in rural and urban setups in Kenya and determine how this impacts on their attitude and practices towards diabetes. Males aged between 13 and 65 years were interviewed. 539 (27.2%) of all the respondents had good knowledge of diabetes; of these 52% had tertiary education; 25% had secondary education while 14% and 9% had primary and no education, respectively. Only 971(49%) of the respondents had a positive attitude towards diabetes while 813 (41%) demonstrated good practices towards diabetes. In this study indicates that the level of knowledge of diabetes in all regions in the country is very poor. It also indicates very poor attitudes and practices of the community towards diabetes. A comprehensive nationwide diabetes education program is necessary to improve this situation.

2.9 Survey of exercise and dietary knowledge and behavior in persons with type II diabetes:

Searle & Ready performed a survey on 1991 to assess the potential for an exercise and weight control program for persons with Type II diabetes. Questionnaires were sent to 1,000 individuals with diabetes, who were randomly selected from the provincial health records office. Physicians and dietitians were the primary sources of information about both exercise and diet. Although few respondents participated in organized (7.7%) or informal (36.8%) exercise programs, or expressed an interest in participating (36.8%), the majority (84.0%) believed that they should get more exercise. Activity preferences were similar to those reported previously for all Canadians; however, barriers to participation differed in the present group. It was concluded that barriers must be assessed, and behavior modification included, if diet and exercise programs are to be successful in this population.

2.10 Gender Differences in Diabetes Attitudes and Adherence:

James *et al (1995)* conducted a research this study focused on diabetes attitudes of men's and women's, different recommendations to men and women by health professionals and difference between men and women in care adherence. A total of 1201 patients with diabetes were surveyed; 65% of these patients were women. Differences in diabetes attitudes were most evident between men and women with insulin-dependent diabetes mellitus (IDDM). No differences were found in the attitudes of men and women with non-insulin-dependent diabetes mellitus (NIDDM) using insulin, and only one attitude was different for patients with NIDDM not using insulin. Few differences were observed in the recommendations given by health professionals to men and women. Gender differences in adherence to the components of self-care also were minimal. These findings may indicate that there are many similarities in the reactions of men and women who have been diagnosed with diabetes.

2.11 The Patient-Provider Relationship: Attachment Theory and Adherence to Treatment in Diabetes

Ciechanowski *et al* (2001) performed a research on the Patient-Provider Relationship in Diabetes treatment. Lack of adherence to diabetic self-management regimens is associated with a high risk of diabetes complications. This study attempts to improve understanding of both patient and provider factors involved in lack of adherence to treatment in diabetic

patients by using the conceptual model of attachment theory. Patients who exhibited dismissing attachment had significantly worse glucose control than patients with preoccupied or secure attachment. An interaction between attachment and communication quality was significantly associated with glycosylated hemoglobin (HbA1c) levels. Among the patients with a dismissing attachment style, there was a significant difference in glycosylated hemoglobin levels between those who rated their patient-provider communication as poor (mean=8.50%, SD=1.55%) and those who rated this communication as good (mean=7.49%, SD=1.33%). Among all patients who were taking oral hypoglycemic, adherence to medications and glucose monitoring was significantly worse in patients who exhibited dismissing attachment and rated their patient-provider communication as poor.

2.12Prevalence of Diabetes, Impaired Fasting Glucose, and Impaired Glucose Tolerance in U.S. Adults: The Third National Health and Nutrition Examination Survey, 1988–1994

Harris *et al* conduct a study in between 1988-1994 on Prevalence of Diabetes, Impaired Fasting Glucose, and Impaired Glucose Tolerance in U.S. Adults to evaluate the prevalence and time trends for diagnosed and undiagnosed diabetes, impaired fasting glucose, and impaired glucose tolerance in U.S. adults by age, sex, and race or ethnic group, based on data from the Third National Health and Nutrition Examination Survey, 1988–1994 (NHANES 111) and prior Health and Nutrition Examination Surveys (HANESs). Prevalence of diagnosed diabetes in 1988–1994 was estimated to be 5.1% for U.S. adults' ≥20 years of age (10.2 million people when extrapolated to the 1997 U.S. population). Using American Diabetes Association criteria, the prevalence of undiagnosed diabetes (fasting plasma glucose ≥126 mg/dl) was 2.7% (5.4 million), and the prevalence of impaired fasting glucose (110 to <126 mg/dl) was 6.9% (13.4 million). There were similar rates of diabetes for men and women, but the rates for non-Hispanic blacks and Mexican-Americans were 1.6 and 1.9 times the rate for non-Hispanic whites. Based on American Diabetes Association criteria, prevalence of diabetes (diagnosed plus undiagnosed) in the total population of people who were 40–74 years of age increased from 8.9% in the period 1976–1980 to 12.3% by 1988–1994. A similar increase was found when WHO criteria were applied (11.4 and 14.3%).The high rates of abnormal fasting and post challenge glucose found in NHANES III, together with the increasing frequency of obesity and sedentary lifestyles in the population, make it likely that diabetes will continue to be a major health problem in the U.S

2.13Diabetes and impaired glucose tolerance. A prevalence estimate based on the Busselton 1981 survey:

Glatthaar*et al***(1981)**conduct a survey on Diabetes and impaired glucose tolerance and estimated the prevalence of diabetes and impaired glucose tolerance from the Busselton 1981 Population Survey using the 1980 World Health Organization (WHO) criteria. Standardized to the Australian non-Aboriginal population aged 25 years and over, the prevalence rates in this white community were 2.5% for known diabetes; 0.9% for newly discovered diabetes; 2.9% for impaired glucose tolerance; and 6.3% for all categories of abnormal glucose tolerance. There appears to have been a real increase in the frequency of diabetes since 1966. Using fasting serum C-peptide values and clinical criteria, 14% of all diabetic subjects were insulin-dependent. The male: female ratio for all categories of abnormal glucose tolerance was 1.4:1. Data from the United States indicate spectacularly higher rates for diabetes and impaired glucose tolerance in the white population. A national study of the prevalence of diabetes and impaired glucose tolerance in Australia is recommended. For epidemiological purposes, a single blood glucose value two hours after a 75 g oral glucose tolerance test is sufficient to categorize glucose tolerance as defined by WHO.

2.14Self-Management of Type 2 Diabetes: A Survey of Low-income Urban Puerto Ricans

Goeler perform a study on Self-Management of Type 2 Diabetesthis study explored self-reported barriers to diabetes self-management in a population of urban, low-income Puerto Rican individuals. A cross-sectional exploratory survey was conducted with 30 Puerto Rican adults with type 2 diabetes. Participants were randomly selected and recruited from a health center, an elder center, and a community outreach database. A survey was used to assess participants' diabetes-related knowledge, attitudes, and patterns of and barriers to self-management. Participants were older and had limited education and good access to health care. Although two thirds had participated in diabetes education, most demonstrated major deficits in diabetes knowledge. Negative attitudes about living with diabetes were common as was dietary knowledge and no adherence. Most participants were overweight or obese, did regular self-monitoring of blood glucose but did not use the results to improve their diabetes control, and frequently missed doses of their diabetes medications

2.15 Prevalence of Diabetes and Impaired Fasting Glucose in the Adult Population of Iran National Survey of Risk Factors for Non-Communicable Diseases of Iran

Esteghamati *et al* in 2002 concerns regarding a diabetes epidemic in the Middle East, internationally published data on national estimates of prevalent type 2 diabetes in Iran do not exist. With this articlel document a dramatically high prevalence of diabetes in Iran. This data are based on the results of the first Survey of Risk Factors of Non-Communicable Diseases of Iran, 2005. In this national cross-sectional survey, 70,981 Iranian citizens aged 25–64 years were recruited. They found that 7.7% of adults aged 25–64 years, or 2 million adults, have diabetes, among whom one-half are undiagnosed. An additional 16.8%, or 4.4 million, of Iranian adults have impaired fasting glucose. The high prevalence of diabetes in working-age adults is an ominous sign for this developing nation. As the relatively young Iranian population ages in the future and urbanization continues or accelerates, the prevalence of diabetes will likely escalate.

2.16 Epidemiology of diabetes mellitus in Canada:

Tan& MacLean perform a survey where they present data on 5 aspects of the epidemiology of diabetes mellitus in Canada: (a) the incidence of insulin-dependent diabetes mellitus in those under 15 years of age. The 2 Canadian centers that participated in the Diabetes Epidemiology Research International study had different incidence rates in IDDM:25.5/100,000 in Prince Edward Island (PEI) and 9.2/100,000 in Montreal. The reasons for this difference are not yet established. Studies on incidence of IDDM over a decade in PEI showed an apparent epidemic of the disease; (b) the prevalence of self-reported diabetes mellitus in Canadian adults. The overall prevalence of self-reported diabetes in Canadian adults (18-74 y) was 5.1% in the Canadian Heart Health Survey. There were no significant regional differences in prevalence of diabetes across Canada. The prevalence rates increased with age; (c) mortality data in people with diabetes mellitus. In PEI, 321 persons with diabetes died between January 1, 1982 and December 31, 1984, accounting for about 2% of all deaths. Diabetes was listed as the underlying cause in 16.8% of the deaths, as a contributing cause of death in 41.7%, and not mentioned at all in 41.1% of the deaths. Irrespective of whether diabetes was mentioned or not, myocardial infarction and cerebral vascular disease were the 2 major causes of deaths in these 321 persons with diabetes; (d) the prevalence of cardiovascular risk factors in Canadian adults with diabetes

mellitus. In the Canadian Heart Health Survey, the prevalence rates of obesity, hypertension, sedentary lifestyle, and hypercholesterolemia were higher in the diabetic group.

2.17 Frequency of Food Consumption and Self-reported Diabetes among Adult Men and Women in India: A Large Scale Nationally Representative Cross-sectional Study

Agrawal conduct a survey on the choice of foods and frequency of intake plays a role in diabetes prevention. They examined the association between frequency of consumption of specific food items and the occurrence of diabetes in adult Indian population. Cross sectional data of 99,574 women and 61,361 men aged 20-49 years who participated in India's third National Family Health Survey conducted during 2005-06 was used for this study. Association between frequency of food intake such as daily, weekly, occasionally and never, and prevalence of diabetes were estimated using multivariable logistic regression models after adjusting for body mass index, tobacco smoking, alcohol drinking, television watching and socio-economic and demographic characteristics, stratified by sex. This study has confirmed findings from high income countries that diabetes among adult Indians, which is large and increasing, might be contained by regular consumption of vegetarian foods including pulses, beans, fruits and dairy products. However, this is an observational finding and uncontrolled confounding cannot be excluded as an explanation for the association. More epidemiological research with better measures of food intake and clinical measures of diabetes is needed in a developing country setting to validate the findings (Journal of Diabetes & Metabolism).

3. Significance of the study

Diabetes is a disease caused by flawed carbohydrate metabolism and manifests itself by unusually large amounts of sugar in the blood and urine (Jacobs & Fishberg, 2002) Over time, diabetes can lead to blindness, kidney failure, and nerve damage. These types of damage are the result of damage to small vessels, referred to as microvascular disease. Diabetes is also an important factor in accelerating the hardening and narrowing of the arteries (atherosclerosis), leading to strokes, coronary heart disease, and other large blood vessel diseases. This is referred to as macrovascular disease. Diabetes affects approximately 26 million people in the United States, while another 79 million have prediabetes. An estimated 7 million people in the United States have diabetes (WHO, 2004).

Diabetes mellitus has reached widespread level in developed countries. Over the past two to three decades number of diabetic patients has increased in a great ratio. In Bangladesh, the number of diabetic patients has also increased due to lack of knowledge & attitude towards this. There is little work done on diabetic patients as well as knowledge & attitude influence diabetes mellitus in Bangladesh.

In Bangladesh, the prevalence of diabetic patients is increasing day by day. To know the current statistics of the diabetes knowledge & attitude of the diabetic patients'we decided to conduct a survey at some of area around Dhaka in Bangladesh.

3.1 The aims & objectives of the study were:

- To know the current situation and risk of diabetes
- To know the diabetic patients' knowledge & attitude towards diabetes.

3.2 Type of study

The study was a survey based study.

3.3 Study area

The study was performed in BIRDEM(Bangladesh Institute of Research and Rehabilitation for Diabetes, Endocrine and Metabolic Disorders) at Shahbag, Dhaka, BIRDEM at Rampura,Dhaka and Baridhara park.

3.4 Study population

The survey was performed on 202 diabetic patients.

3.5 Inclusion criteria

In this survey, only Diabetic patients were included. Both male and female.

3.6 Exclusion criteria

In this survey, children and pregnant women was not added in the survey.

3.7 Questionnaire development

The questionnaire was developed based on some common criteria that influence diabetic patients' knowledge & attitude in Bangladesh. The questionnaire was developed on the perspective of Bangladesh so that maximum accurate statistical data can be collected from the survey.

3.8 Method:

We asked questions from the printed survey questioner and collect answers from diabetic patients.

3.9 Data analysis:

All the data's are analyzed by MS excel 2014.

4. Result

4.1 Socio-demographic data:

		n (%)
Sex	Male	105(51.44%)
	Female	97(48.55%)
Marital status	Single	8(3.96%)
	Married	194(96.53%)
	Divorced	0
Level of education	Illiterate	56(27.4%)
	Primary	62(30.29%)
	Secondary	31(15.18%)
	College	29(14.9%)
	Graduate	18(9.13%)
	Post graduate	6(3.1%)
Age	<40	14(6.73%)
	40-50	137(68.26%)
	>60	43(21.51%)
Family income	<5000	2(0.96%)
	5000-6000	7(3.36%)
	10000-25000	56(27.88%)
	>25000	36(17.78%)
Living with family	Yes	92(45.67%)
	No	8(3.85%)
Major type of diabetes	1	3(1.92%)
	2	24(12.02%)
	3	23(11.54%)
	4	17(8.65%)
	Don’t know	127(62.98%)
Type of diabetes mellitus	Type 1	16(8.17%)
	Type 2	10(4.8%)
	Don’t know	162(80.29%)
Duration of DM	<1year	13(6.73%)
	1.1-1.5	48(24.03%)

	5.1-10	81(39.9%)
	10.1-20	46(22.59%)
	>20	8(3.84%)
Mode of diagnosis	Symptomatic	117(57.21%)
	Incidental	85(39.9%)
Family history of diabetes	yes	92(45.2%)
	NO	78(38.46%)
	Don’t know	30(14.42%)

14.2 Knowledge about causes of diabetes:

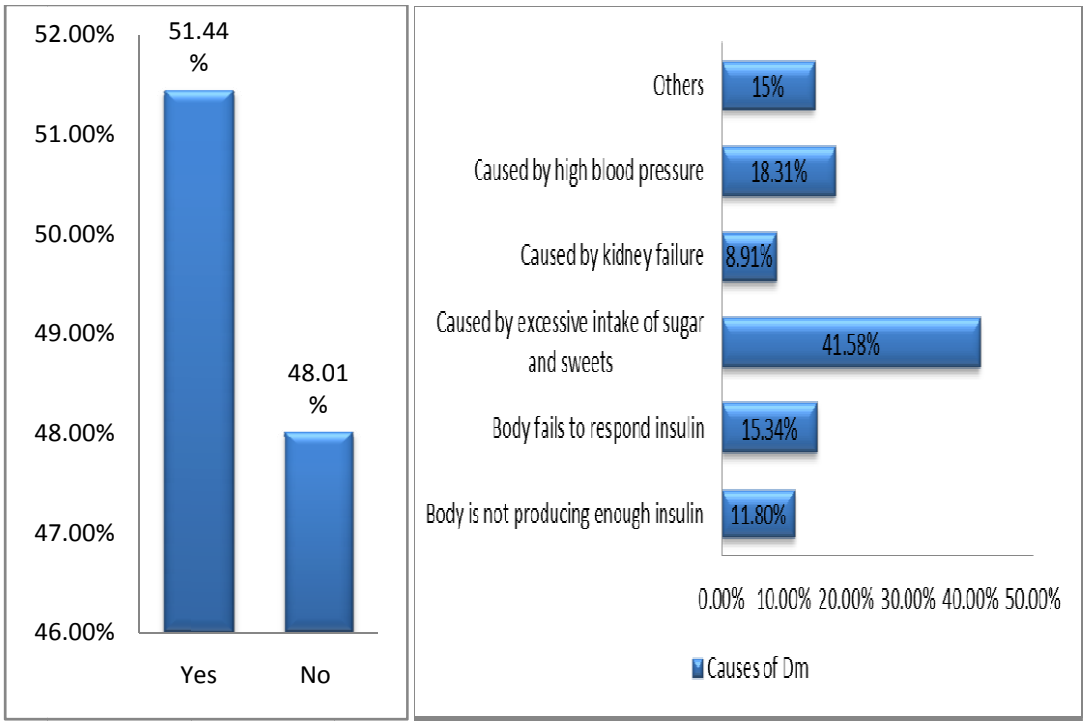


Figure 14.1: Causes of diabetes

14.3Frequency of visiting healthcare provider:

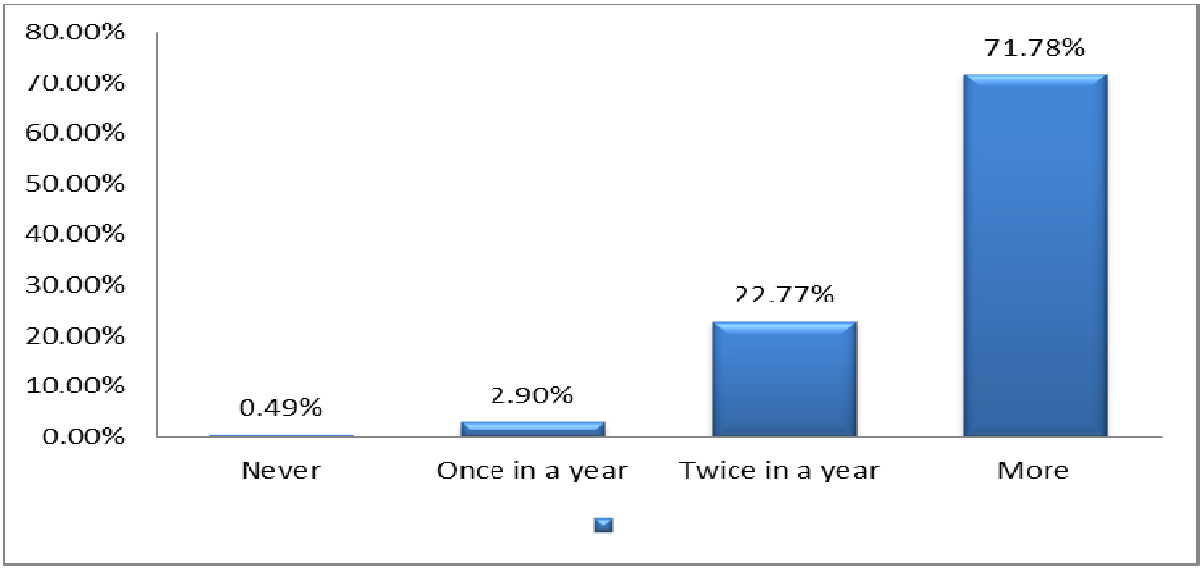


Figure14.2: Frequency of visiting healthcare provider

14.4Normal range of fasting blood glucose level:

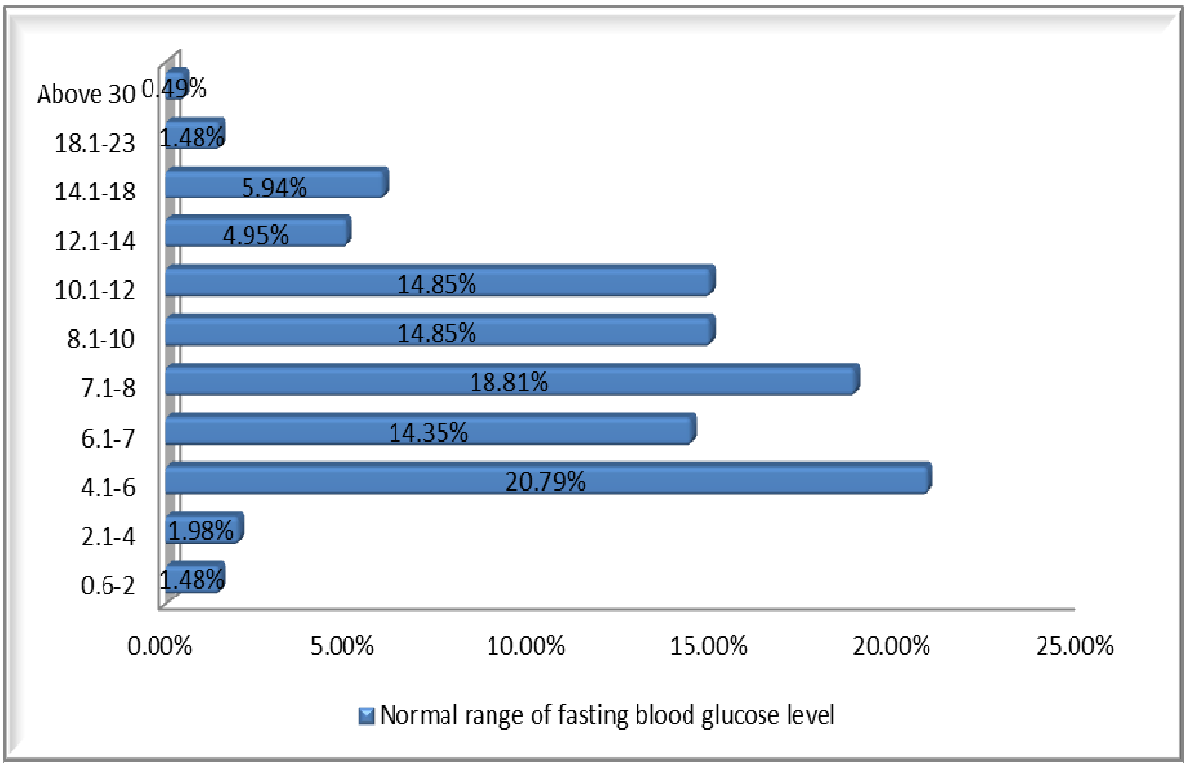


Figure 14.3: Knowledge about normal range of fasting blood glucose level

14.5Normal range of random blood glucose level:

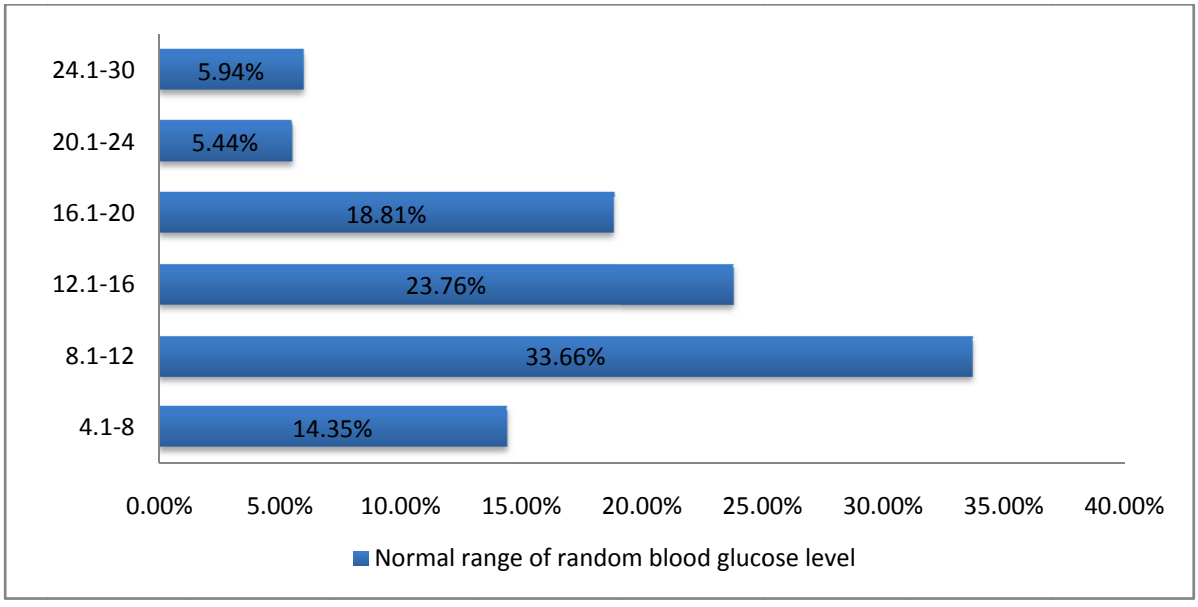


Figure 14.4: Knowledge about normal range of random blood glucose level

14.6Knowledge about Symptoms of Hyperglycemia:

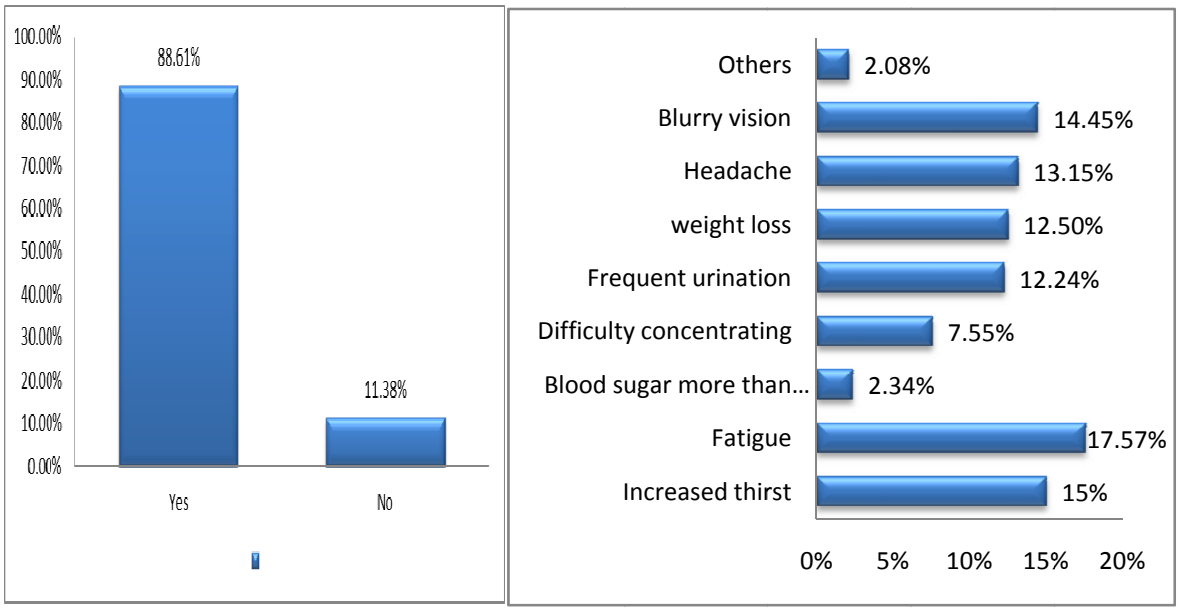


Figure14.5: knowledge about Symptoms of Hyperglycemia

14.7Knowledge about Symptoms of Hypoglycemia:

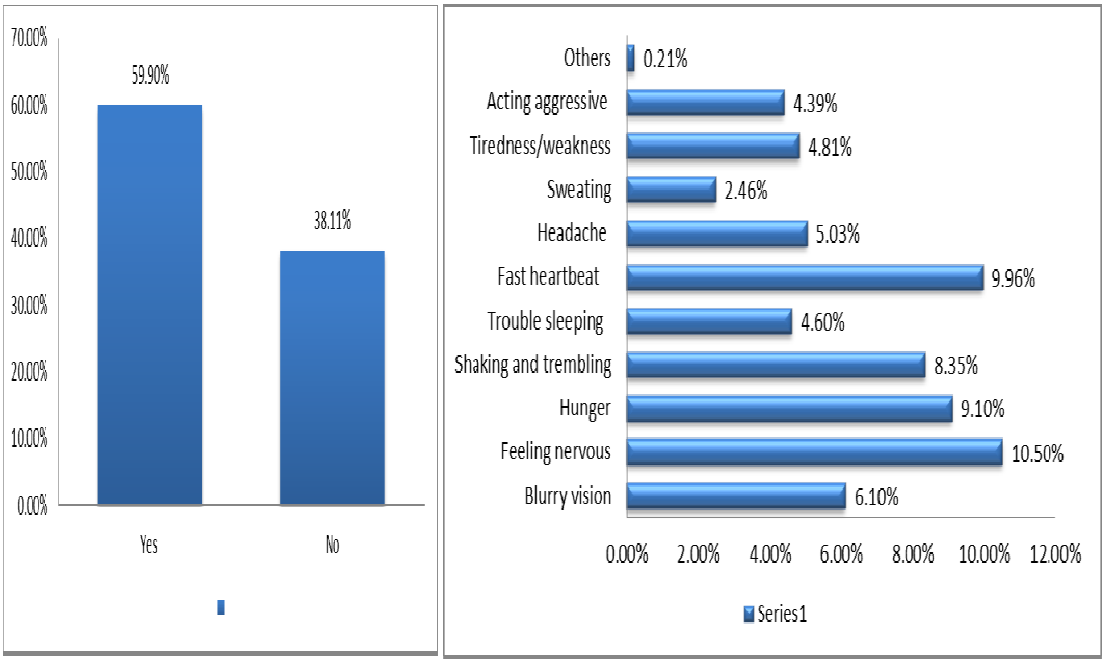


Figure 14.6: knowledge about Symptoms of Hypoglycemia

14.8Knowledge about Risk factors of Diabetes

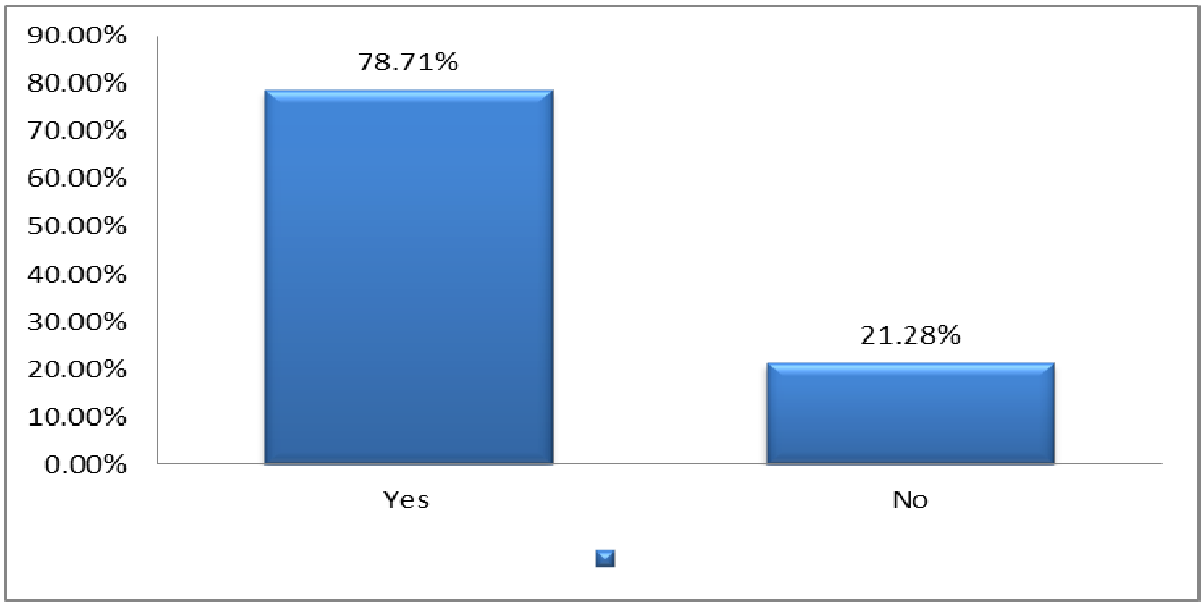


Figure 14.7: Knowledge about Risk factors of Diabetes

14.9Knowledge about Risk factors of Diabetes

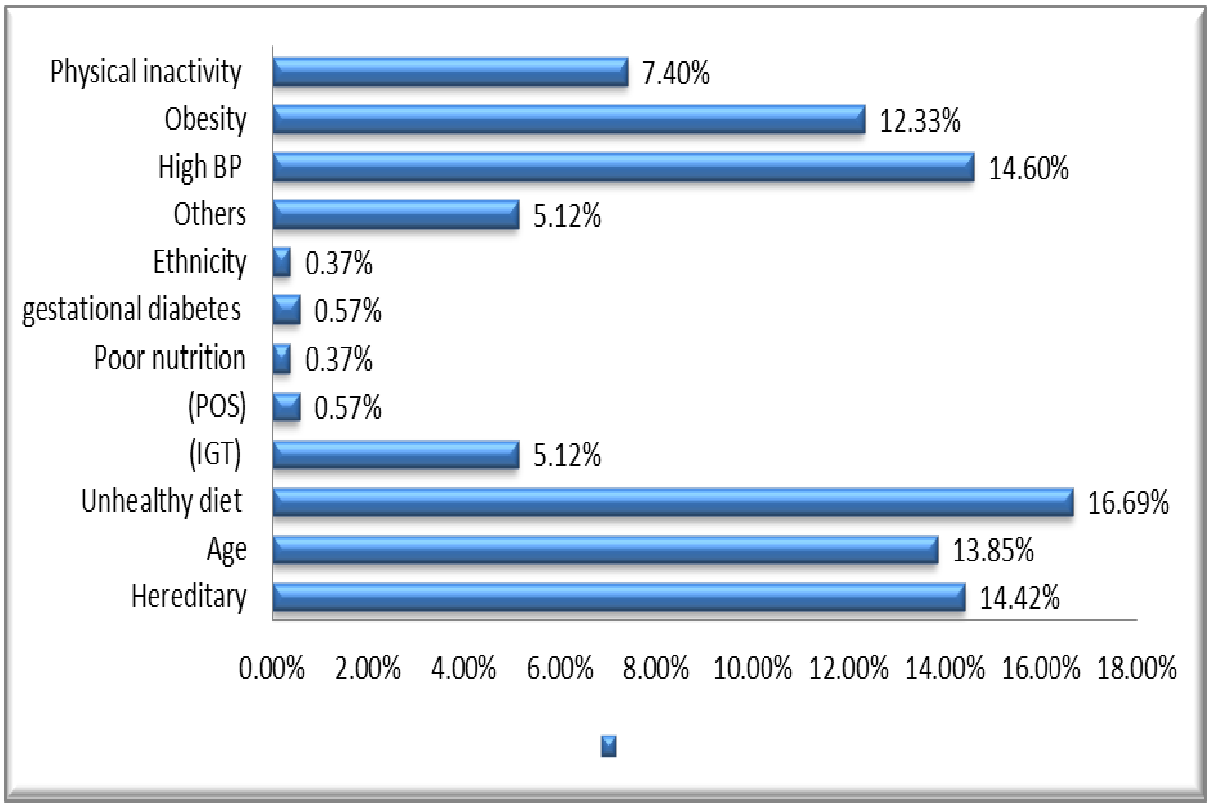


Figure 14. 8: Knowledge about Risk factors of DM

14.10Knowledge about Sign and symptoms of Diabetes:

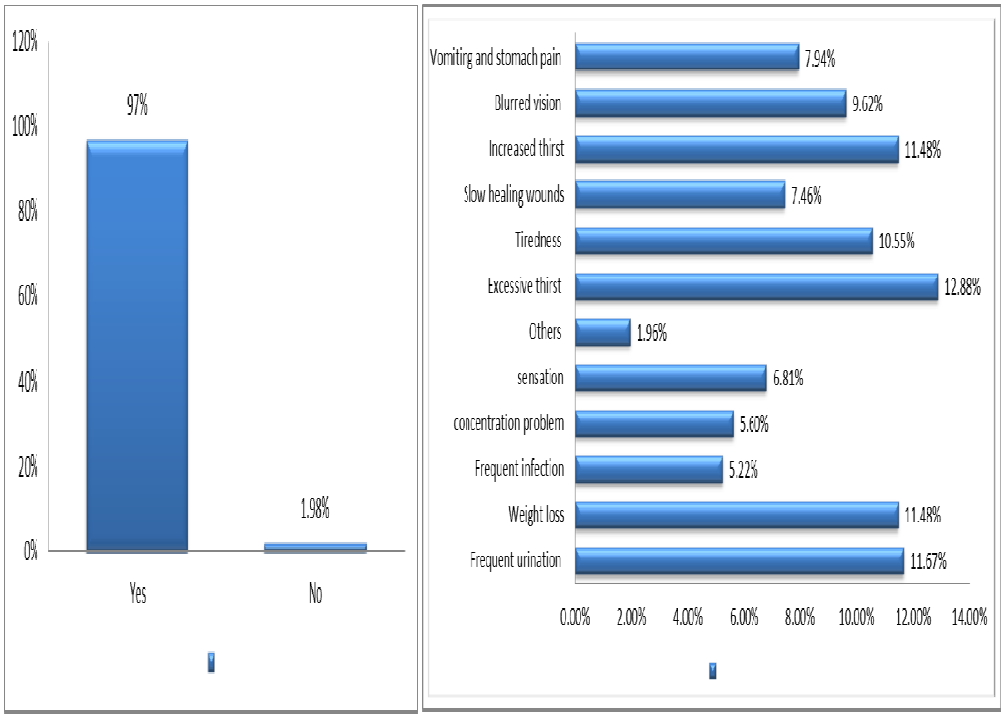


Figure 14.9: Knowledge about Sign and symptoms of Diabetes

14.11Complications of DM

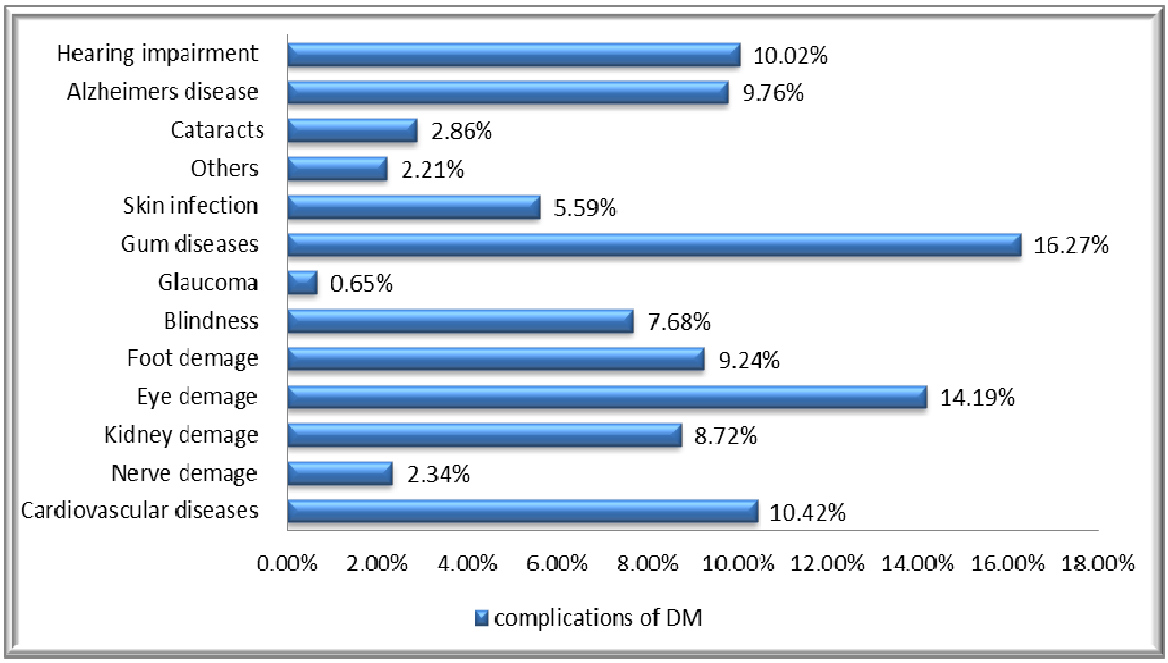


Figure 14.10: Knowledge about Complications of DM

14.12Source of knowledge of DM

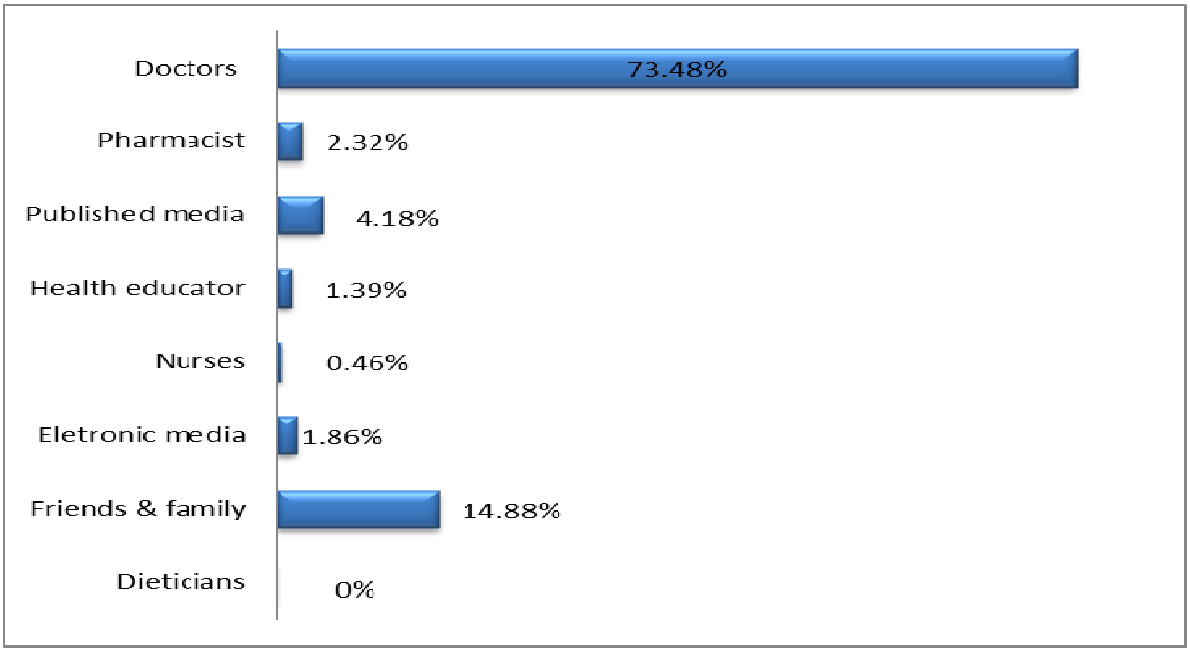


Figure 14.11: Source of knowledge of DM

14.13Knowledge about HbA1c:

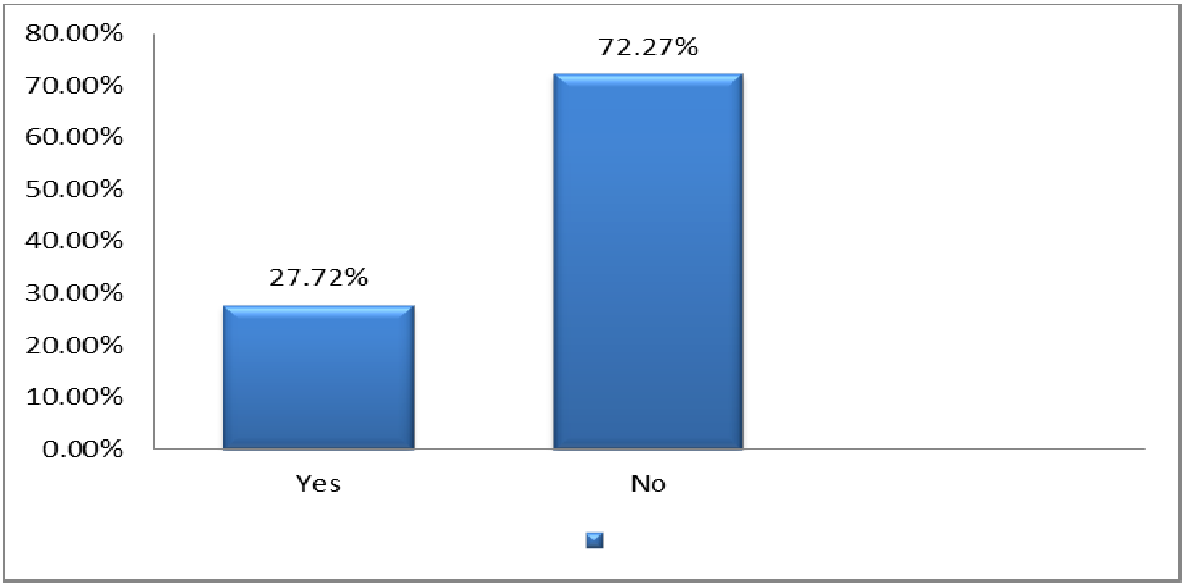


Figure 14.12: Knowledge about HbA1c

14.14Attitude toward the importance of DM care:

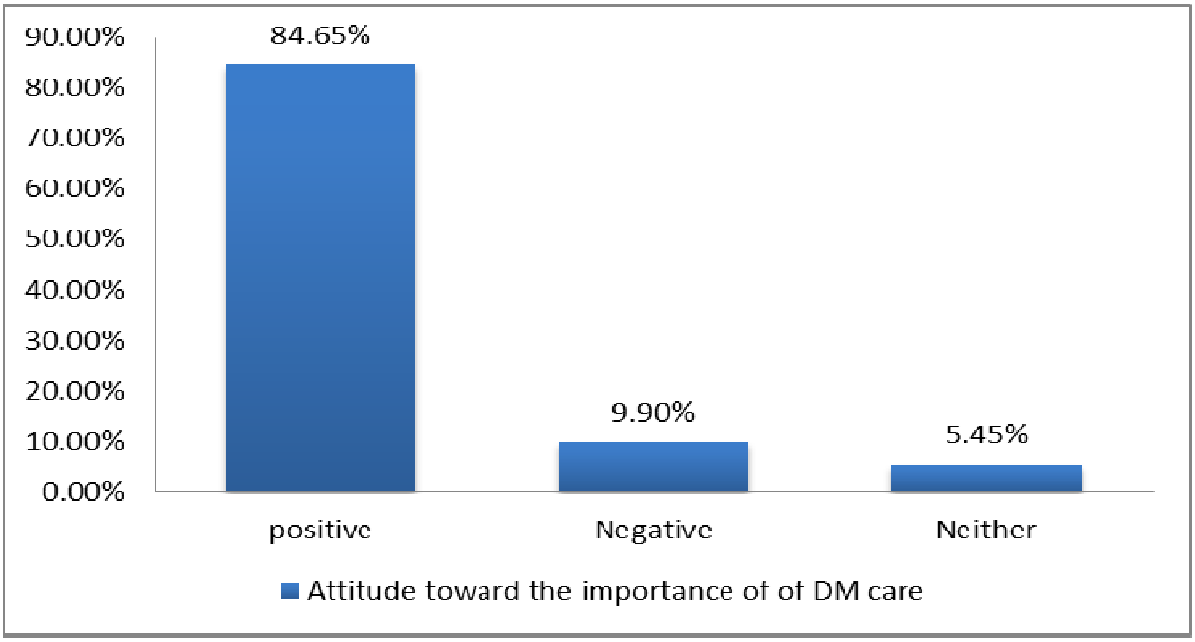


Figure **4.13**: Attitude toward the importance of DM care

14.15Attitude toward having DM:

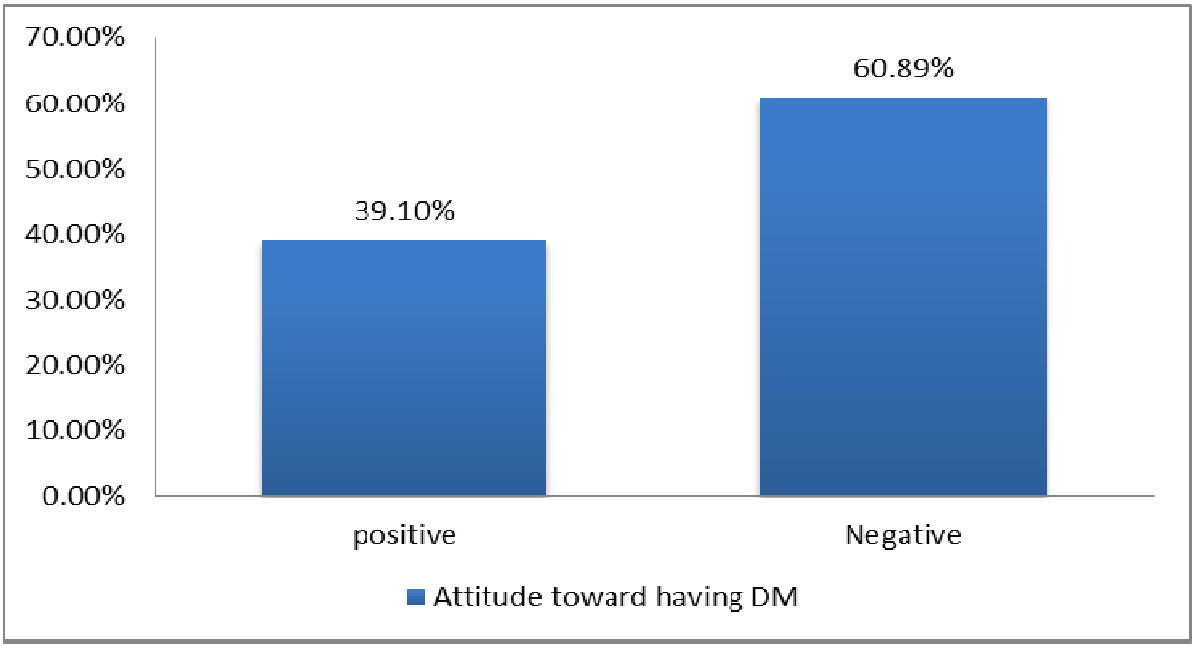


Figure **4.14**: Attitude toward having DM

5. Discussion:

Al-Maskari *et al* conducted a survey on Knowledge, Attitude and Practices of Diabetic Patients in the United Arab Emirates and found that Thirty-one percent of patients had poor knowledge of diabetes. Seventy-two had negative attitudes towards having the disease and 57% had HbA1c levels reflecting poor glycemic control. Only seventeen percent reported having adequate blood sugar control, while 10% admitted non-compliance with their medication and also found that from the 575 participants 55% were females, 65% were UAE citizens and 46% were illiterate. The mean age of the sample was 50 (15) years and the mean duration of diabetes was 9 (7) years. Mean HbA1c was 7.7%.In present performed study on 202 diabetic patients 51.44% male and 48.55% female. Patients were selected randomly in this survey. The considered factors affecting diabetes knowledge were sex, age, level of education, marital status, profession, and income, mode of diagnosis and duration of diabetes. Interestingly, analysis showed a positive correlation between patients' knowledge and the number of contacts with a diabetic education in the last two years. Only Diabetic patients were selected as study population. 96.53% of them were married and 3.96% were single. In the present study also showed that the maximum percentage (20.79%) of normal range of fasting blood glucose level was 4.1-6 mg/ml and the maximum percentage (33.66%) normal range of random blood glucose level was 8.1-12mg/ml. But Knowledge about HbA1c is very poor and maximum (72.27%) of the study population were not even heard of name of HbA1c or glycosylated hemoglobin.

Kiawi *et al* (2006) performed a study to investigate knowledge, attitudes, and behaviors relating to diabetes and its main risk factors in urban Cameroonians in 2006. The investigation was an exploratory and descriptive qualitative study Sixty-two interviews were conducted across the four sites. 10% of the participants had no formal education, 30% had completed primary education, 40% secondary education, and 20% had undertaken post-secondary studies. In present study observed in the basis of level of education most of the populations were received Primary education(30.29%), Illiterate(27.4%), some of them were received secondary (15.18%), College(14.9%), Graduate (9.13%), post graduate(3.1%). Among of those study population age below 40 diabetic patients 6.73%, age between 40-50 68.26% and more then 60 21.51%.

Approximately 561 insulin-treated diabetic patients aged 20–50 years living in the province of Västerbotten in Northern Sweden to assess their experience of living with diabetes. The

response rate was 87% (n = 488). Differences in the experience of living with diabetes related to gender, age, duration of diabetes, frequency of visiting doctors and chronic diabetic complications were reported. Men seemed to underestimate problems related to diabetes more than women. The frequency of visiting doctors is increased and patients visit healthcare provider more than twice in a year. (Gåfvels,Lithner & Börjeson,1998).In performed study showed that knowledge about diabetes 55.44% study population know the causes of diabetes. Among them 11.8% thought that the causes of DM is for body is not producing enough insulin, 15.34% body fails to respond insulin, 41.58% thought diabetes is caused by excessive intake of sugar and sweets, 41.58% caused by kidney failure, 18.31% caused by high blood pressure(figure 4.2). Our respondents knew that a common cause was excessive intake of sugar and sweets. Present study also showed that people in Bangladesh frequency of visiting healthcare provider has raised alarmingly. 71.78% patients visit healthcare provider more than twice in a year, 22.77% visit twice in a year, 2.9% visit once in a year which is a good ratio of visiting a health care provider (figure 4.2). Attitude toward the importance of DM care 84.65% population has positive attitude and 9.9% has negative attitude. Whereas in our study attitude toward having DM 69.89% of study population has negative attitude and 39.1% of study population has positive attitude (figure 4.15).

Survey of Risk Factors of Non-Communicable Diseases of Iran, 2005. In this national cross-sectional survey, 70,981 Iranian citizens aged 25–64 years were recruited. They found that 7.7% of adults aged 25–64 years, or 2 million adults, have diabetes, among which one-half are undiagnosed. An additional 16.8%, or 4.4 million, of Iranian adults have impaired fasting glucose. The high prevalence of diabetes in working-age adults is an ominous sign for this developing nation. As the relatively young Iranian population ages in the future and urbanization continues or accelerates, the prevalence of diabetes will likely escalate **(**Esteghamati *et al* in 2002**)**.

Performed study found that, 78.71% of study populations have knowledge about Risk factors of Diabetes and 21.28% has no knowledge of the risk factors of Diabetes (figure4.8). Maximum percentage(16.69%) population thought Unhealthy diet is the major risk factor, 14.42% Hereditary, 13.85 Age, 5.12% impaired glucose tolerance(IGT), 0.57% polycystic ovary syndrome, 0.37% Poor nutrition, 0.57% gestational diabetes, 0.37% Ethnicity, 5.12% Others, 14.6% High BP, 12.33% Obesity, 7.4% Physical inactivity (figure 4.9).

Al-Maskari *et al* conducted survey on knowledge of Diabetes Symptoms and Complications Most (89%) of the surveyed patients had seen a diabetic educator since their diagnosis, but many only a few times. Most patients (87%) cited doctors as the primary source of DM knowledge.Whereas in present study maximum (73.48%) percentage of study population the

source of knowledge was Doctors, 14.88% friends & family, 4.18% published media, 1.86% electronic media, 1.39% health educator, 0.46% nurse (figure 4.12).

Brenda *et al* conducted a research in 1983 on Hypo- and Hyperglycemia and their Parents and result showed that fifty-nine patients with insulin-dependent diabetes and 50 of their parents were asked whether or not they could detect hyperglycemia and hypoglycemia. They then identified from a mixed symptom checklist those symptoms that they used to recognize each state. There was a marked discrepancy between the proportion of patients and parents who believed that they could recognize hyperglycemia and hypoglycemia and the proportion that chose physician-selected symptoms as the basis for their judgment. On the basis of these findings, several clinical/educational/research interventions are proposed. These include a paradigm for evaluating individual variation in symptomatology and for teaching patients the major symptoms of glycemic states in the context of behavioral patterns and daily life events.

In the present study it was seen that 88.61% population has knowledge about Symptoms of Hyperglycemia 59.9% population has knowledge about Symptoms of Hypoglycemia in the other hand only 11.38% diabetic patients has no knowledge about Symptoms of Hyperglycemia and 38.11% has no knowledge about Symptoms of Hypoglycemia (figure 4.10) Moreover we found that most of the most common symptoms of Hyperglycemia were fatigue (17.57%), 15%Increased thirst, 14.45% Blurry vision, 12.24% frequent urination, 12.5% weight loss, 13.15% Headache, 7.55% Difficulty concentrating, 2.34% Blood sugar more than 180mg/dl. The most common symptoms of hypoglycemia were1 0.5% nervous feeling, 8.35% shaking and trembling, 9.96% fast heartbeat, 9.1% hunger, 6.1% blurry vision, 5.03% headache,4.6% trouble sleeping, 4.81% tiredness or weakness ,4.39% acting aggressive,2.46%sweating, 0.21%Others (figure 4.10).

6. Conclusion

Diabetes mellitus is a long term disorder that causes several harmful consequences. It's a rapidly growing disorder the world. On the basis of these findings evaluating individual variation in symptomatology and for teaching patients the major symptoms of glycemic states in the context of behavioral patterns and daily life events. This study was conducted on 202 diabetic patients in Bangladesh. From our study it is found that knowledge about diabetes in study population pretty higher and also frequency of visiting healthcare provider has risen alarmingly. People are more cautious about their diabetes condition. They know the sign and symptoms and management practice of diabetes in hyperglycemic and hypoglycemic condition. In spite of that Government & society should take proper and powerful steps to decrease the number of diabetic patients by creating awareness among mass population.

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