BELIEFS, ATTITUDES, PRACTICES, RESPONSE TO INTERVENTIONS AND THERAPEUTIC EDUCATION OF OBESE AND NORMAL WEIGHT TYPE 2 DIABETES MELLITUS PATIENTS ATTENDING THE DIABETIC CLINIC IN NELSON MANDELA ACADEMIC HOSPITAL, MTHATHA

by

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ABSTRACT

INTRODUCTION: Education is the cornerstone of diabetes care. Because of lack of awareness, most patients suffer from diabetes complications. This study was conducted to determine the knowledge, attitude, practices and responses to interventions and therapeutic education of obese and normal weight type 2 diabetes mellitus patients.

OBJECTIVES: The objectives of the study were: to determine the knowledge, beliefs, attitudes and practices among patients with T2DM; to estimate the proportions of uncontrolled blood glucose, poor quality of life, and no adherence to medications and diet among patients with T2DM; to explore food choices and nutrition practices and behavior related to T2DM; and to develop from responses, educational programs towards self and health professional management.

Methods: This descriptive study included two hundred T2DM. A modified version of the Diabetes knowledge, attitude and practice (KAP) questionnaires were used for data collection. The participants were recruited using convenience sampling technique and all data collected was analyzed using SPSS version 18. The patient's knowledge, attitudes and practice about the disease, the proportion of uncontrolled blood glucose and no adherence to medication and diet, nutrition practices and behavior related to T2DM were the main outcome measures.

Results: The mean age of the patients were 49.0±16.6 years for men and 48.2±15.8 years for females with the male to female ratio being 1:1. The population was formed by adults and elderly adults, who were between 18 and 80 years of age. Most were obese (43.0%); married (50.5%) and overweight (27.7%). Patients' awareness about diabetes was high. The overall knowledge on the etiology and features of T2DM was good. Answers for glycemic control, risk factors and complications were very good. Awareness about eye and renal complications was also high. A majority also noted eye problems as the complication of DM yet only 69% have visited an ophthalmologist. More than half of the sample population correctly answers questions regarding dietary requirements in diabetes.80% of the patients responded that alcohol is not good for a diabetic, that losing weight can prevent diabetic from getting worse and that smoking can worsen diabetes. 20% of the population does not know that the above mentioned factors are important in the management of their condition. The percentage of uncontrolled blood sugar and HbA1c among T2DM residing in Mthatha was good as 80% of the patients have their previous and current blood sugar level and HbA1c as normal.

Conclusions: The knowledge, attitude and practice scores were high in most areas of diabetes care. However, the majority of the patients were obese emphasizing the need for additional educational efforts in life style modification.

Keywords: Type 2 diabetes, belief, attitudes, practices, responses to intervention, therapeutic education.

DECLARATION

I, ODUFU ALEXANDER ABIODUN, Student Number 210155078, solemnly declare that this research paper entitled "Beliefs, attitudes, practices, response to interventions and therapeutic education of obese and normal weight Type 2 Diabetes Mellitus patients attending the Diabetic Clinic in Nelson Mandela Academic Hospital, Mthatha" is my original work. All sources used or quoted in the study have been indicated and acknowledged by way of complete references.

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ABBREVIATIONS

T2DM: Type 2 Diabetes Mellitus

HBA1c: Glycated Hemoglobin

Hemoglobin A1C: Glycated Hemoglobin

DM: Diabetes Mellitus

ADA : American Diabetes Association

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Chapter 1: Introduction and Literature Review

1.1. Introduction

Type 2 diabetes mellitus defined as a heterogeneous disorder resulting from predominantly insulin resistance with relative insulin deficiency (Kumar & Clark, 2009), is a major global mass problem emerging and increasingly so even in developing countries. This metabolic disorder caused by different factors, resulting from defects in insulin secretion, insulin action, or both (ADA, 2009), is characterized by chronic high levels of blood sugar (hyperglycemia) with disturbances to carbohydrate, fat, and protein metabolism. The incidence of type 2 diabetes mellitus is rapidly growing in epidemic proportions and is now considered a global public health problem in the world (Shaw *et al.,* 2010).This condition, traditionally associated with the affluent, now affects populations from all socio-economic levels (Zimmet, 2003).

People from lower socioeconomic status (SES) are at increased risk of developing DM, poor treatment compliance (adherence) after DM diagnosis, worse glycemic control, and higher proportions of diabetic complications (Chaturerdi *et al.,* n.d).

High prevalence of undiagnosed DM leads to a high number of patients with diabetic complications and important direct or indirect costs (Kirigia *et al.,* 2009). Poverty including low income and low education level is significantly associated with high morbidity and mortality (Alder & Snibbe, 2003) and DM related poor health outcomes (Miech *et al.,* 2009).

Norris *et al.,* 2005 reported obesity as the major attributive factor commonly related to poor health of DM. Most persons with DM are overweight, and obesity worsens the metabolic and physiologic abnormalities associated with this condition. Effective lifestyle and behavioral weight loss and weight control interventions in adults with DM is eminent. Weight loss strategies; dietary interventions (very low-calorie diets or low-calorie diets), physical activity, and behavioral interventions should be implemented. These interventions coupled with others mentioned in this literature hold promise to reduce complications associated with DM (Norris *et al.,* 2005).

Pivotal to the management of DM is improving the quality of life of DM patients through good and efficient glycemic control (Halman *et al.,* 2008), control of risk factors, lifestyle modification (Johnson *et al.,* 2009 & Gutschall *et al.,* 2009), prevention of DM complications and diabetes education (Baradran *et al.,* 2006).DM education has been documented by many researchers as the cornerstone of its care (Peyrot *et al.,* 2009 & Funeel *et al.,* 2009). According to (Maina *et al.,* 2010 & Gul, 2010), self-care education is an essential component in the management of DM. Patient self-care behavior plays a great role in influencing diabetes control.

Effective education of DM patients about self-care make health professionals including family doctors to be aware about knowledge of psychosocial, epidemiological and pathophysiological aspects of DM in addition to psychological abilities (therapeutic education), capacity to communicate, listen, understand and also to negotiate with a multidisciplinary and inter professional approach (Rodrigues *et al.,* 2009 & Palain *et al.,* 2006).

According to Zhang *et al.,* 2008 health workers knowledge, abilities and strategies can positively influence behavioral change in patients with DM so as to adhere to diet, physical activities, monitoring blood glucose/ glycosylated hemoglobin, taking oral anti-diabetic drugs and insulin with resultant correct metabolic control.

The United Nations and International Diabetes Federation update of 2011 emphasized the need to stop the growing epidemic of DM by encouraging government to implement actions to educate and inform populations about primary and secondary diabetes prevention, treatment and care.

An essential tool in the management of this disease would therefore be aimed at helping patients from lower SES and their families to gain knowledge, skills, resources and support essential for optimal health (Funnel *et al.,* 2009). This can be achieved primarily by assessing their beliefs, attitudes, and practice surrounding DM.

1.2. Epidemiology

Diabetes Mellitus (DM) is increasing in prevalence worldwide, reaching the status of an epidemic and costing healthcare services significant amounts of money in direct and indirect costs. The total number of people with diabetes is projected to rise from 171 million in 2000 to 366 million in 2030, while in developing countries the prevalence is projected to double between 2000 and 2030 (Wild *et al.,* 2004). For sub-Saharan Africa (SSA) the 5th edition of the International Diabetes Federation (IDF) 2011 reported 11.6 millions of DM cases of which 77.9-80% is undiagnosed. Prevalence estimates of DM in SSA urban areas exceed those found in developed settings (Longo-Mbenza *et al.,* 2010).

In Mthatha district, South Africa, DM is quickly becoming a new health priority (Ekpebegh *et al.,* 2010 & Ekpebegh *et al.,* 2011). The true prevalence of diabetes in Eastern Cape Province is not known, however, local data from the district health information system in Grahamstown showed that the prevalence of diabetes in 2009 was 4.85% at the primary healthcare clinics.

The study conducted by Erasmus *et al.,* 2001 among factory workers in Mthatha found a prevalence of 2.45% in the study participants. This statistic is arguably old and may not reflect the prevalence of diabetes in Mthatha in 2013.

1.3. Pathogenesis

DM is a complex disease characterized primarily by a relative or absolute insufficiency of insulin secretion and concomitant insensitivity or resistance to the metabolic action of insulin on target tissues (Garber, 1998). Hyperglycemia results as a consequence of the defects in the secretion of insulin by the pancreas and its action. As documented by Mahler, 1995, the pathophysiology of T2DM is characterized by peripheral insulin resistance, impaired regulation of hepatic glucose production and declining b-cell function, eventually leading to b–cell failure.

1.3.1. Insulin resistance

The hormone insulin is responsible for the mobilization of glucose into the cells of the human body from blood, mostly in muscles and fat tissues, where glucose is utilized as the source of energy. Sources of glucose are foods which are rich in carbohydrates and the most commonly present carbohydrates in the human diet are disaccharides mainly sucrose and a polysaccharide, starch.

After a meal these carbohydrates are digested and then converted into monosaccharide glucose, (Montonen *et al.,* 2007) as a result, the blood glucose level begins to rise and in turn the pancreas releases insulin. These insulin molecules, after reaching the cells, attach themselves to the insulin specific receptors, which open the specific channels, to allow the entry of glucose into the cells, and then the glucose is utilized as a principle source, for energy production (Frier & Fisher, 2006).

As a result of insulin secretion by the pancreas and subsequent glucose uptake by the cells of the body, blood glucose level decreases, which in turn decrease the insulin secretion by the pancreas.

In diabetes there is a decrease in insulin production by the pancreas or there is insulin inaction, causing hyperglycemia. Both of these conditions that are decrease insulin production, and insulin inaction can also occur simultaneously in diabetes (ADA, 2009).

1.3.2. Impaired regulation of hepatic glucose production

Hepatic insulin resistance is characterized by a marked decrease in glucokinase activity and a catalytic increased conversion of substrates to glucose despite the presence of insulin (Gulli *et al.,* 1992). Thus, the liver in T2DM is programmed to both overproduce and underuse glucose. The elevated free fatty acid levels found in T2DM may also play a role in increased hepatic glucose production (Mahler, 1995).

1.3.3. Declining b-cell function

B-Cell dysfunction is initially characterized by impairment in the first phase of insulin secretion during glucose stimulation and may antedate the onset of glucose intolerance in type 2 diabetes (Wald & Beard, 1986). Initiation of the insulin response depends upon the trans-membranous transport of glucose and coupling of glucose to the glucose sensor. The glucose/glucose sensor complex then induces an increase in glucokinase by stabilizing the protein and impairing its degradation. The induction of glucokinase serves as the first step in linking intermediary metabolism with the insulin secretory apparatus.

Glucose transport in b-cells of type 2 diabetes patients appears to be greatly reduced, thus shifting the control point for insulin secretion from glucokinase to the glucose transport system (Leahy,1991; & Porte, 1991).

Later in the course of the disease, the second phase release of newly synthesized insulin is impaired, an effect that can be reversed, in part at least in some patients, by restoring strict control of glycemia.

This secondary phenomenon, termed desensitization or b-cell glucotoxicity, is the result of a paradoxical inhibitory effect of glucose upon insulin release and may be attributable to the accumulation of glycogen within the b-cell as a result of sustained hyperglycemia (Malaisse, 1996).

Other defects in b-cell function in T2DM include defective glucose potentiation in response to non-glucose insulin secretagogues, asynchronous insulin release, and a decreased conversion of pro-insulin to insulin (O'Rahilly, 1988; & Porte & Kahn, 1989).

Autoimmune destruction of pancreatic b-cells may be a factor in a small subset of type 2 diabetic patients and has been termed the syndrome of latent autoimmune diabetes in adults (Mahler, 1995). In some early-onset patients with T2DM, there may be a deficiency in insulin secretion that may or may not be due to autoimmune destruction of the b-cell and is not due to a deficiency in the glucokinase gene. In the great majority of patients with type 2 diabetes, the delay in immediate insulin response is accompanied by a secondary hypersecretory phase of insulin release as a result of either an inherited or acquired defect within the b-cell or a compensatory response to peripheral insulin resistance.

Over a prolonged period of time, perhaps years, insulin secretion gradually declines, possibly as a result of intra-islet accumulation of glucose intermediary metabolites (Kruszynska & Olefsky, 1996).

1.3.4. Pathophysiology of T2DM related to obesity

Although obesity or an increase in intra-abdominal adipose tissue is associated with insulin resistance in the absence of diabetes, it is believed that insulin resistance in type 2 diabetes is entirely due to the existence of increased adiposity (Carey *et al.*, 1996). In the majority of type 2 diabetic patients who are insulin resistant, obesity is almost invariably present (Stanley *et al.*, 2012).

As their blood glucose level rise even a small amount above normal, defects in the glucose homeostasis system occur initially to impair the beta cell's glucose responsiveness to meals by impairing the first phase insulin response and cause the blood glucose level to rise into the range of impaired glucose tolerance (IGT). This rise in blood glucose, now perhaps in the presence of excess fatty acids that are a typical feature of obesity and insulin resistance, cause additional deterioration in beta-cell function along with further insulin resistance, and the blood glucose levels rise to full-blown diabetes (Guillausseau *et al.*, 2004).

1.4. Predisposing / risk factors

1.4.1. Obesity/ fat distribution

Increased intra-abdominal adipose accompanied with increases in body mass index (BMI) of >30 kg/m^2 is documented as the primary risk factor for the development of T2DM, owing in part to the associated insulin resistance, and pancreatic cell function decline (Garber, 1998). Insulin resistance in type 2 diabetes is entirely due to the existence of increased adiposity (Carey *et al.*, 1996).

Carol *et al.*, 2003 reported that rapid nutrition transition, socioeconomic transition, and sedentary lifestyle are the major cause of worldwide epidemics of obesity and T2DM. These environmental factors, share the ability to stress the glucose homeostasis system in phenotype predisposed to developing this condition.

1.4.2. Physical Inactivity

Physical inactivity or a sedentary lifestyle not only increases the risk of developing T2DM but also compounds its health risk and complicates its management (Frier & Fisher, 2006). Physical activity helps control weight, uses up glucose as energy and improves cells sensitivity to insulin. Stanley *et al*., 2012 documented that, a relatively small weight loss results in improvement of T2DM.

1.4.3. Genetics

Although to date very little is known about specific genetic defects in this disease, a phenotype with genetic predisposition to T2DM is likely to develop this condition in their life time compare with phenotypes without any genetic predisposition (Mahler, 1995).

1.4.4. Race

Very little is known why people of certain races are more likely to develop T2DM than others. Epidemiological studies have documented an increase in the incidence and prevalence of T2DM among Africans, Hispanics, American Indian and Asian-American than among the European race (Wild *et al*., 2004).

1.4.5. Age

Although increase incidence and prevalence of T2DM is reported among children, adolescents and younger adults, the risk of T2DM increases with increasing age (especially > 45 years) (Frier & Fisher, 2006). This is attributed to factors including physical inactivity, loss of muscle mass and increase in weight that accompanies aging (Frier & Fisher, 2006).

1.4.6. Other Predisposing Factors

1.4.6.1. Increased Sugar Consumption

DM can also occur due to increased sugar consumption. Study of Montonen and co - workers state that, sugars especially glucose have a high glycemic index, and when sugar is consumed in increased amounts, there is a possibility of increased and stressful insulin secretion by the pancreas (Montonen *et al.*, 2007).

1.4.6.2. Prediabetes

Prediabetes is a condition in which your blood sugar level is higher than normal, but not high enough to be classified as diabetes (ADA, 2009). Left untreated, prediabetes often progresses to T2DM.

1.4.6.3. Gestational Diabetes

As reported by ADA (2009), there are increased chances to develop T2DM later in life in people who suffer from gestational diabetes.

1.5. Clinical Presentation

The clinical presentation of patients with T2DM varies greatly. Generally for T2DM many patients are asymptomatic initially and at the time of diagnosis mild to marked obesity is present in 80% of T2DM patients (Ogunbanjo, 2006).

Mostly these patients may present for consultation only after the development of complications such as retinopathy and neuropathy, 20-21 % of patients with newly diagnosed T2DM have retinopathy (Fong *et al.,* 2004; Mbokazi, 2006).

At the time of diagnosis and that 10-15 % of type 2 diabetic patients will develop diabetic foot ulceration at some stage of their illness (Levin, 1997).

However, according to Frier & Fisher, 2006, the symptoms of T2DM are: polyuria (increased urine excretion), polydipsia (excessive thirst), polyphagia (increased hunger), loss of weight, changes in vision and fatigue.

1.6. Diagnosis of Type 2 Diabetes Mellitus

According to ADA (2009), recommended diagnostic testing for T2DM is the Glycated hemoglobin (HbA1c) test. This blood test indicates average blood sugar level for the past two to three months.

It measures the percentage of blood sugar attached to hemoglobin. An HbA1c level of 7 percent or higher (≥7 %) on two separate tests indicates diabetic disorder. A result between 5.7 and 7 percent (5.7% - 7%) is considered prediabetes, which indicates a high risk of developing diabetes. Normal level is below 5.7 percent (< 5.7%).

If HbA1c test isn't available, or in the presence of conditions such as pregnancy or hemoglobin variant, that can make HbA1c test inaccurate, the other recommended diagnostic testing for DM should include:

- Random plasma blood glucose test. Random blood glucose level of 200 mg/dL (11.1 mmol/L) or higher suggests diabetes, especially when coupled with any of the signs and symptoms of diabetes, such as frequent urination and extreme thirst.

A level between 140 mg/dL (7.8 mmol/L) and 199 mg/dL (11.0 mmol/L) is considered prediabetes, and a blood glucose level less than 140 mg/dL (7.8 mmol/L) is normal (Wingard & Barrett-Connor, 1995).

- Fasting plasma blood glucose test. Measured after an overnight fast. A fasting blood glucose level less than 100 mg/dL (5.6 mmol/L) is normal. A fasting blood glucose level from 100 to 125 mg/dL (5.6 - 6.9 mmol/L) is considered prediabetes. If fasting blood glucose is 126 mg/dL (7 mmol/L) or higher on two separate tests, it predicts diabetes (Wingard & Barrett-Connor, 1995).
- Oral glucose tolerance test. Also measured after an overnight fast. A 75-g sugary liquid is administered prior to the test, and blood glucose levels are tested periodically for the next two hours. A blood glucose level less than 140 mg/dL (7.8 mmol/L) is normal.

  A reading of more than 200 mg/dL (11.1 mmol/L) after two hours indicates diabetes. A reading between 140 and 199 mg/dL (7.8 mmol/L and 11.0 mmol/L) indicates prediabetes (Wingard & Barrett-Connor, 1995).

Fasting glucose values are preferred for their convenience and reproducibility. The term impaired fasting glucose has been defined as fasting plasma glucose of 110 or more and 125 mg/dL or less (Wingard & Barrett-Connor, 1995). Impaired glucose tolerance (IGT) is defined as a 2-h plasma glucose value of 140 or more and of less than 200 mg/dL during an oral glucose tolerance (ADA, 1997).

1.7. Therapy for T2DM

The cornerstone of treatment for T2DM requires a lifelong commitment to: blood glucose monitoring, diet, exercise, behavioral modifications and diabetes medication or insulin therapy. These practices will help regulated blood sugar level in T2DM patients and delay or prevent complications.

1.7.1. Blood Glucose Monitoring

ADA (2009) reported that careful monitoring of blood glucose level helps in evaluating the progress of the treatment regimen. Blood sugar levels should be monitored one to two hours postprandial, before and after exercise, once a day or depending on treatment regimen.

1.7.1.1. Importance of Monitoring Blood Glucose Level

Blood glucose level should be monitored to observe the following endangering signs usually present with the condition.

1.7.1.1.1. Hyperglycemia

Strong relationship exists between the degree of glycemic control and microvascular complications as well as the contribution of hyperglycemia in the development of macrovascular disease in T2DM patients (Ferrannini & Stern, 1995). Hyperglycemia or increase in blood glucose prognoses poor management of the disease. It can result from either diet (type and amount of food eaten) or medication (ADA, 2009).

It is advisable for diabetics to monitor blood glucose and also watch for signs of hyperglycemia: polyuria, polydipsia, and polyphagia. Prolonged hyperglycemic state can lead to coma or diabetic shock.

1.7.1.1.2. Hyperglycemic Hyperosmolar Nonketotic Syndrome (HHNS)

Signs and symptoms of this life-threatening condition include a blood glucose reading higher than 600 mg/dL (or 33.3 mmol/L), dry mouth, and extreme thirst, fever greater than 101 F (38^{o}C), drowsiness, confusion, vision loss, hallucinations and dark urine (ADA, 2009). It is more common in older T2DM patients and often proceeded by an illness or infection. HHNS usually develops over days or weeks. Thus, frequent monitoring of blood sugar level will lead early identification and management of the condition.

1.7.1.1.3. Hypoglycemia

Generally, hypoglycemia is characterized by low blood glucose level. Hypoglycemia can result due to the fasting and excessive physical activity. Most diabetics practice sugar consumption or consumption of sugar containing foods to keep blood sugar level within normal values when fasting or before exercise after prior blood sugar reading (ADA, 2009). Common signs of hypoglycemia include sweating, shakiness, weakness, hunger, dizziness, headache, blurred vision, heart palpitations, slurred speech, drowsiness, confusion and seizures (ADA, 2009).

1.7.2. Diet

Diet therapy is important for the prevention as well as the treatment of all stages of T2DM (Grundy, 1991).

When obesity coexists with hyperglycemia, as seen in the majority of individuals with T2DM, weight reduction is the major goal of dietary therapy (Wing, 1995).

Traditional recommendations emphasize reduction of both the total and saturated fat content and replacement with complex carbohydrates to 50 –55% of the dietary calories. Such diets may cause marked postprandial hyperglycemia in these patients. As there is considerable patient variability in the rate of glucose absorption, arduous attention to postprandial glucose monitoring and the addition of high fiber contents to the diet become critically important.

Moreover, as the glycemic response to the diet is also dependent upon the texture and content of other food stuffs in the diet as well as the rate of intestinal motility, the diet as well as the stage and duration of T2DM has to be considered on an individual basis (Riccardi & Rivellese, 1991).

1.7.3. Exercise

Exercise has been shown to be beneficial in the prevention of the onset of T2DM as well as in the improvement of glucose control as a result of enhanced insulin sensitivity (Eriksonn & Lindgarde, 1991).

Decreased intra-abdominal fat, an increase in insulin-sensitive glucose transporters (GLUT-4) in muscle, enhanced blood flow to insulin-sensitive tissues, and reduced free fatty acid levels appear to be the mechanisms by which exercise restores insulin sensitivity (Erisonn *et al.,* 1997). In addition, exercise provides the added benefits of lowering blood pressure, improving myocardial performance, and lowering serum triglycerides while raising high density lipoprotein cholesterol levels.

1.7.4. Pharmacotherapy therapy for T2DM

Current therapeutic agents available for T2DM include sulfonylureas and related compounds, biguanides, thiazolidenediones, a-glucosidase inhibitors and insulin.

1.7.4.1. Sulfonylureas and related agents

Sulfonylureas have been used to treat T2DM since 1942 and require functional pancreatic b-cells for their hypoglycemic effect (Roman & Harris, 1997). All currently available sulfonylureas bind to specific receptors on b-cells, resulting in closure of potassium ATP channels.

As a result, calcium channels open, leading to an increase in cytoplastic calcium that stimulates insulin release (Pilipson & Steiner, 1995). A newer sulfonylurea, glimiperide, given in doses of 1, 4, or 8 mg pre-prandially, appears to have a more rapid onset than previous sulfonylureas (both glyburide and glipizide) and consequently less of a risk of hypoglycemia (Geisen, 1988). To a lesser degree than insulin administration, sulfonylureas, through endogenous hyperinsulinemia, cause a propensity for hypoglycemia and weight gain (Harrower, 1994).

1.7.4.2. Repaglinide

This is a new agent that binds to pancreatic b-cells and stimulates insulin release. It is structurally different from sulfonylureas and binds to a nonsulfonylurea receptor (Wolffenbutte *et al.,* 1993). The drug is taken preprandially and has a rapid onset and limited duration of action, which may decrease the incidence of weight gain and hypoglycemic episodes.

Limited published clinical data demonstrate an efficacy similar to that of sulfonylureas; as with sulfonylureas, repaglinide shows an added benefit when given with metformin (Moses *et al.,* 1997).

1.7.4.3. Biguanides

Glucose lowering by the drug occurs primarily by decreasing hepatic glucose production and, to a lesser extent, by decreasing peripheral insulin resistance. The drug acts by causing the translocation of glucose transporters from the microsomal fraction to the plasma membrane of hepatic and muscle cells. It does not stimulate insulin release and does not, when given alone, cause hypoglycemia (Mahler, 1995).

Moreover, it does not cause weight gain, and it improves the lipid profile by causing a decline in total and very low density lipoprotein triglyceride, total cholesterol, and very low density cholesterol levels and an increase in high density lipoprotein cholesterol levels (Davidson & Peters, 1997).

It is ideally suited to obese patients with T2DM who are unresponsive to diet alone and are presumed to be insulin resistant. When introduced gradually in 500mg or 850mg increments to a maximum dose of 2000mg daily, a reduction in hemoglobin A1c (HbA1c) up to 2.0% (60 mg/dL decrement in average glucose level) can be anticipated. It is effective as monotherapy or in combination with other agents, such as insulin secretagogues, other insulin-sensitizing drugs, or inhibitors of glucose absorption. The major risk continues to be that of lactic acidosis, which occurs with a frequency of 1/20,000 patient year. As the major route of excretion of the drug is through the kidneys, it should not be given to those with renal disease, in the presence of hepatic disease, or in patients with tissue ischemia.

1.7.4.4. Insulin

Insulin therapy is indicated in the treatment of T2DM for initial therapy of severe hyperglycemia, after failure of oral agents, or during perioperative or other acute hyperglycemic states. Insulin has been used in multiple combinations in T2DM, and new insulin analogs are in clinical trials (Burge & Schade, 1997). The first available insulin analog is lispro insulin, representing a two-amino acid modification of regular human insulin. Lispro insulin does not form aggregates when injected, allowing it to have a more rapid onset and a shorter duration of action than regular insulin (Holleman & Hoekstra, 1997).

Although these properties may help minimize the postprandial rise in glucose and decrease the risk of late hypoglycemia (Howey et *al.,* 1994), the use of insulin in T2DM is not without theoretical as well as practical concerns.

Insulin therapy can cause further weight gain in obese T2DM patients and increase the risk of hypoglycemia (although less commonly than in type 1 diabetes mellitus) (Dagogo-Jack & Santiago, 1997). In addition, the peripheral hyperinsulinemia achieved by exogenous insulin therapy may be a risk factor for cardiovascular disease (Lamarche *et al.,* 1996).

1.7.4.5. Combination Therapies

Mahler J (1999) documented that the most available agents have been used in combination to treat T2DM.

Although many combinations are not yet approved for use, a rational choice for combination therapy would include an agent that increases insulin levels and one that enhances sensitivity to insulin and lowers glucose production. This combination of agents would appear to correct most of the pathophysiological defects found in T2DM individuals.

1.7.4.6. Investigational Therapies

It is well established that an oral glucose load evokes a greater insulin response than glucose given by the intravenous route (McIntyre *et al.,* 1965). One of the gut polypeptides responsible for this observation is glucagon-like peptide (GLP-1) (D'Alession *et al.,* 1995). Given parenterally or through the buccal mucosa, GLP-1 lowers glucose levels, decreases glucagon levels, and delays gastric emptying (Goke & Byrne, 1996). Its role as an adjunctive treatment of T2DM is currently under investigation.

Caution in its application will be necessary in those patients with gastroparesis. Amylin is a b-cell peptide co-secreted along with insulin. Found to be absent or markedly reduced in type 1 diabetes (Nyholm *et al.,* 1997), its presence in T2DM varies with the state of b-cell function. When given parenterally, it appears to decrease the glucagon level and delay gastric emptying, thereby facilitating insulin action (Kolterman, 1997). It, too, will require caution in its use in patients with gastroparesis. Insulin-like growth factor I (IGF-I) levels decline with aging in parallel with the decline in insulin sensitivity (Dunger & Acerini, 1997).

Although a cause and effect relationship has not been established, the administration of IGF-I can cause a modest improvement in insulin sensitivity (Dunger & Acerini, 1997).

Its potential benefit must be balanced with the requirement for parenteral administration, expense, and theoretical potential to worsen vascular complications, particularly retinopathy (Acerini *et al.,* 1997). Because of these concerns, IGF-I trials have been temporarily discontinued.

1.8. Complications of T2DM

As with other cardiovascular diseases, patients with T2DM also continue to experience a high incidence of morbidity and mortality. Because the complications associated with this disease affect multiple organ systems they can have a dramatic impact on quality of life.

Uncontrolled diabetes can lead to various complications which include diseases of the cardio vascular system, kidneys, eyes, and nervous system.

1.8.1. Cardiovascular Complications of T2DM

Diabetes dramatically increases the risk of various cardiovascular problems, including coronary artery disease with angina, heart attack, stroke, atherosclerosis and hypertension (Norris et al., 2005). The risk of stroke is two to four times higher for people with T2DM, and the death rate from heart disease is two to four times higher for people with diabetes than for people without the disease (American Heart Association, 2011).

Blalock *et al*., (2010) also reported that, patients with T2DM have increased risk of developing multi-vessel coronary artery disease, much more than those without diabetes.

Acute coronary syndrome, specifically myocardial infarction, is one of the leading causes of death among diabetic patients, and diabetic patients have increased risk of complications if they survive an acute coronary event, both during the acute phase and in the post-infarction period.

1.8.2. Nervous System Complications of T2DM (Neuropathy)

Diabetes causes damage to the peripheral nervous system (in which the patient loses sensations at the periphery of limbs); resulting to poor blood flow to the peripheral limbs thus increases the risk of various foot complications. If left untreated, small cuts and blisters can become serious infections. Severe damage might require amputation of limbs (ADA, 2011).

Also, diabetes can cause injury to the walls of capillaries which provides nourishment to nerves resulting to tingling, numbness, and burning or pain sensation in the toes or fingers (Levin, 1997).

Damage to the nerves that control digestion can cause problems with nausea, vomiting, diarrhea or constipation.

1.8.2. Urinary System Complications of T2DM (Nephropathy)

The kidneys contain millions of nephrons that filter waste from the blood. Diabetes causes damage the nephrons leading to kidney failure or irreversible end-stage kidney disease, requiring dialysis or a kidney transplant (Ferrannini & Stern, 1995).

1.8.3. Ophthalmic Complications of T2DM

Diabetes causes damage the blood vessels of the retina (diabetic retinopathy), potentially leading to blindness (Fong *et al.,* 2004). Diabetes also increases the risk of other serious vision conditions, such as cataracts and glaucoma (Mbokazi, 2006).

1.9. Management of T2DM

1.9.1. General Management of T2DM

Patients with T2DM do not depend on insulin for their survival although there can be limitations in the amount of endogenous insulin secretion coupled with the presence of insulin resistance.

Any approach to management of T2DM must combine drug, education, diet, exercise, and management of multiple risk factors. Control of hypertension and dyslipidemia is essential.

Blood pressure of less than 130/85 mm/Hg and a low density lipoprotein cholesterol level below 130 mg/dL (low density lipoprotein cholesterol, 100 mg/dL if coronary artery disease is present) are a suggested standard of care (ADA, 1998). The degree of glycemic control recommended will vary depending upon age, education, and complicating risk factors.

In otherwise healthy individuals, near normalization of the glycosylated hemoglobin level is recommended (Gaster & Hirsch, 1998), and in all cases an HbA1c level above 8.0% demands therapeutic intervention.

If HbA1c values continue to exceed 8%, a second agent may be added, either a secretagogue or another insulin-sensitizing agent depending upon patient characteristics, and if postprandial hyperglycemia persists, anaglucosidase inhibitor may be added.

Ultimately, insulin therapy may become necessary either early in the course of the disease to establish control or later in the disease course as b-cell failure ensues (Roman & Harris, 1997).

In a nutshell, self-care management education is at the pivot in reducing the prevalence and mortality rates of T2DM; thus management as mentioned earlier should be centered at educating patients on self-care management such as calorie restriction (Diet), weight reduction, and exercise and lifestyle changes.

Clinically, the administrations of drugs that increase insulin sensitivity or drugs that cause additional release of insulin by the pancreas are used. (Guyton & Hall, 2000).

1.9.2. Management of T2DM Patients with Obesity

Obesity is not only a primary risk factor of T2DM but also a primary complication of this condition. Most diabetic patients are obese (Ogunbanjo, 2006). This as noted by Norris et al, 2005, is a result of poor dietary modification and lack of exercise. Healthy traditional high-fiber, low-fat, low-calorie diet, with decreasing consumption of calorie-dense foods containing refined carbohydrates, fats, red meats, and low fiber will result in improvement of T2DM (Carol et al., 2003). In addition to diet, weight loss strategies are imperative for T2DM patients (Stanley et al., 2012).

A relatively small weight loss results to improvement of all obesity related co - morbidities and T2DM.

1.10. Self Care Management Strategies

1.10.1. Regular Visits to Specialist

Regular visit to specialist for general or specific physical examination is advisable for all T2DM patients for early detection and prevention of diabetic related complications. The following are commonly monitor and examined during such visits.

HbA1c levels need to be checked between two and four times a year. The ADA, (1999) recommends an HBA1c level below 7 percent (< 7%). Compared with repeated daily blood glucose tests, Hb1c testing better indicates how well a diabetic patient's treatment plan is working.

In addition to the HbA1c test, cholesterol levels, thyroid function, liver function and kidney function are monitored using urinalysis. Blood pressure readings are also monitored couple with examination of the eyes. This is because hypertension, hyperlipidemia, retinopathy and ischemic heart disease, are entities commonly found in association with T2DM (Ferrannini & Stern, 1995).

1.10.2. Adherence to Drugs

Norris *et al.*, (2005) documented that taking medication, together with blood glucose testing is an important aspect in management of T2DM.

1.10.3. Foot Examination

Daily foot examination for blisters, cuts, sores, redness or swelling is an important self-care management plan (ADA, 2009).

1.10.4. Smoking Cessation

Smoking increases the risk of various diabetes complications, including heart attack, stroke, and nerve damage and kidney disease. Thus cigarette smoking is not an advisable regimen practice among diabetic patients (ADA, 2009).

1.10.5. Alcohol Consumption

Alcohol, as well as drink mixers, can cause either hyperglycemia or hypoglycemia. Alcohol consumption should be moderate in diabetics and most often advise to consume with a meal.

The recommendation for women is no more than one drink per day and no more than two drinks per day for men (ADA, 2009).

1.10.6. Diet

Following a meal plan couple with other self care management strategies is pivotal in the management of T2DM (Norris *et al.*, 2005).

1.10.7. Exercise

Norris *et al.*, (2005) documented that exercising regular exercise is pivotal in the management of T2DM. A diabetic patient should aim for 30 minutes of moderate physical activity a day like taking a brisk walk, ride a bike or swimming.

1.10.8. Attempt to Lose Weight

Treatment of confounding risk factor of obesity assumes major importance and must be coordinated with good glycemic control for reduction in total mortality in T2DM (U.K. Prospective Diabetes Study Group, 1998). Weight reduction should focus on permanent changes to eating and exercise habits.

1.11. Research Problem

The principal reasons for increased prevalence of T2DM are obesity, nutritional transitions and physical inactivity (Stanley *et al.*, 2012). Failure to comply with treatment regimen has also been suggested to be associated with the upheaval of complications of T2DM among patients (Amod *et al.*, 2012). Thus knowledge about treatments and risk factors of the disease will increase compliance to lifestyle changes and drug therapy; hence the ability to attain treatment goals.

It is published that, patients' belief about their self-efficacy to perform specific actions to promote their health is affected by the knowledge and skills that they attain and that subsequently influence their compliance to treatment plans (Blalock *et al.*, 2010). Compliance with drug treatment can also be directly affected by the individual's health beliefs, social and medical concerns, and denial of their illness (Blalock *et al.*, 2010).

Self care management is thus of utmost importance as far as the management of T2DM is concern. The patient's beliefs, attitudes, practices, response to intervention and treatment education which have been provided by health workers play an important role.

Notably, patients and health professional differ in their beliefs and attitudes concerning DM. Most of health workers opinions about DM are more serious than their patients owing to factors such as barrier in communication, lack of understanding of the information given or lack of perception of the severity of their condition (Clark & Hampson, 2003). It is thus important to build a bridge to avoid this information gap and to form an alliance between the health care providers and the DM patients. Medical doctors are classically trained with direct style of communication (Rollnick *et al.,* 2008). This style should not be appropriate to communicate with patients suffering from DM, a chronic disease.

Since this threatening life disease needs the patient's own motivation, energy, change in behavior and commitment, the language of communication should be empathetic (Rollnick *et al.,* 2008).

Patients generally accept a patient-centered communication style over a more traditional directive approach (Dellasega *et al.,* 2012 & Swenson *et al.,* 2004). Thus, adherence and the medical provider's effectiveness may be improved when the patient's perception of his or her disease is known (Platt *et al.,* 2001). The problem is further complicated in cases of different cultural backgrounds of patients and healthcare provider (Carbone *et al.,* 2007). Motivational interviewing (MI) should be used in different health problems such as alcohol addiction (Strull *et al.,* 1984) and glycaemic control in DM patients (Viner *et al.,* 2003).

Several reports from family medicine identified the need for improvement in the practices for treating and educating DM patients (Shera *et al.,* 2002).

Through a patient-centered communication approach and Motivational Interviewing (MI), the beliefs and attitudes concerning T2DM treatment and management education of the patients can be identified. This information will assist health workers to improve on the education of patients with T2DM and implement other management strategies.

1.12. Problem Statement and Rationale of the Study

Approximately 90% of people with type 2 diabetes are overweight or obese. Obesity is seen as a significant contributory factor in its development (Carol *et al.*, 2003). In view of the rapid rise of T2DM in developing countries, more aggressive public health awareness programs coupled with governmental action and clear country specific guidelines are required. Such actions would contribute to decelerating further escalation of "epidemics" of obesity and T2DM in developing countries.

Rheeder (2006) concluded that South Africa will experience high prevalence of obesity and T2DM now and will continue to do so by the year 2030 if various preventive measures are not implemented. Although theoretical knowledge about the condition is well known, the attitude of patients and healthcare professionals influence the practicalities of implementing lifestyle changes for obese patients living from day to day with the condition (Mahler, 1995).

Farmer and colleagues advocated that knowledge remains an important prerequisite to good compliance with medical therapy (Farmer *et al.*, 2006). Attitudes and beliefs towards medications have also been found to be highly correlated to medication compliance (Wilson *et al.*, 2006).

Therefore, there is a need to develop diabetes patient's education center in the Mthatha district, one of the poorest settings in South Africa (STATSSA, 2009). These teaching activities will be focused on DM patients and their families, so that knowledge and strengthened active attitudes towards DM management will be provided.

Before setting these programs, we should have ample data on the population's knowledge, attitude and practice (KAP) of diabetes. There are some epidemiological studies, but there is no KAP study from Eastern Cape Province. In addition, there are no studies from Mthatha district evaluating DM patient predisposition to adopt self care actions. There are no studies focusing on the benefits of educational interventions in DM patients with the specific context of the Xhosa ethnic group.

Although brief DM interventions demonstrate promise on average (Viner *et al.,* 2003), it is important to determine whether patients from Mthatha are disadvantaged or benefiting. If as suggested by (Goldman & Smith, 2002), DM patients education is needed to compensate for lower SES including low education level, it is possible that these disadvantaged patients will not benefit as much as more educated patients.

On the basis of what could be considered intuitively sensible, it would appear that patient's health-related knowledge, attitudes and practices constitute important constructs affecting the management T2DM.

One could argue therefore that healthcare practitioners play a pivotal role in improving the general well-being of diabetic patients by addressing these areas in their day-to-day interactions with patients.

The proposition that increased knowledge about a specific health problem leads to improved adherence to treatment plans and subsequently to desirable health outcomes in T2DM is the goal of this study.

To our knowledge, no research addressing the knowledge, attitude and practices of T2DM patients has been published. The main objective of this study was therefore to assess knowledge, attitude and practices of T2DM patients.

Furthermore, findings generated by the present study could subsequently be helpful to design and initiate comprehensive strategies and programs for detection and control of T2DM and its complications with self-care and community support as its major components.

1.13. Research Question

Based on the above, this study will address the following research question:

- What is the level of knowledge, beliefs, attitudes and practices to DM, diet or the regimen behaviors in obese T2DM patients?

1.14. Aim and Objectives

1.14.1. Aim

The aim of this study was to investigate the beliefs, attitudes, practices, response to interventions and therapeutic education of obese and normal weight T2DM patients.

1.14.2. Objectives

The following specific objectives are defined to achieve the aim of this study:

- To determine the knowledge regarding the etiology and features of T2DM among patients with T2DM.
- To determine the knowledge regarding risk factors and complications of T2DM among patients with T2DM.
- To determine the attitude and practice regarding diet, alcohol intake and exercise to lose weight for obese and normal weight T2DM patients.
- To determine the level of responses to intervention and therapeutic education among obese and normal weight T2DM patients.
- To identify univariate and multivariate determinants of the attemption to lose weight for obese and normal weight T2DM patients.

1.15. Significance of the Study

In the province of the Eastern Cape where a very high percentage of the population suffers from T2DM, the need to investigate the level of knowledge, beliefs, attitudes and practices towards self-care management was imperative.

Likewise, the researcher believed that the findings of this study will help patients and clinicians in the management of T2DM.

Furthermore, the baseline data gathered from the result of this study shall serve as a guide to other researchers in the quest for additional knowledge in this field of study.

1.16. Ethical Consideration

The study protocol was designed according to the Helsinki Declaration and approved by the Research and Ethics Committee of Walter Sisulu University, the Eastern Cape Department of Health and the Chief Executive Officer of NMAH Mthatha. Since the study involves patients, the following ethical principles were applied;

- Informed written consent was obtained from each participant prior to the study (Appendix 1).
- A complete explanation of the procedure was given to the participants (Appendix 2).
- Participants were informed that information collected for the study will only be used to publish results at completion and codes will be used to protect them.
- No physical harm was anticipated.
- The session was rescheduled should the participant become exhausted.
- All participants who met the criteria of the research population were approached.

CHAPTER 2: Methods and Materials

2.1. Study Design and Setting

This study was a descriptive cross-sectional study carried out at the outpatient clinic of the Nelson Mandela academic Hospital Mthatha (NMAH); Eastern Cape Province of South Africa. Variables of interest (beliefs, attitudes, and practices, adherence to medications and diet, quality of life, blood glucose control, demographic data, clinical and environmental factors) of 200 T2DM patients were investigated once and a relationship between them was determined.

2.2. Study Population

This study was conducted in the Diabetic Clinic at NMAH, Mthatha. The total study duration was 3 months from April 2013 through July 2013. The target population was 200 consecutive T2DM patients admitted at the NMAH during the study period. All two hundred patients included were eligible T2DM patients with disease duration of more than 1 year and were willing to participate. All patients with type 1 diabetes mellitus and patients with any major illness like cardiac failure, chronic renal failure, and psychiatric illness were excluded from the study. Sampling technique was non-probability (convenience) and the study design was descriptive.

2.3. Patient Identification and Recruitment

The data were collected from patients who were scheduled to visit the Diabetic Clinic at NMAH during the study duration. The diabetic clinic at this hospital caters for most of the diabetic patients in the Mthatha region, and provides regular follow-up, medication and referral where required.

Eligibility for enrolment into the study was considered if the patient was an adult (≥18 and ≤90 years old), and diagnosed with T2DM.

Diabetes diagnosis was established if the patient's medical notes documented the diagnosis (fasting plasma glucose of 126 mg/dl or more on previous occasions) and the patient was registered in the diabetes registry of the clinic.

Eligible patients were asked at the end of their clinic visit by the physician if they were interested in participating in a research study on diabetes. Those who agreed were met by a research assistant and provided with a brief verbal explanation of the study. Patients who continued to express interest to be involved were invited to the diabetic educator's room, where the research assistant read and explained both the English and Xhosa version of the study's consent which they were asked to sign. The research assistant then escorted consenting patients to the patient counseling room in the outpatient pharmacy where a second research assistant met the participant whilst the first returned to the clinic area to recruit other patients. In the outpatient pharmacy the research assistant collected information pertaining to the participant's demographic information, and administered the study questionnaire.

2.4. Data Collection and Procedure

Water Sisulu Institutional review board approval was obtained prior to the commencement with data collection. A structured questionnaire designed in English and Xhosa (Appendix 3), was used as the data collection tool. The questionnaire was pilot tested on 10 diabetic patients in the same hospital to assess the suitability of content. An interpreter who was well trained in using the questionnaire and knew the local languages was used.

The questionnaire was divided into two main sections namely; demographic data and questions to assess the beliefs, attitudes, practices, response to interventions and therapeutic education about diabetes and glycemic control, risk factors, complications and therapy.

2.4.1. Demographic Variables

The age, gender, location, occupation, educational qualification and marital status of all the participants who were willing to take part in the study were obtained through an oral interview. This information was entered into the data collection sheet (Appendix 3) for analysis.

2.4.2. Anthropometric Measurements (International Society for the Advancement of Kin anthropometry, 2001)

2.4.2.1. Height (cm)

The measurement was taken while the participant was standing with heels together against the stadiometer with the body held in a maximally erect (stretched) position. Hands were placed on hips directed posteriorly and anteriorly, respectively. The head was held in the Frankfurt plane, the eyes and nose were directed straight forward.

2.4.2.2. Body weight (kg)

The measurement was taken with the participant standing on the bathroom scale, minimally clothed (shorts, lightweight shirt), feet comfortably spread with the weight evenly distributed on both feet and in the hands-on hips position.

2.4.2.3. Nutritional Status

The body mass index (BMI) which is the simple index of weight-for-height was used to classify the participants into three different nutritional statuses that being underweight (malnutrition), normal and overweight (obesity).

The BMI was calculated as weight in kilograms divided by the square of the height in meter (Prentice and Jebb, 2001).

BMI = weight (kg) / [height (m)] ^{2}

The participants were then classified according to their BMI as defined by (WHO, 2004), as follows;

BMI <18.5 kg/m^2: Underweight / malnutrition.

BMI 19 – 24.5 kg/m^2: Normal nutritional status.

BMI 25 – 29.5 kg/m^2: Overweight

BMI > 30 kg/m^2: Obesity.

2.5.2. Diabetes Knowledge, Attitude and Practice (KAP) Questionnaire

This 47-item questionnaire is a modified version from the Diabetes knowledge, attitude and practice (KAP) questionnaire by Dinesh *et al.*, (2007), which had been specifically developed to assess KAP related to DM (Appendix 3). The 47 items of the KAP questionnaire are distributed as follows:

Nine demographic questions: gender, age, occupation, highest education, residence, marital status, home language, weight and height.

Thirty eight multiple choice KAP and responses to therapeutic education questions: These are multiple choice questions, with options based on each question. These questions were tapped from different areas of diabetes. There were questions on the following:

- Knowledge regarding etiology and features of T2DM
- Belief, attitude and practice regarding risk factors and complications of T2DM
- Belief, attitude and practice regarding exercise and diet in dm (food choices and nutrition practices related to T2DM)
- Attitude and practice regarding drug therapy in DM (proportions of no adhesive to medications)
- Response to intervention and therapeutic education
- Percentage of uncontrolled blood sugar level

2.6. Operational Definitions

Belief is personal understanding about T2DM. Attitude is the feelings towards T2DM, as well as any preconceived ideas towards diabetes mellitus. Practice is the way in which belief and attitude is demonstrated through actions. Obesity is a body mass of ≥ 30 mg/m^2

2.7 Analysis of Data

The continuous variables were expressed as mean ± standard deviation (SD) and categorical variables were presented as frequencies (number=n) and proportions (%) plotted in graphs and tables.

Univariate analysis served to compare means using Student t-test between two groups or one way analysis (ANOVA) between ≥3 groups, as well as to compare percentages between groups using Chi-Square test. Univariate associations between potential factors and attemption to lose weight were analyzed using Odds ratio (OR) with its respective 95% Confidence Interval (95%CI).

Multivariate analysis served to identify independent determinants of attemption to lose weight (dependent variable) using a logistic regression model. The multivariate association between dependent variable and independent variables was calculated using multivariate OR (95%CI) after adjusting confounding variables (some variables are only significant in univariate analysis). The differences were regarded as significant if $p<0.05$.

All statistical calculations were performed with the software SPSS version 21 (IBM, Macintosh OSX).

Chapter 3: Results

Two hundred T2DM patients residing within the urban and rural setting of Mthatha and attending sessions at the Nelson Mandela Academic Hospital (NMAH) participated in this study. After data was collected, a preliminary analysis was performed from information provided in the questionnaires. All 200 participants met the inclusion criteria for participation in the study. None was excluded.

3.1. Characteristic of the Study sample

A sample of 200 T2DM patients attending NMAH was analyzed. This sample comprised of 89 men and 111 women, the sex ratio being 1 man: 1 woman. The general characteristics of the study sample are summarized in Table 1.

Table 1. Characteristics of the study sample

Variables	Mean	Standard deviation
Age(years)	48.6	16.1
Weight(kg)	78.0	18.2
Height(m)	1.6	0.1
BMI(kg/m^2)	29.2	5.9

3.2. Influence of Gender on the Study Variables

Table 2 compares the mean values of the study sample according to gender. The mean values of BMI in women were significantly higher (P=0.02) than that of males. Women presented higher levels of weight than men (P=0.140) but with no significant difference. However, the mean values of height and age in men were similar (P> 0.05) with that observed in women.

Table 2. Comparison of age, weight, height, BMI by gender

	Men (N=89)	Women (N=111)	
Variables of Interest	Mean± SD	Mean ±SD	P - values
Age (years)	49.0 ±16.6	48.2± 15.8	0.740
Weight (kg)	75.93 ±17.0	79.75 ± 19.0	0.140
Height (m)	1.64 ± 0.1	1.62 ±0.1	0.253
BMI (kg/m^2)	28.1 ± 5.2	30.1 ± 6.3	0.015

The mean ± 95% CI of the age of the sample is presented according to gender in Figure 1A.There was a high discrepancy of mean values of age between men and women. Men were slightly older than females.

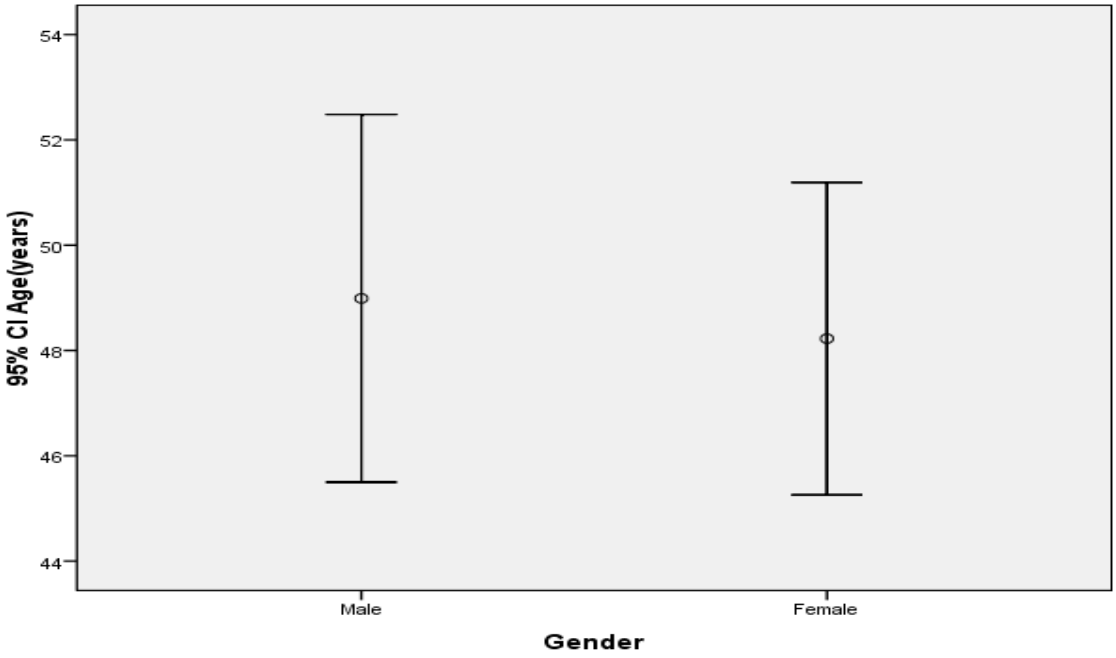


Figure 1A. Error Bars showing mean ± 95% CI of Age in men and women.

The mean ± 95% CI of the weight of the sample is presented according to gender in Figure 1B. Females were generally greatly overweight in contrast with slightly overweight men.

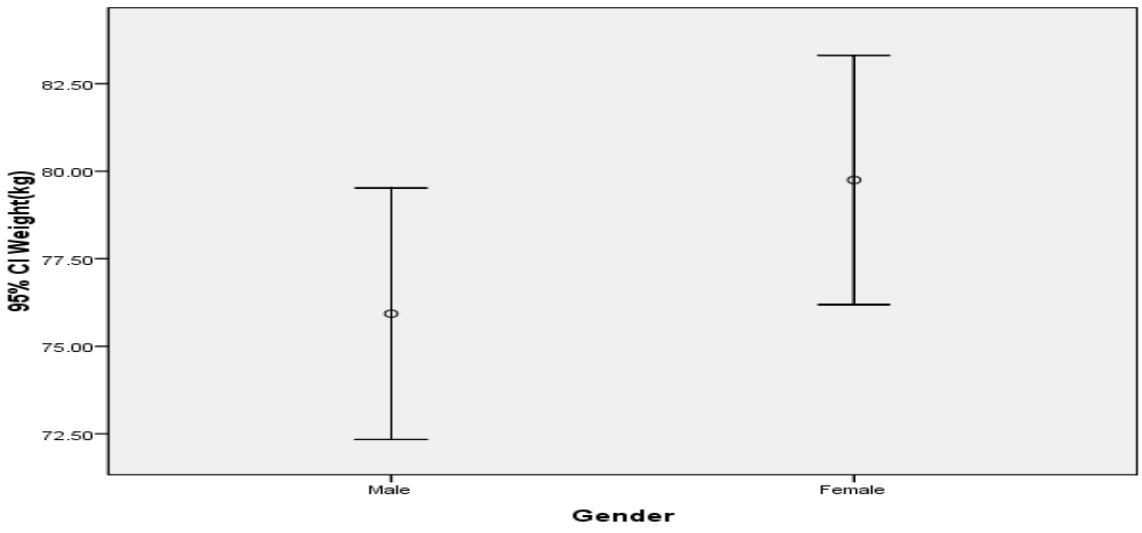


Figure 1B. Error Bars showing Mean ± 95% CI of Weight in men and women.

The mean ± 95% CI of the height of the sample is presented according to gender in Figure 1C. Both males and females were generally of the same height.

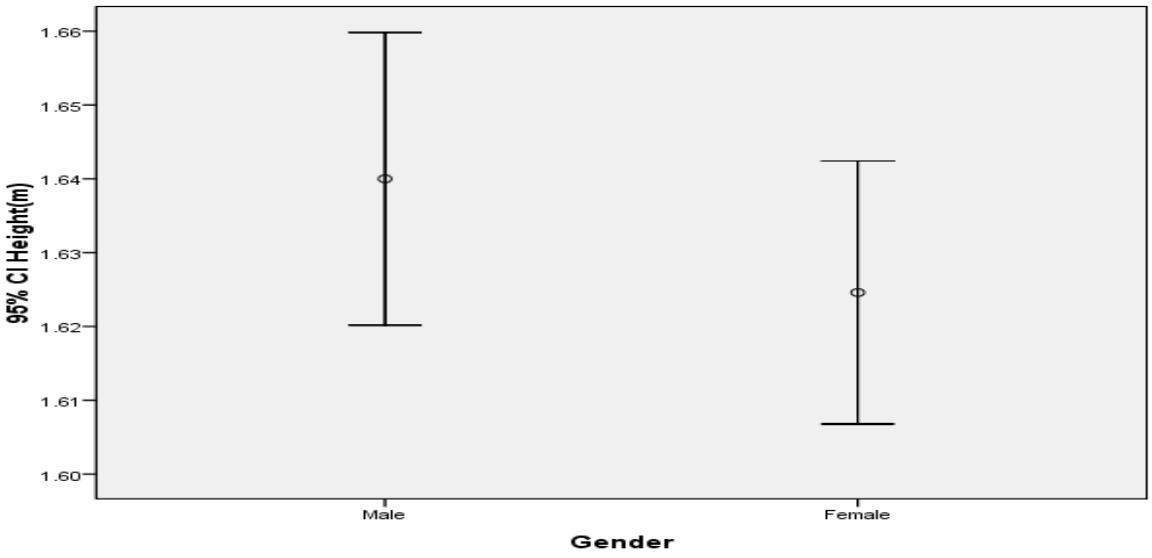


Figure 1C. Error Bars showing mean ± 95% CI of Height in men and women.

The mean ± 95% CI of BMI of the sample is presented according to gender in Figure 1D. Females were generally greatly overweight compared with slightly overweight men.



Figure 1D. Error Bars showing Mean ± 95% CI of BMI in men and women.

3.3. Percentages of other demographic variables of the study Population

Table 3 summarizes the percentages of occupation, level of education, residential area, marital status, home language and nutritional status of the study sample. A higher percentage of the population were laborers (29.0%), who obtained secondary educational qualification (33.0%), who lived in rural areas around Mthatha (57.0%), married (50.5%), speaks IsiXhosa (88.5%) and obese (43.0%).

Table 3. Percentages of occupation, highest qualification, residential area, marital status and home language of the study population

Variables of Interest	**n (200)**	**%**
Gender, Male	89	44.5
Gender, Female	111	55.5
Occupation		
Student	10	5.0
Housewife	3	1.5
Service	46	23.0
Laborer	58	29.0
Pension	35	17.5
Grant	3	1.5

Unemployed	45	22.5
Highest Level of Education		
Primary	56	28.0
Secondary	66	33.0
Tertiary	49	24.5
Training Certificate	8	4.0
None	21	10.5
Residence, Urban	86	43.0
Residence, Rural	114	57.0
Marital Status		
Single	61	30.5
Married/Traditional Marriage	101	50.5
Divorced/Separated	5	2.5
Widow/Widower	27	13.5
Living Together	6	3.0
Home Language		
English	10	5.0

Sotho	2	1.0
Tswana	1	0.5
Xhosa	177	88.5
Zulu	5	2.5
Others	5	2.5
Nutritional Status (BMI in kg/m^2)		
Underweight:(<18.5 kg/m^2)	4	2.0
Normal Weight:(19 – 24.5 kg/m^2)	55	27.5
Overweight: (25 – 29.5 kg/m^2)	55	27.5
Obesity: (BMI > 30 kg/m^2)	86	43.0

The percentage of the different occupation of the sample is presented in Figure 2A. A high percent of the population were laborers (29%), 23% were providing services in various departments, 17.5% are pensioners, 5% were students, 1.5% were housewife and 22.5% were unemployed.

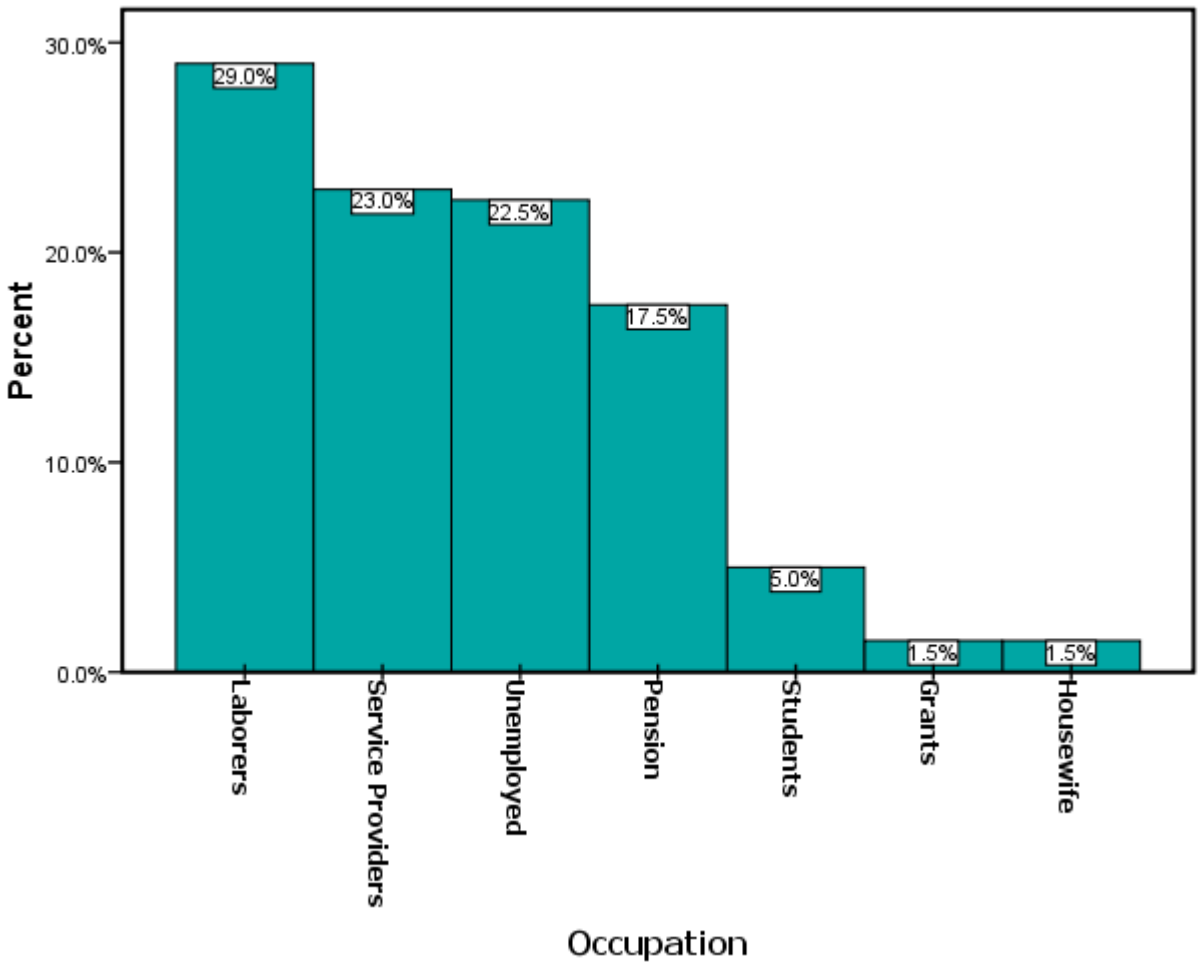


Figure 2A: Bar Chart shows the percentage of the different occupations of the study population

The percentage of highest level of education of the sample is presented in Figure 2B. A high percent of the population had obtained secondary education (33%), 28% had attended primary, 24.5% had attended tertiary, 4% had attended training colleges and 11.5% had never been to school.

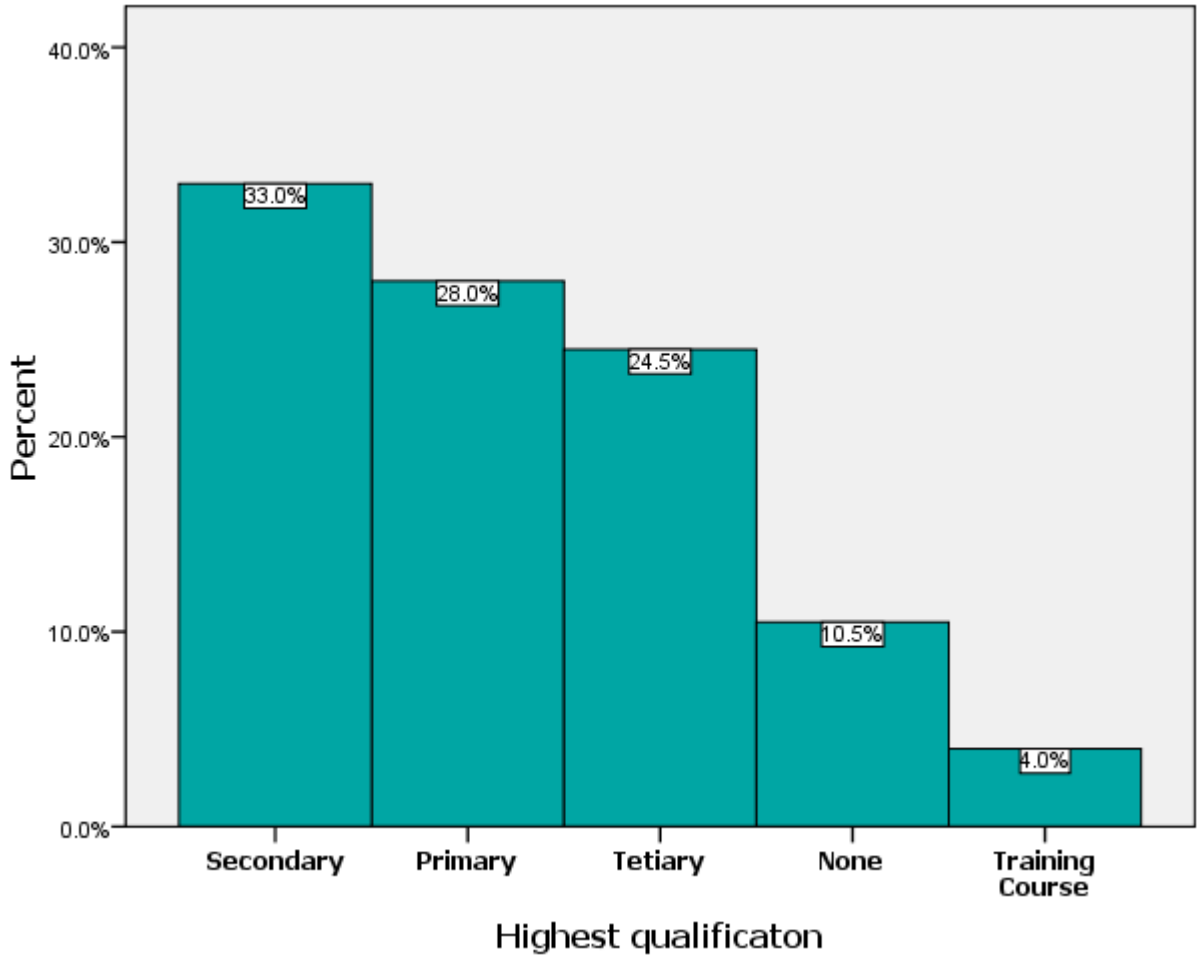


Figure 2B: Bar Chart shows the percentage of highest level of education of the study population

The percentage of residential area of the sample is presented in Figure 2C. A high percent of the population reside in rural areas (57%) while 43% reside in urban areas around Mthatha.

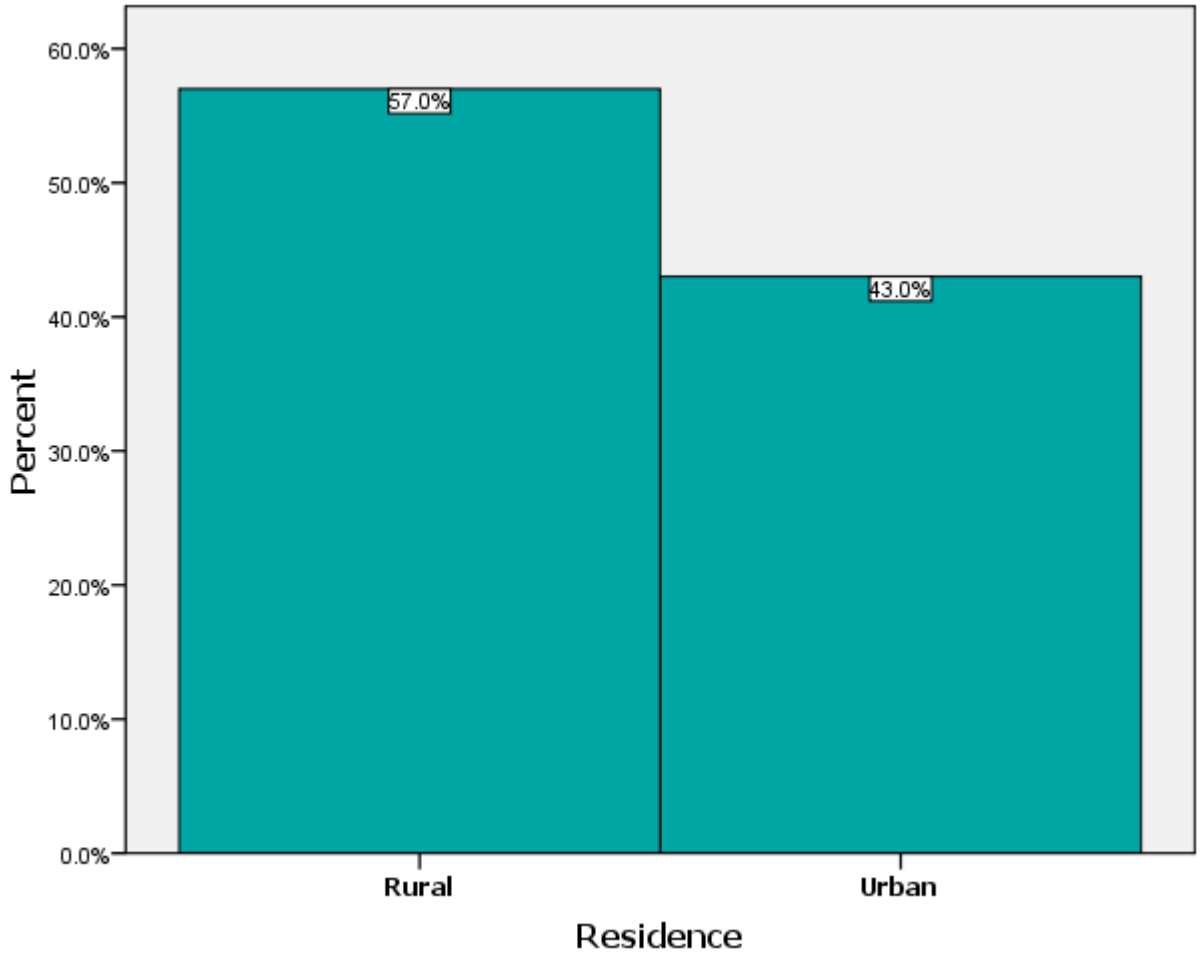


Figure 2C: Bar Chart shows percentage of the residential areas of the study population

The percentage of marital status of the sample is presented in Figure 2D. A higher percent of the population were married (50.5%), 30.5% were single, 13.5% were widow/widower, 2.5% were divorced and 3% were living together.

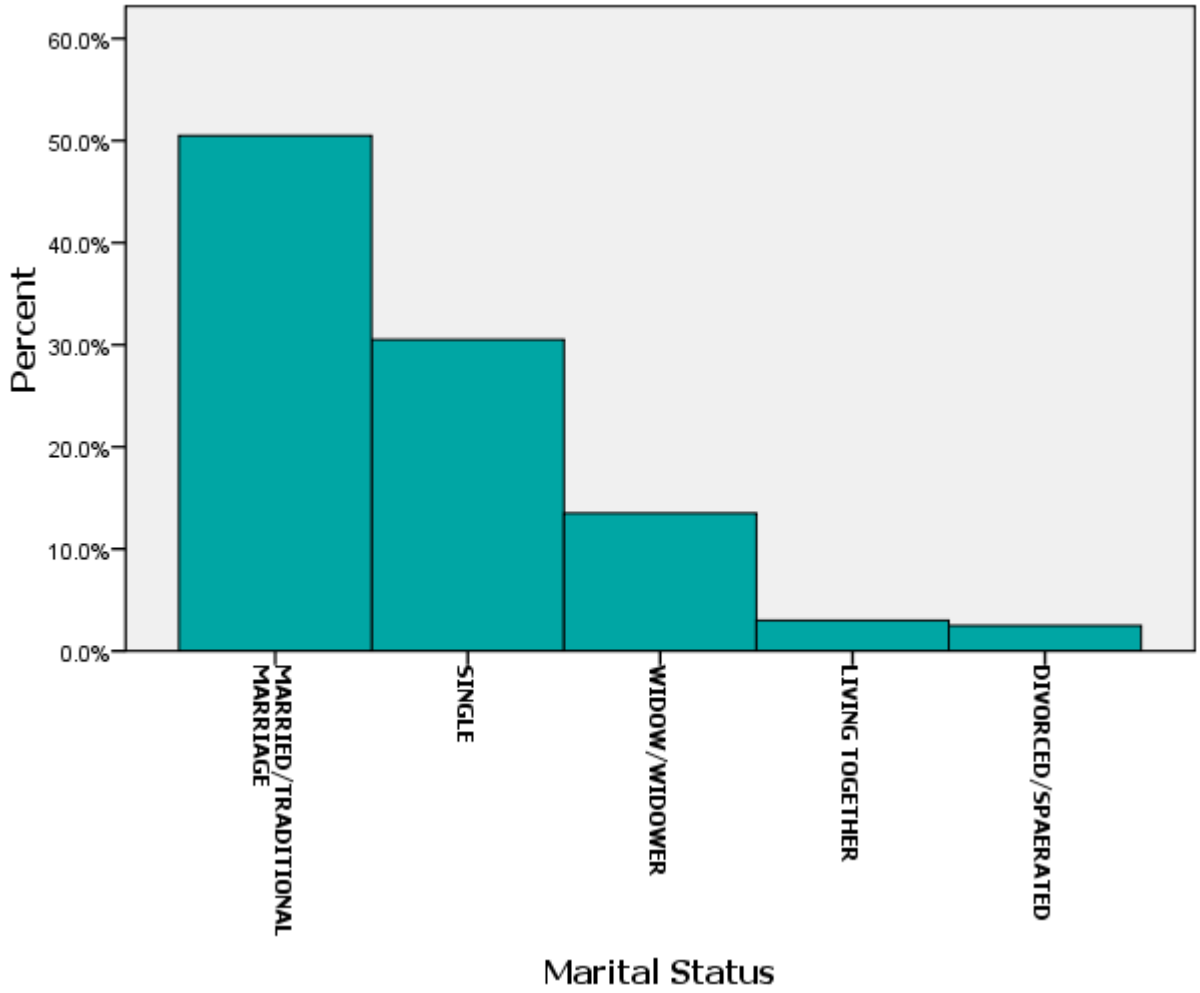


Figure 2D: Bar Chart shows the percentage of marital status of the study population

The percentage of home language of the sample is presented in Figure 2E. A very high percent of the population were Xhosa speaking (88%), 5% were English speaking, 1% Sotho and Tswana, 2% Zulu and 3% other languages.

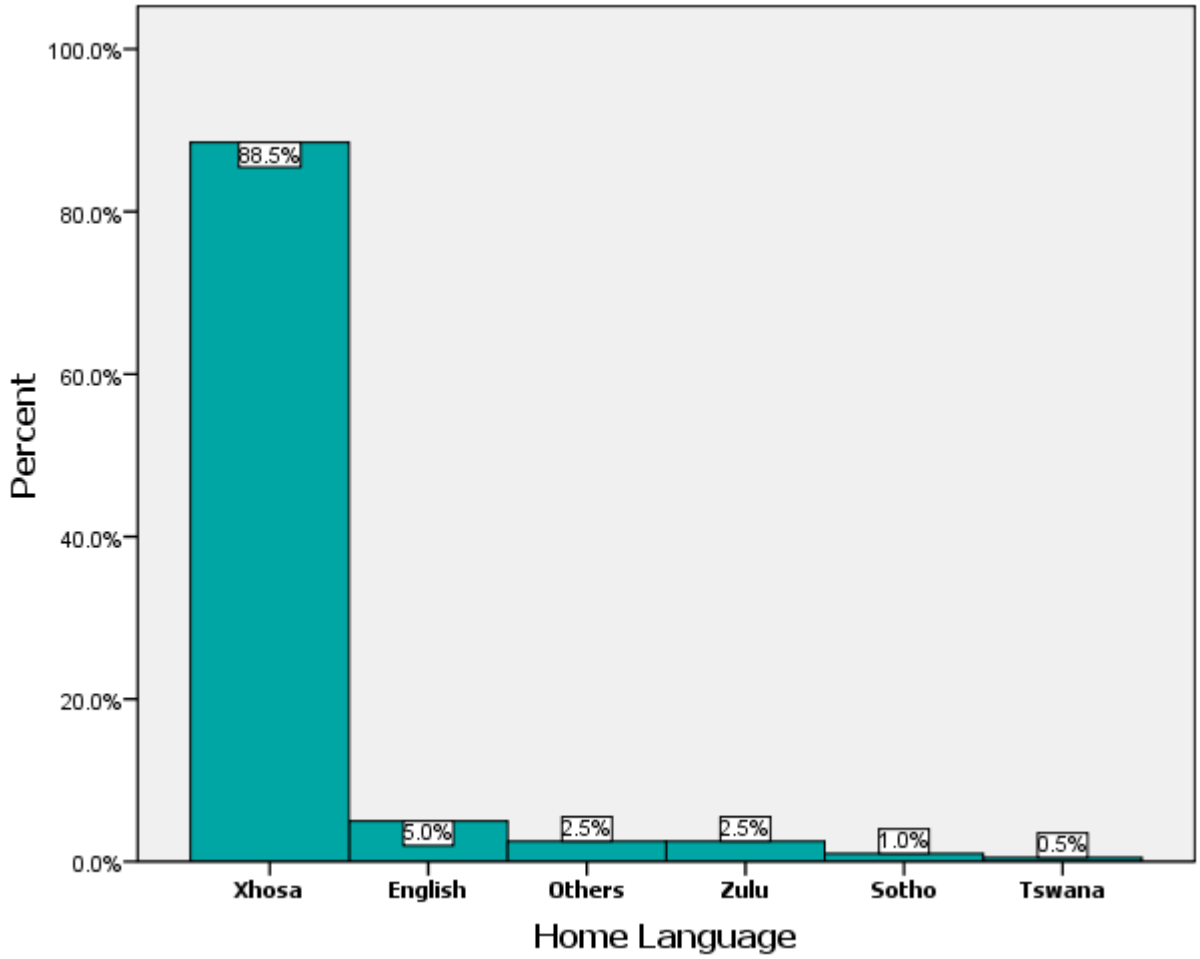


Figure 2E: Bar Chart shows the percentage of home language of the study population.

The percentage of nutritional status of the sample is presented in Figure 2F. A very high percent of the population were obese (43%), 28% were overweight, 27% were normal weight and 2% were underweight.

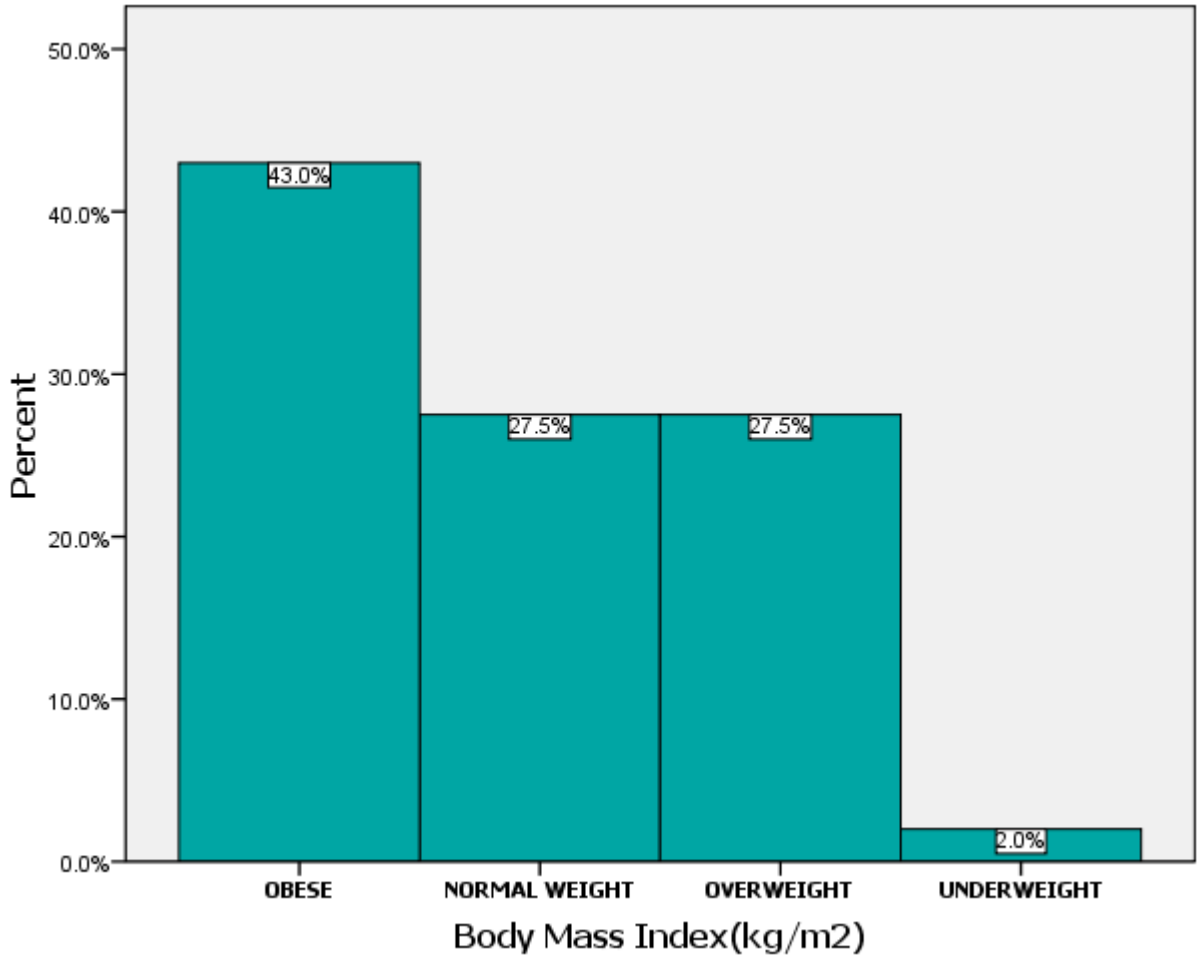


Figure 2F: Bar Chart shows the percentage of nutritional status of the study population.

3.4. Beliefs, attitudes and practices (BAP) among patients with T2DM

3.4.1. Knowledge of Patients regarding etiology and features of T2DM

Table 4 illustrates the percentages of people who know the etiology and features T2DM. Of the 200 participants, a very high percentage had a good understanding of the etiology of T2DM. 20% of the study sample belief that excessive intake of sugar is not the major cause of T2DM in the Republic of South Africa (RSA).

74.0% listed all the symptoms of T2DM, while a smaller percentage of the sample population listed single symptoms of their condition.

Table 4 shows the percentage of participants who know the etiology and features of T2DM

Statement/Question	**% (n=200)**
Etiology	
Increase in blood sugar more than normal	
Yes	97.0
No	3.0
It is hereditary	
Yes	91.5
No	8.5
Result from lack of insulin	
Yes	93.0
No	7.0
Excessive sugar consumption is the major cause in RSA	
Yes	80.0

No	20.0
Features	
The symptoms of diabetes are:	
Increased frequency of urination	11.0
Increased thirst and hunger	2.5
Increased tiredness	6.0
Slow healing of wounds	4.5
All of the above	74.5
Don’t know	1.5

The percentages of the etiology and features of T2DM of the study sample are further illustrated in Figure 3A and Figure 3B respectively.

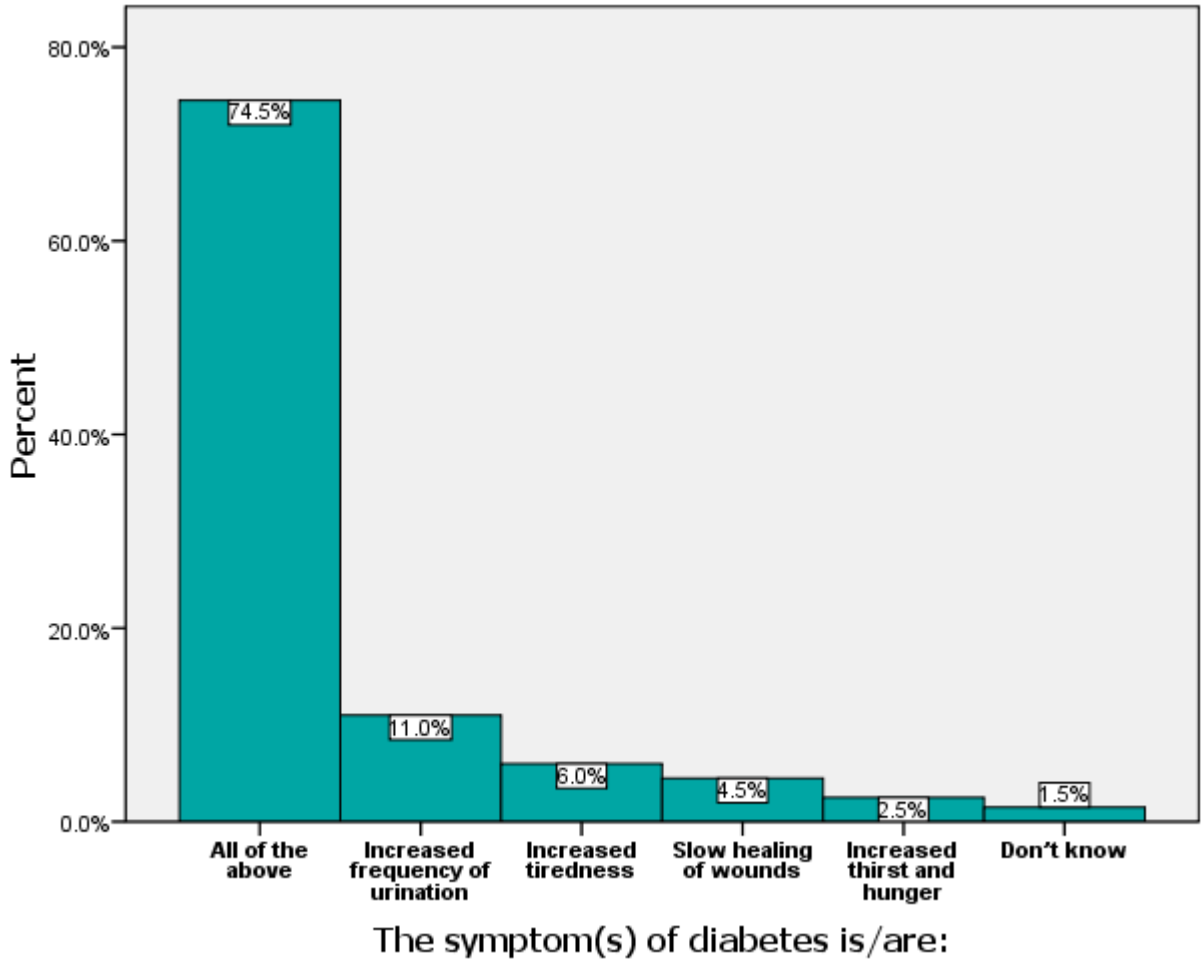


Figure 3A. Bar shows percentage of people who know the etiology of T2DM

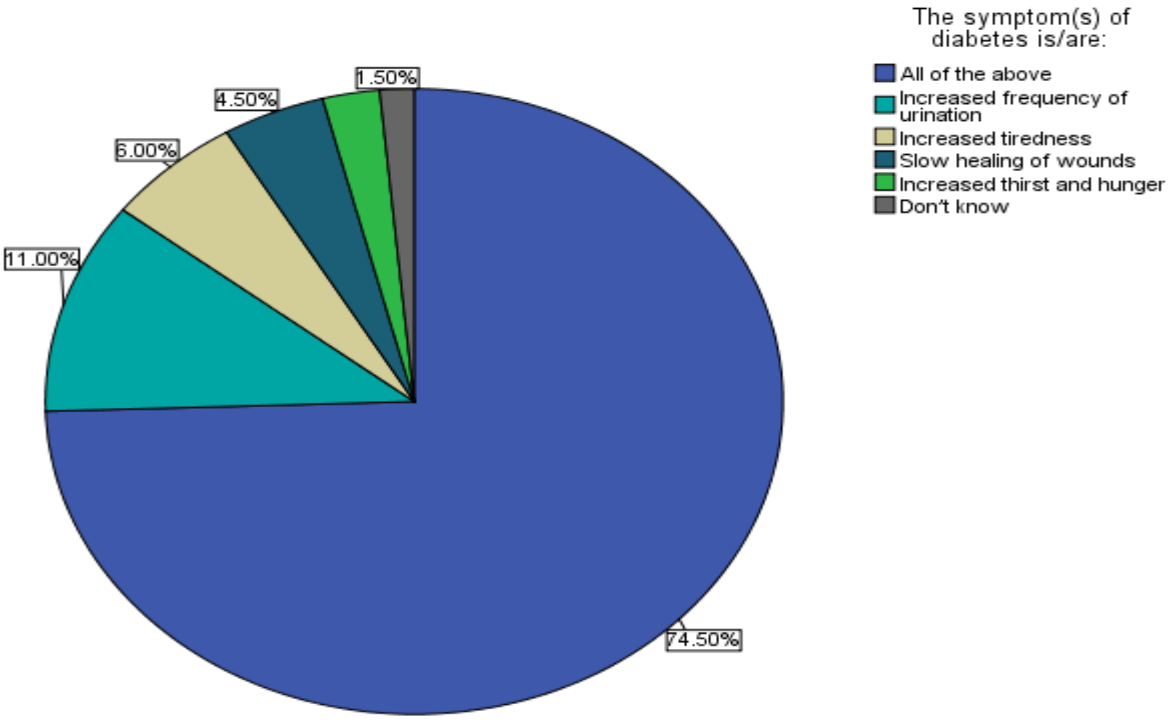


Figure 3B. Pie shows percentage of people who know the of features of T2DM.

3.4.2. Beliefs, Attitudes and Practices of patients regarding risk factors and complications of T2DM

Table 5 illustrates the percentages of beliefs attitudes and practices of T2DM patients regarding the risk factors and complications of T2DM. Risk factors like hyperglycemia, hypertension and obesity correctly responded by 99.5%, 94.0%, 81.5% respectively. However, only 67.0% of the study sample does not drink alcohol, 29.0% drinks occasionally while 4.0% drink twice a month. A fair proportion (87.5) of the study sample understood that their condition if not managed properly might lead to kidney an eye the complications. 69.5% have visited an ophthalmologist, 86.0% have two consecutive normal blood pressures reading while 80.0% knew of the importance of daily foot care.

Table 5 shows the percentage of BAP regarding risk factors and complications of T2DM

Variable of Interest	%(n=200)
Knowledge on blood glucose monitoring	99.5
Knowledge on blood pressure check	94.0
Frequency of Blood Pressure check, Every day	40.5
Once every month	40.0
Attemption to lose weight	81.5
Alcohol consumption, Never	67.0
Occasionally	29.0
Once or twice a week	4.0
Knowledge of kidney and eye complication	87.5
Visit to eye specialist, Yes	69.5
Good Blood pressure readings, Yes	86.0
Foot care, Yes	80.0
Frequency of foot care	
Once a day	60.0
Every month	12.0

The percentages of the frequency of blood pressure check, alcohol consumption and foot care of T2DM of the study sample are further illustrated in Figure 4A, Figure 4B and Figure 4C respectively.

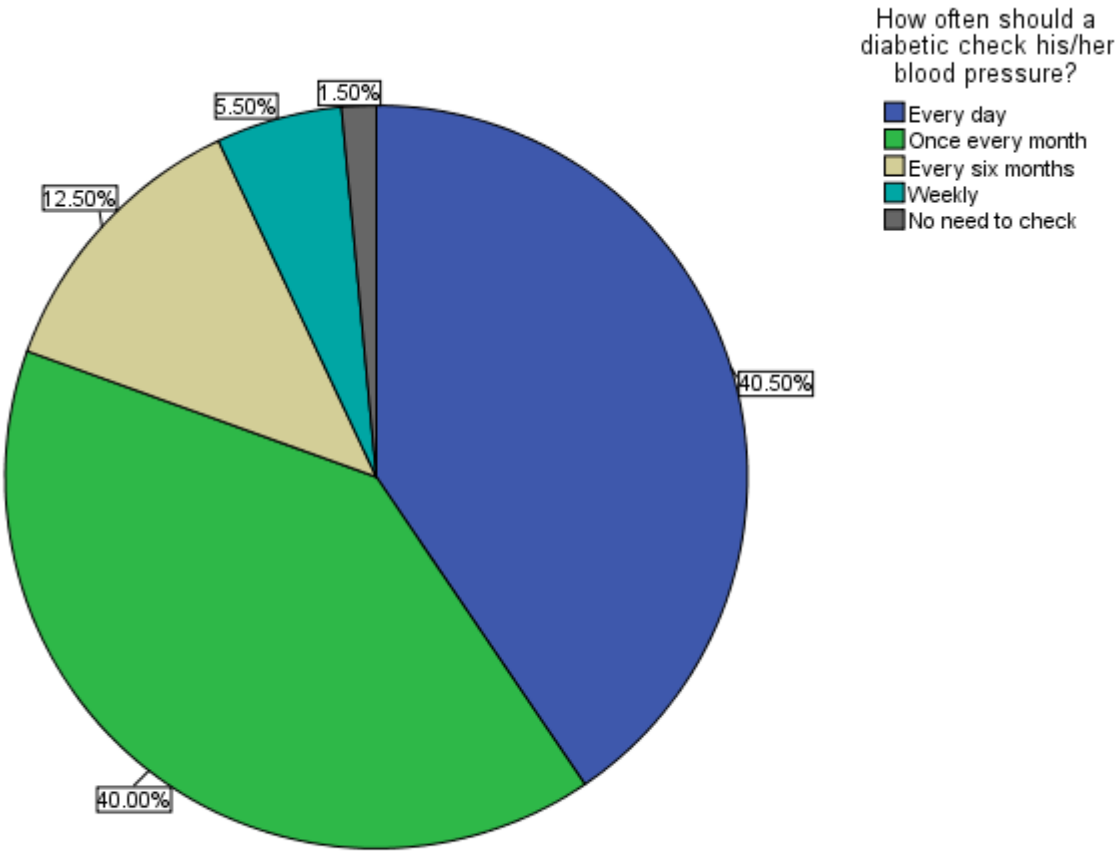


Figure 4A. Pie shows percentage of frequency of blood pressure check of T2DM.

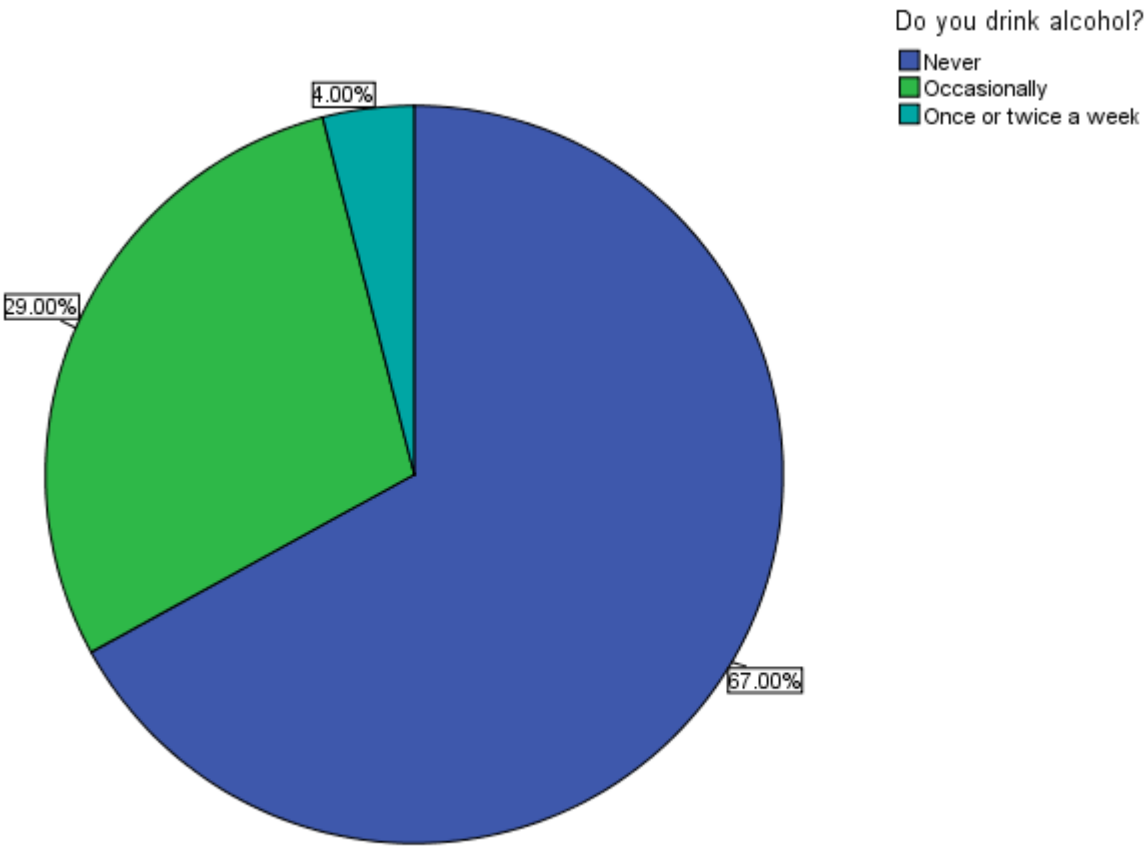


Figure 4B. Pie shows percentage of frequency of alcohol consumption of T2DM.

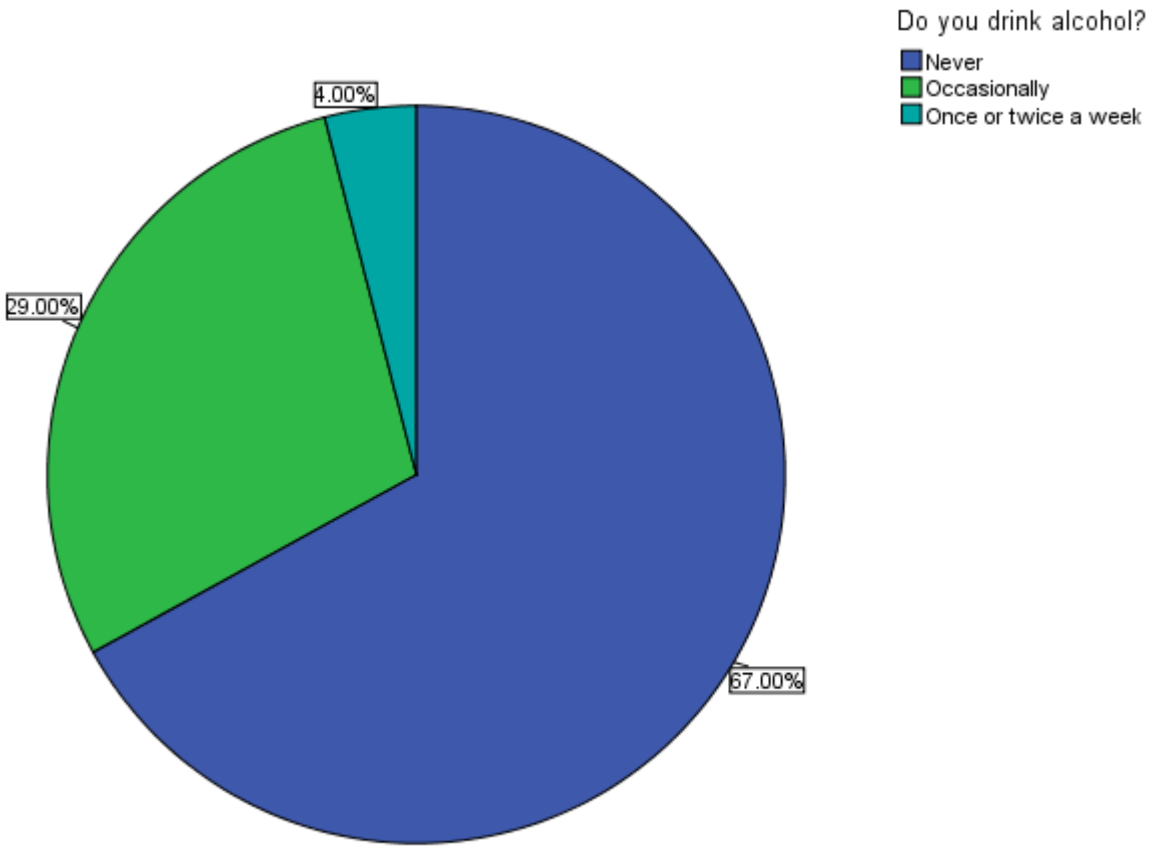


Figure 4C. Pie shows percentage of frequency of foot care of T2DM.

3.4.3. BAP regarding exercise and diet in DM (Food choices and nutrition practices related to T2DM)

Table 6 illustrates the beliefs of T2DM patients regarding exercise and diet in DM. Positive respond to lifestyle modification in T2DM specifically regarding diet and exercise among the sample population was moderate. 86.0% of the participants do exercise, of this percentage; 49.0% exercise every day, 28.5% exercise once a week, while 2.0% and 6.5% exercised every other day and were not sure how often they exercise respectively.

Concerning diet as a lifestyle change with T2DM, 74.5% eat a diabetic diet, 93.0% belief pap, porridge, meat, rice and umngqusho should be eaten in moderation by a diabetic patient.

65.0% eat white bread, pap and potatoes once a week, 16.0% eats twice a week, 8.0% eats three times a week while 11.0% do not eat. 58.5% drink coke or other cold drinks once a week, 12.0% drinks twice a week, 12.5% drink three times a week and 17.0% do not drink.

Table 6 shows the percentage of BAP regarding exercise and diet in DM

Variables of Interest	**% (n=200)**
Food Choices	
Diabetic diet, Yes	74.5
Pap, porridge, meat, rice and umngqusho consumption, Yes	93.0
Frequency of white bread, pap or potatoes consumption/week	
Once	65.0
Twice	16.0
Never	11.0
Frequency of coke or other cold drinks drinking/week	
Once	58.5
Twice	12.0

Never	17.0
Exercise	
Yes	86.0
Frequency of exercise	
Everyday	49.0
Once a week	28.5

The percentage of the frequency of exercise of T2DM of the study sample is further illustrated in Figure 5.

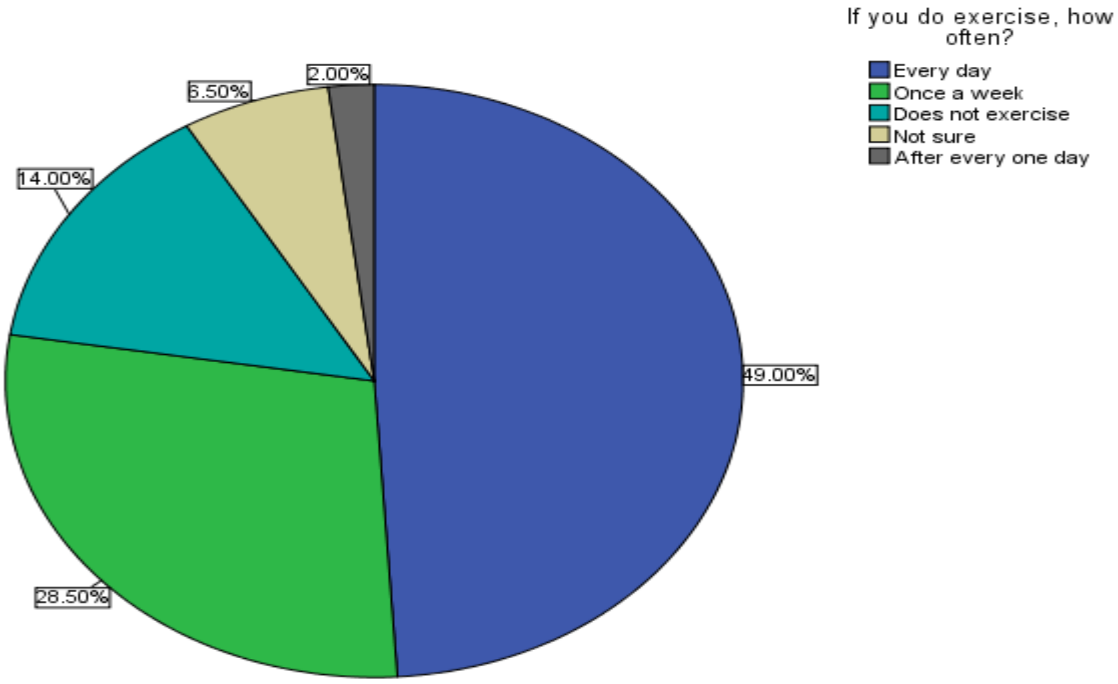


Figure 5. Pie chart shows percentage of frequency of exercise of T2DM.

3.4.4. Attitude and Practice regarding drug therapy in Dm (Proportions of no adhesive to medications)

Table 7 illustrates the percentages of the attitude and practice of T2DM patients regarding drug therapy. The proportion of no adherence to medications for the study sample was very low.82.5% of the study sample had never forgotten to take their medication. 71.5% of the participants would send somebody to collect their monthly medication if they can't make it, 27.0% won't take medication for that month and 1.5% insist they must come for their appointment.71.0% are aware of their blood sugar level falling below normal when taking their medication and of this percentage, 34.5% took sugar to increase blood sugar level, 26.0% took medicines, 7.4% administer insulin injection, 4.0% have never experience this and 1.5% does nothing about it.

Table 7 shows the percentage of the attitude and practice regarding drug therapy of T2DM patients

Variables of Interest	**% (n=200)**
Compliance to drug therapy	
Frequency of non-compliance/month	
Never	82.5
Once or twice	12.5
Three to four times	3.5

More than four weeks	1.5
Responsibility when not available for medication appointment	
Don't take medication for that month	27.0
Send somebody	71.5
Side Effects of drugs	
Hypoglycemia, Yes	71.0
Self-care management of hypoglycemia	
Took sugar	34.5
Took medicine	26.0
Took insulin	7.5

3.4.5. Response to intervention and therapeutic education

Table 8 illustrates the response to intervention and therapeutic education of T2DM patients. All 200 participants responded that diabetes can be managed. However, of this 100.0%, 87.5% responded that T2DM can be managed throughout life while 12.5% responded that it is managed only when one is sick. 98.5% responded correctly that diabetes can be controlled and the complications prevented while 1.5% do not think so.

The percentages for response to education on diet gave 96.0% for specific diabetic diet and 4.0% for eating anything, response to education on drug 94.0%, response to education on prevention of complications: foot care 52.0% , eye care 27.5% , preventing heart disease 20.5% ; treatment options: insulin injection 73.0% , taking tablets 27.0%, lifestyle changes: alcohol is not good for a diabetic 89.0% , alcohol is good for a diabetic 11.0% ,smoking can worsen diabetes 81.5% , smoking cannot worsen diabetes 18.5% and exercise: losing weight can prevent diabetes from getting worse 91.0% , losing weight cannot prevent diabetes from getting worse 9.0%.

Table 8 shows the response to intervention and therapeutic education of T2DM Patients

Variables of Interest	**% (n = 200)**
Interventions and Therapeutic Education	
Management	
T2DM can be managed, Yes	100.0
T2DM is managed throughout life	87.5
T2DM is managed only when sick	12.5
Prevention of complications	
T2DM can be controlled & complications prevented	98.5

Diabetic treatment & control, specific diet	96.0
Hypoglycemia result when insulin is administered without any meal , Yes	94.0
Diabetic Management involves	
Foot care	52.0
Eye Care	27.5
Preventing Heart Disease	20.5
Treatment	
Treatment involves	
Taking tablets	73.0
Insulin injection	27.0
Lifestyle Modifications	
Alcohol consumption is not good, Yes	89.0
Weight loss is important, Yes	91.0
Smoking is not good, Yes	81.5

3.4.6. Percentage of uncontrolled Blood sugar level

Table 9 illustrates the percentage of uncontrolled blood sugar level among T2DM patients.

A good percentage of the study sample had their previous blood sugar and hemoglobin A1C within normal (89.5%) while 10.5% had abnormal blood sugar and HbA1c readings. Also, an increased number of the participants had their current blood sugar and HbA1c within normal (90.5%) while a lesser percentage (9.5%) had abnormal readings.

Table 9 shows the percentage of uncontrolled blood sugar level among T2DM

Variables of Interest	**% (n = 200)**
Uncontrolled blood glucose level	
Normal previous visit's blood sugar and hemoglobin A1C, Yes	89.5
Normal blood sugar and hemoglobin A1C, Yes	90.5

The percent of uncontrolled blood sugar level among T2DM patients of this study is further presented in Figure 6A and Figure 6B.

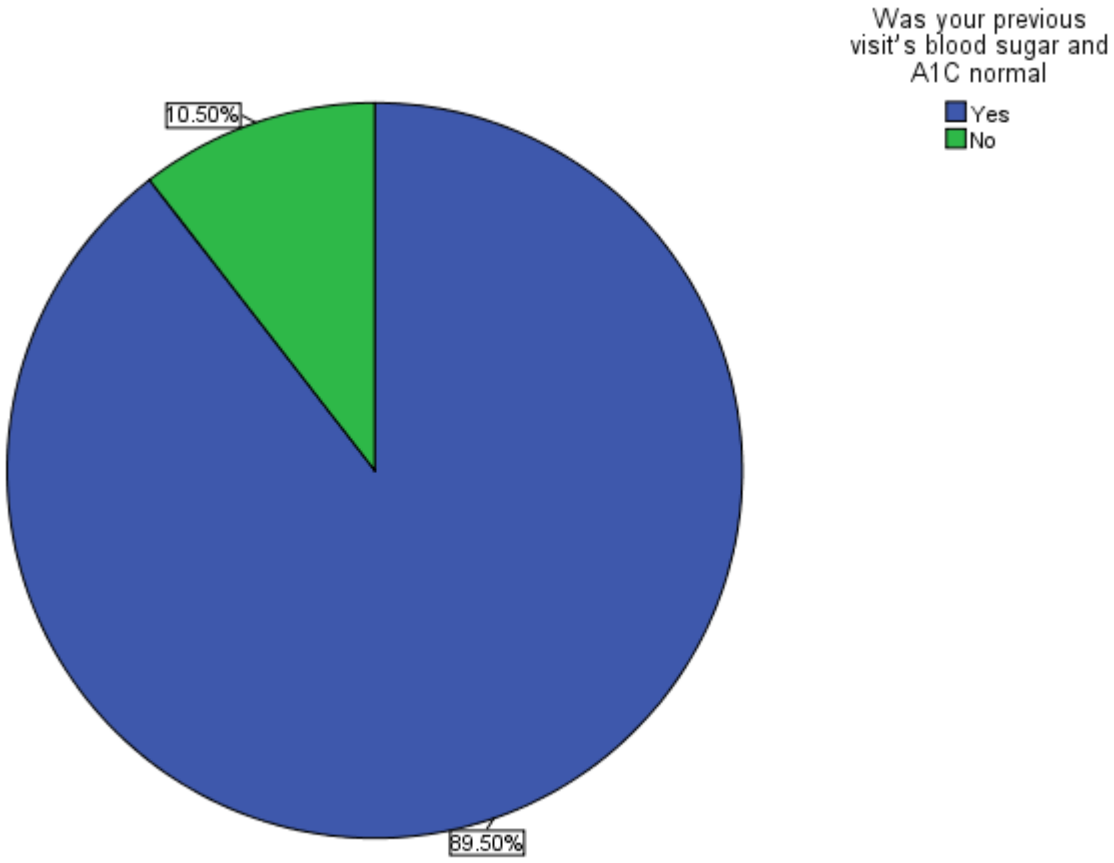


Figure 6A. Bar chart shows percentage of Previous uncontrolled blood sugar and hemoglobin A1C level.

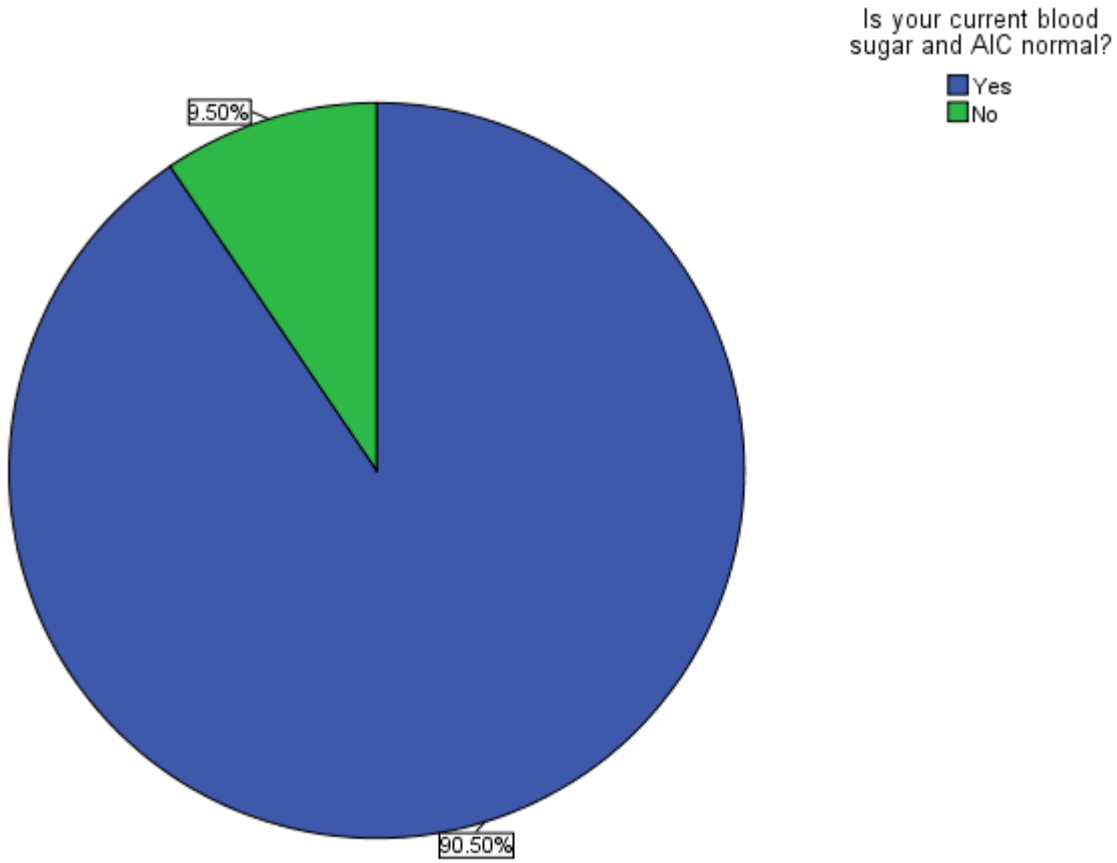


Figure 6B. Bar chart shows percentage of current uncontrolled blood sugar and hemoglobin A1C level.

3.5. KAP of weight loss within specific study variables

Urban residence attempt more often to lose weight (89.5% n=77/86; OR=2.8 95%CI 1.2 – 6.3; p=0.011) than rural residence (75.4% n=86/114).

A significantly high proportion of those who belief that T2DM is hereditary attempt to lose weight (84.2% n=154/183; OR=4.7 95%CI 1.7 – 13.2; p=0.002) than those who do not belief that T2DM is hereditary (52.9% n=9/17).

A significant high proportion of people who belief that T2DM results from lack of insulin attempt to lose weight (83.9% n=156/186; OR=5.2 95%CI 1.7 – 15.9;

p=0.002) than those who belief that T2DM does not results from lack of insulin (50% n=7/14).

Those who belief that untreated T2DM can lead to kidney and eye problems practice weight loss more frequently (85.1% n=149/175; OR=4.5 95%CI 1.8 – 11; p<0.0001) than those who belief untreated T2DM cannot lead to kidney and eye problems (56% n=14/25).

Most of the people who belief that a T2DM patient should check his or her blood pressure attempt to lose weight more frequently (83% n=156/188; OR=3.5 95%CI 1.04 – 11.7; p=0.033) than those who do belief that a T2DM patient should not check his or her blood pressure (58.3% n=7/12).

Among those who know that T2DM management is required throughout life, weight lose practice was high (86.9% n=152/175; OR=8.4 95%CI 3.4 – 20.8; p<0.0001) compared to those who stated that T2DM management should be managed only when one is sick (44.0% n=11/25).

The attemption to lose weight was significantly more prevalent in thinking that T2DM can be controlled and the complications preventable (82.2% n=162/197; OR=9.3 95%CI 1 – 105; p=0.030) than when patients think that T2DM cannot be controlled and the complications cannot be prevented (33% n=1/3).

The practice to lose weight was significantly higher if specific diabetic diet is a part of diabetic treatment and control (84.4% n=162/192; OR=37.8 95%CI 4.5 – 318.5; p<0.0001).

The attemption to lose weight was significantly more frequent when diabetic patients do think that pap, porridge, meat, rice and umngqusho should be eaten in moderation (84.9% n=157/185; OR= 10.1 95%CI 3.2 – 32.4; p<0.0001) than when they do not (35.7% n=5/14).

The attemption to lose weight was significantly higher among diabetic patients who exercise (89.5% n=154/172; OR=18.1 95%CI 7.1 – 45.8; p<0.0001) than those who do not (32.1% n=9/28).

The attemption to lose weight was significantly higher in T2DM patients who think that losing weight can prevent DM from getting worse (85.7% n=156/182; OR=11 95%CI 3.7 – 32.2; p<0.0001) than those who do not (35.3% n=6/17).

The attemption to lose weight was significantly more prevalent in patients who think that smoking can worsen DM (87.7% n=143/163; OR=9.4 95%CI 4 – 22.1; p<0.0001) than those who do not (43.9% n=13/30).

The attemption to lose weight as significantly higher in DM patients who think that alcohol intake is not good for DM patients (88.8% n=158/178; OR=26.9 95%CI 8.9 – 0.7; p<0.0001).

The attemption to lose weight was significantly more reported by DM patients who think that insulin injection without eating first can cause sudden fainting (83% n=156/188; OR=3.5 95%CI 1.04 – 11.7; p=0.033) than those who do not (58.3% n=7/12).

The attemption to lose weight significantly (p=0.003) varied and unequally across the main three parts of DM management: the highest proportion in foot care (83.7% n=87/104), the intermediate in eye care (63.6% n=21/33), and the lowest in preventing heart disease (50% n=7/14).

Multivariate Analysis

After adjusting for residence, part of diabetic management, can diabetes be hereditary, diabetes can result from lack of insulin, diabetes if untreated can lead to kidney and eye problems, part of diabetes treatment and control, smoking can worsen diabetes, losing weight can prevent diabetes from getting worse, insulin injection without first eating can cause sudden fainting and do you exercise, logistic regression model (multivariate analysis) identified only to reduce intake of quantities of alcohol and foods such as pap, rice and red meat as the most important independent determinants of the attemption to lose weight (Table 10).

Table 10. Independent determinants of the attemption to lose weight in T2DM patients

	B	S.E	Wald	OR(95%CI)	P-value
Independent Variables To reduce intake of quantities of Alcohol					
Yes vs. No	2.987	0.628	22.645	19.8(5.8-67.8)	<0.0001
Pap, rice, meat					
Yes vs. No	2.054	0.800	6.589	7.8(1.6 –37.4)	<0.01
Constant	-3.151	0.934	11.377		<0.001

SE: Standard Error

Chapter 4: Discussion

This study describes the beliefs, attitudes, practices, response to interventions and therapeutic education among obese and normal weight T2DM patients residing around Mthatha. The data generated in this study provided insight into important aspects of the knowledge, attitude and practices relating to diabetes, features of T2DM, food choices, lifestyle modification, drug therapy (compliance) and risk factors and complications. No previous studies have documented the BAP of T2DM among Mthatha residents. Most studies have documented the epidemiology and prevalence of diabetes in this region (Ekpebegh *et al.,* 2010; & Longo-Mbenza *et al.,* 2010) and hence, this study has attempted to gather the data regarding the same. The study had serious limitations which had to be taken into consideration before interpretation of the results. The sample size was very small and the sampling method used was one of convenience as such the participants cannot be regarded as truly representative of the population. The use of questionnaires to measure the KAP domains was another limiting factor. While this is unavoidable when assessing areas relating to subjective domains of health, knowledge, preferences, satisfaction and similar areas, it does bring about risk of bias associated with social desirability effect (Jabbar *et al.,* 2009). Practically, while we emphasize the importance of knowledge in adherence to drug therapy and lifestyle programs, we must acknowledge the complexity of the issue of poor adherence (or compliance) which involves several other factors that were reported in the literature.

These include lack of patient information about their disease or its treatment, adverse effects of prescribed drugs, the patient's dissatisfaction with their health condition, the personality of the patient, the disease and the treatment (cost and complexity) (Shah *et al.,* 2009; & Tham *et al.,* 2004).

Since the study conducted among patients with T2DM, mean ± SD of age for men was 49.0 ±16.6 and that for females was 48.2± 15.8, all of whom have been diagnosed of T2DM and have been attending the diabetes clinic at NMAH for more than 1year. Of the 200 patients who participated in the study, 57% were from rural areas, 43% were obese, 33% were laborers and 23% have attended tertiary education. Since the setting of the study was a government hospital and all of the patients were recruited from thereof, they may be biased regarding the above specified demographic variables. Lifestyle modification and diet may be the problem in diabetes management. According to (Van Zyl & Rheeder, 2008), self-care among individuals with type 2 diabetes improved glycemic control and reduced complications. Thus education of the importance of exercise, diet and weight lose in this community can become a cost-effective public health strategy in the management of T2DM.

The American Diabetic Association (ADA) has defined self management education as the process of providing the person with diabetes the knowledge and skill that is needed to perform self care, manage crises and make life style changes. According to the ADA (2009), the national standard for self care management in diabetes entails patients and doctor to work together.

Highlighted in this standard for self care is the teaching of the pathophysiology of T2DM and its relation with treatment, nutritional aspects, medications, complications, goal setting and psychosocial adjustments. Considering these standards, the questionnaire for this current study was formulated.

Diabetes is an important cause of morbidity and mortality all over the world. Because of lack of awareness about diabetes, most patients with diabetes suffer from its complications (Wild *et al.,* 2004).

Answers to questions tapping knowledge revealed a good proportion of the population understood clearly the pathophysiology of T2DM. A very high percentage of patients had a good understanding of the etiology of T2DM. The majority of them knew what DM is, knew that DM is hereditary, knew that DM can result from lack of insulin and that excessive intake of sugar is the major cause of DM in SA. However, a call for concern 20% of the sample however belief that excessive intake of sugar is not the major cause of T2DM in South Africa. Khan (2011) demonstrated a very strong association between increased sugar consumption and increased in the prevalence of DM. As such our population needs to be educated on the implications of increased sugar consumption and or sugar containing foods. Most of the patients knew all the symptoms of DM. Only a smaller percentage of the sample population listed single symptoms of their condition.

During evaluation of BAP regarding the risk factors and complications of T2DM, we found that most of T2DM patients are aware of the risk factors. Although most patients were aware of the risk factors of hypertension, only a few checked their blood pressure (BP) regularly.

Mahler (1995) emphasized the need for a diabetic to check their BP daily. The majority of patients checked BP once a month during their monthly appointment. Most patients also knew the risk factor of hyperglycemia and had normal blood sugar and HBA1c readings for two consecutive visits. The percentage of patients who recognized alcohol consumption and foot care as risk factors was small. Our study population has to be educated further in this area.

Obesity is a major risk factor for T2DM and also over all cardiovascular health but the study shows that only half aimed for target body weight. 47% of our study sample was obese. Thus, a number of the patients might not have considered obesity as a risk factor for complications related to their condition. The underlying cause of obesity as reported by (Norris *et al.*, 2005) is poor dietary habit. Although there is no specific diet, it is important for obese T2DM patients to modify diet to low glycemic index foods (high-fiber, low-fat foods such as, fruits, vegetables, whole grains). Also, diabetic diet should be less in animal products, refined carbohydrates and sweets. Consistency in diet is also an important element in the control of obesity and a resultant control of blood sugar level. In this light, other health professionals including dietitians can also help in strategizing health goals, food preferences and lifestyle changes to help reduce all co-morbidity related to obesity and T2DM.

Our study have identified reduced intake of quantities of alcohol and foods such as pap, rice and red meat as the most important independent determinants of the attemption to lose weight among obese T2DM patients. This discovery has also been highlighted by other researches in the literature (ADA, 2009; & Norris *et al.*, 2005) as an important entity for good glycemic control among T2DM patients.

Evaluations of the BAP regarding complications reveal limited knowledge of all the complications of T2DM. Most patients belief that kidney problem is the major complication of DM. A majority also noted eye problems as the complication of DM yet only 69% have visited an ophthalmologist. This is however good compared to the results reported from studies in developed countries (Gul, 2010).

More than half of the sample population correctly answers questions regarding dietary requirements in diabetes. This is much better than the figures reported from Pakistan (Gul, 2010). The poor state of knowledge regarding nutrition has been reported in several studies (Rafique & Azam, 2006). This implies our population is doing far better regarding this area. The percentage of the population which recognized sedentary life style (no exercise) as a risk factor of DM was very high.

Thus, if this population is so knowledgeable about their dietary and exercise, why is almost half of the study sample obese? Logically speaking, one could conclusively say that there is a practice or implementation gap among our population. From our study, this gap could be due to factors such as residence. People from urban areas in Mthatha practice weight lose or exercise regularly ($p= 0.011$) than those from rural areas.

The attitude and practice regarding drug therapy and treatment had an overall better score compared to other aspects of this study. Most of the patients never forget to take their medication and if they can't make it for their appointment, they sent somebody to collect their monthly medication.

Also, a good proportion of the patients are aware of blood sugar level falling below normal and of this proportion, more than half of them took sugar to increase their blood sugar level.

Responses to interventions and therapeutic education showed that people in Mthatha region believe that diabetes can be managed, however, some of the them believed that it can be managed only when one is sick and not throughout life. The majority of the patients also responded that their condition can be controlled and all its complications prevented. A good percentage of the study sample responded that specific diabetic diet is a primary part in the treatment and control of T2DM.

Education concerning treatment and control was also good. A high percentage of the patients responded that taking diabetic tablets is one of ways of treating diabetes and are aware of hypoglycemia if medication is taken pre-prandial.

Concerning diabetic management, most of the patient's belief that foot care is part of diabetic management, a small proportion noted eye care and preventing heart disease are part of diabetic management.

In the area of lifestyle modification, the responses were not good averaging only 80% of the patients who responded that alcohol is not good for a diabetic, that losing weight can prevent diabetes from getting worse and that smoking can worsen diabetes. 20% of the population does not know that the above mentioned factors are important in the management of their condition.

The percentage of uncontrolled blood sugar and HBA1c among T2DM patients residing in Mthatha was good. 80% of the patients have their previous and current blood sugar level and HBA1c readings within normal. This is very encouraging and tells us of the seriousness of the patients in the management of their condition and it also tells us that patient's compliance in treatment and management of their condition is very good.

Chapter 5: Conclusion

Present study was carried out to understand the knowledge, attitude and practices (KAP) regarding diabetes mellitus (DM) among the diabetic patients attending a diabetic clinic at NMAH. Diabetes education among patients with T2DM was high, illustrating the positive outcome of the effort of the government, health professionals and the patients towards the management of their condition. However, the high number of obese patients, excessive alcohol consumption and poor dietary modifications (increased consumption of rice, pap, and meat) identified in Mthatha through this study, are areas that need to be emphasized in the education of this community. This study might help in the implementation of diabetic education program giving more emphasis among obese group of patients and encouraged all patients to have more contact with physicians, so that complications that occur at early stage of disease could be prevented.

The researchers recommended the involvement of appropriately trained and culturally aware members of the primary healthcare team in patient education and in partnership with other secondary care services.

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Beliefs, attitudes, practices, response to interventions and therapeutic education of obese and normal weight Type 2 Diabetes Mellitus patients attending the Diabetic Clinic in Nelson Mandela Academic Hospital, Mthatha.

APPENDIX 1 : INFORMED CONSENT (English Version)

Consent form

I am Dr. Odufu Alexander Abiodun a Master degree candidate in Public Health, at WSU, Community Medicine Department.

I am carrying out a study on Beliefs, Attitudes, Practices, Response to Interventions and Therapeutic Education of obese and normal weight Type 2 Diabetic Mellitus Patients Attending The Diabetic Clinic in Nelson Mandela Academic Hospital, Mthatha. The study is in partial fulfillment of the Masters in Public Health at the Walter Sisulu University, Mthatha. Any information that will be provided for this study will be treated as confidential and for the benefit of all patients. The study is voluntary and you should feel free to participate or decline and by declining to participate in this study will not affect your care in the Hospital.

Any abnormality will be communicated to you and an intervention will be offered where necessary.

The researcher (Dr Odufu AA) will be available on 0475024400 for any question or clarification you may require at any point in time during this study.

I (initials please) ..... understand the purpose of this interview and volunteer to participate in the study.

Signature .....

Date .....

Investigator.....

Signature .....

Date .....

APPENDIX 2: INFORMED CONSENT: XHOSA VERSION

Ndingu DR Odofu Alexander Abiodun wefundise Ntlekele lase ye Master degree ePublic Health, eWSU, Community Medicine Department.

NdenzaIsifundokwinkolo,ngcinga,impendulokungenelelonemfundisokwizigulanazodidilwesibinilwesigul oiswekileezihambakwiklinikhiyeswekileese Nelson Mandela Academic Hospital eMthatha.

EsisifundoesenziwakwiDyunivesithiiWalterSisulusiyinxalenyeyokuzalisekiswakwemfundoephezulu ye Masters kwiMpiloyoluntu.

Naziphinainkcukachaezizawuthizivezwekwesisifundozizawuphathwangentloniphonangokufihlakeleyouk ukhuselanokuncedaizigulanaekuthethwengazo.

Esisisifundoesinganyanzelisiyo,yhayeukwalaukuthabathainxaxhebaakuyikuthetha into yokubaisigulaniasizuphathekakakuhleesibhedlele.

Ukubakukhonaingxakietheyabhaqekakwisigulananasiphinaesingeneleleyouncedoluzakubakhoaphokukh onaimfunekokhona.

UmfunilwaziuDRAAodofuuzakufumanekaiiyureezingamashumiamabinianesineukuphendulayonkeimibuz okulenombolo 047 502 4400.

Mna……Ndiyasiqondaisizathusokwenzalemibuzoyayendiyithatheinkxaxhebangaphandl ekokunyanzeliswa.

Sayina……..

Umhla……..

Umbuzi-mibuzo……..

Sayina……..

Umhla……

Beliefs, attitudes, practices, response to interventions and therapeutic education of obese and normal weight Type 2 Diabetes Mellitus patients attending the Diabetic Clinic in Nelson Mandela Academic Hospital, Mthatha.

APPENDIX 3 : DATA COLLECTION SHEET

QUESTIONNAIRES

Instructions

Mark the appropriate block with a X or write your answer on the space provided.

For office use only

SOCIODEMOGRAPHIC DATA

			1-3

1. Date questionnaire is completed (dd/mm/yy)

-	-	-		4-5

2. What is your gender

(a) Male	1			6
(d) Female	2			

3. What is your age (years)?

				7-8

4. What is your occupation?

_	_	_		9-10

5. What is your highest educational qualification?

_	_	_		11-12

6. Where do you live?

a. Urban area	1			13
b. Rural area	2			

7. What is your marital status?

(a) Single	1			14
(b) Married/Traditional marriage	2			
(c) Divorced/Separated	3			
(d) Widow/Widower	4			
(d) Living together	5			

8. What is your home language?

(a) Afrikaans	1			15
(b) English	2			
(c) Sotho	3			
(d) Tswana	4			
(e) Xhosa	5			
(f) Zulu	6			
(g) Other: Specify:	7			

9. What is your weight (kg)?

_	_		_	16-17

10. What is your height (m)?

			_		18-20

Knowledge, attitude, practice and response to education of diabetes mellitus.

11. Is diabetes an increase in blood sugar more than normal?

a. yes	1		_	21
b. No	2			

12.Can diabetes be hereditary?

a. Yes	1			22
b. No	2			

13. Can diabetes result from lack of insulin?

a. Yes	1			23
b. No	2			

14. Is Excessive intake of sugar the major cause of diabetes in RSA?

a. Yes	1			24
b. No	2			

15. The symptom(s) of diabetes is/are:

a -increased frequency of urination.	1								25-30
b -increased thirst and hunger.	2								
C -increased tiredness.	3								
d -Slow healing of wounds.	4								
e - All of the above	5								
f –Don't know	6								

16. Diabetes if untreated can lead to kidney and eye problems?

a. Yes	1			31
b. No	2			

17. The most accurate method of monitoring diabetes is by checking blood sugar level

a. Yes	1			32
b. No	2			

18. A diabetes patient should check his/her blood pressure?

a. Yes	1			33
b. No	2			

19. If yes to the above, how often?

a. Every day	1			34
b. once every month	2			
c. Every six months	3			
d. No need to check	4			

20. Do you think diabetes can be managed?

a. Yes	1			35
b. No	2			

21. If yes to the above question, how do you manage it?

a. Throughout life	1			36
b. Only when I am sick	2			

22. Do you think diabetes can be controlled and the complications prevented?

(a) Yes	1			37
(b) No	2			

23. Part of diabetic treatment and control is?

(a) Specific diabetic diet	1			38
(b) The food you eat does not matter	2			

24. Do you think pap, porridge, meat, rice and umngqusho should be eaten in moderation by a diabetic patient?

(a) Yes	1			39
(b) No	2			

25. Do you exercise?

(a) Yes	1			40
(b) no	2			

26. If you do exercise, how often?

(a) Every day	1			41
(b) Once a week	2			
(c) Not sure	3			

27. Losing weight can prevent diabetes from getting worse.

(a) Yes	1			42
(b) No	2			

28. Smoking can worsen diabetes.

(a) Yes	1			43
(b) No	2			

29. One of the ways of treating diabetes is:

(a) Taking tablets	1			44
(b) Insulin injection	2			

30. Alcohol is not good for diabetic patients.

(a) True	1			45
(b) False	2			

31. Insulin injection without eating first can cause sudden fainting.

(a) True	1			46
(b) False	2			

32. Part of diabetic management is:

(a) Foot care	1					47-49
(a) Eye care	2					
(b) Preventing heart disease	3					

33. How many times do you eat white bread, pap or potatoes in a week?

(a) Once	1			50
(b) Twice	2			
(c) Three times	3			

34. How many times in a week do you drink coke or other cold drinks?

(a) Once	1			51
(b) Twice	2			
(c) Three times	3			

35. Do you eat diabetic diet?

(a) Yes	1			52
(b) No	2			

36. Do you attempt to lose weight?

(a)Yes	1			53
(b) No	2			

37. How often do you forget to take your medications in a month?

(a) Never	1			54
(b) Once or twice	2			
(c) Three to four times	3			
(d) More than four weeks	4			

38. If you cannot make your monthly appointment for

your medication, what do you do?

(a) Don't take medication for that month	1			55
(b) Send somebody	2			

39. Do you drink alcohol?

(a) Never	1			56
(b) Occasionally	2			
(c) Once or twice a week	3			

40. Have you ever been to the eye doctor to check your eyes?

(a) Yes	1			57
(b) No	2			

41 .Was your last visit and this current visit BP reading good?

(a) Yes	1			58
(b) No	2			

42. Are you aware of blood sugar levels falling below normal when taking your drugs?

(a) Yes	1			59
(b) No	2			

43. If yes to the above, what do you do?

(a) Took sugar	1			60
(b) Took medicine	2			
(c) Took insulin	3			
(d) I don't know	4			

44 .Was your previous visit's blood sugar and hemoglobin A1C normal

(a) Yes	1			61
(b) No	2			

45. Is your current blood sugar and hemoglobin AIC normal?

(a) Yes	1			62
(b) No	2			

46. Do you take care of your foot at all?

(a) Yes	1			64
(b) No	2			

47. If yes to the above question, how often?

(a) Once a day	1			65
(b) Every month	2			
(c) Every six months	3			
(d) Yearly	4			