KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,

KUMASI, GHANA

COLLEGE OF HEALTH SCIENCES,

SCHOOL OF PUBLIC HEALTH

DEPARTMENT OF HEALTH PROMOTION AND EDUCATION

FACTORS INFLUENCING TREATMENT COMPLIANCE IN TYPE 2 DIABETES MELLITUS CLIENTS AT THE KOMFO ANOKYE TEACHING HOSPITAL DIABETIC CLINIC.

BY

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DECLARATION

I hereby do declare that except for references to other people's work which have been duly acknowledged, this piece of work is my own composition and neither in whole nor in part has this work been presented for the award of a degree in this university or elsewhere.

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SIGNATURE……..DATE……

NAME…….

HEAD OF DEPARTMENT

DEDICATION

This research is dedicated to all type 2 diabetics as well as the medical personnel who take care of them.

ACKNOWLEDGEMENT

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ABBREVIATIONS AND ACRONYNMS

ADA	American Diabetes Association
CVD	Cardiovascular Disease
DM	Diabetes Mellitus
GNA	Ghana News Agency
HBA1C	Glycated Haemoglobin
HCV	Hepatitis C Virus
KATH	Komfo Anokye Teaching Hospital
MCP SIG	Medication Compliance and Persistence Special Interest Group
MODY	Maturity Onset Diabetes of the Young
RPSGB	Royal Pharmaceutical Society of Great Britain
SMBG	Self-Monitoring of Blood Glucose
T2DM	Type Two Diabetes Mellitus
W.H.O	World Health Organization

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ABSTRACT

Introduction

Diabetes mellitus (DM) is a life-long advancing metabolic disorder delineated by an increase in blood glucose level. One of the three major types of diabetes is type 2 diabetes and it's the most common type. In this condition there is a high level of sugar (glucose) in the blood as a result of absolute or relative deficiency of insulin hormone. Available evidence suggests that, vigorous management of type 2 diabetes mellitus can reduce the morbidity and mortality of the disease by decreasing the chronic complications that come along with it. However, research suggests that compliance to therapy is low among clients with type 2 DM. As a result, the study aimed at assessing the factors that influence compliance to treatment in clients with type 2 diabetes at the Komfo Anokye Teaching Hospital (KATH) Diabetic Center.

Methods

Descriptive cross-sectional study design was used to conduct the study and the study population included type 2 diabetes mellitus clients who visited the diabetic clinic of Komfo Anokye Teaching Hospital during the period of the study. Data were gathered using structured questionnaire and systematic random sampling technique was adopted to administer the structured questionnaire to 400 diabetic patients. The data were entered into Microsoft Access

2013 and was transported to Stata version 12.0 for analysis. Statistical significant was set at 0.05

Results

Majority of the respondents (99.0%) acknowledged the fact that type 2 DM can be managed by treatment compliance with medications, diet planning, exercises, monitoring and injury prevention management. Also, most of the clients mentioned factors such as accessibility of KATH (28.5%),

registration with NHIS (94.3%), medications covered by NHIS (62.2%), ability to afford medications not covered by the NHIS (26.1%) as perceived factors influencing treatment compliance. Finally, there was a significant relationship between socio-demographic characteristics such as educational level of the respondents and their compliance to diet (pvalue=0.03), medication (0.01) and injury prevention (p-value=0.03). Also the relationship between occupational status of the diabetics (p-value=0.01) as socio-demographic characteristic and compliance to medication was statistically significant.

Conclusion and Recommendation

Accessibility of KATH, registration with NHIS, medications covered by NHIS, clients' ability to afford medications not covered by NHIS were found to be factors influencing treatment compliance from the perspective of clients. Therefore, the need to create support fund by the support organizations to assist diabetes patients in the purchase of non-insured medications.

CHAPTER ONE: INTRODUCTION

1.0 Background of the study

Diabetes mellitus (DM) is a lifelong advancing metabolic disorder delineated by an increase in blood glucose level (Shrivastava et al., 2013). This is mainly due to absolute or relative deficiency of insulin hormone which could result in extensive damage to most of the systems in the body especially the nerves and blood vessels (Shrivastava et al., 2013). DM has been classified into two main types namely; type 1 insulin dependent diabetes mellitus and type 2, non-insulin dependent diabetes mellitus (Thent et al., 2013).

Worldwide, 347 million people have diabetes and type 2 diabetes makes up about 90% (WHO, 2013). The World Health Organization (WHO) has projected it to be the seventh leading cause of death by 2030 (WHO, 2013). In addition, the WHO has estimated that about 80% of people suffering from DM live in the low and middle income countries like Ghana (WHO, 2013). In Africa, the prevalence is increasing dramatically with estimated rate of 10.4 million people (WHO, 2013). Ghana has about 4million people who have been affected by diabetes mellitus (G.N.A, 2012) and the national prevalence for diabetes in 2013 was 3.35% (International Diabetes Federation, 2013)

Compliance to healthcare is defined as the extent to which a patient's behavior in terms of taking medication, executing the lifestyle changes, undergoing medical test or keeping appointment with the physician coincides with the healthcare provider's recommendations for health and medical advice (Khan et al., 2012). Research suggests that compliance to therapy is low among clients with type 2 diabetes mellitus (Vermeire et al., 2009). Available evidence suggests that, vigorous management of type 2 diabetes mellitus can reduce the morbidity and mortality of the disease by

decreasing the chronic complications that come along with it (Wens et al., 2005). Irrespective of the benefits derived from therapy, studies in the USA have shown that recommended glycemic goals are attained by 50% of patients which is related to decreased compliance to treatment (Garcia-Perez et al., 2013). In relation to this, a study conducted in Sudan revealed that about 45% of the type 2 diabetics had poor metabolic control. This was also due to non-compliance with diet, drugs and lack of education on the condition (Bos and Agyemang, 2013).

Compliance to treatment in patients with type 2 diabetes mellitus is dependent upon a number of factors, including those specific to the patient, to the provider, and to the treatment (David, 2012). Non-compliance to therapy is thus not restricted to client's failure to take prescribed medication. It also encompasses their refusal to change their lifestyle, carrying out prescribed investigations and adhering to review appointments. A study carried out in Nigeria to assess the factors that influence compliance to oral hypoglycemic revealed that factors like forgetfulness, high cost and fear of side effects contributed to non-compliance to treatment (Adisa et al., 2009). Thus, the problem of poor adherence to therapy is a very complex one as it is multifaceted. In Ghana, available evidence indicates that, complications which often result in the death and disability of type 2 diabetics can be attributed to poor compliance to treatment and late diagnosis, making DM the eleventh top cause of death in the country (WHO, 2013).

Records available at the KATH Biostatistics Unit (2010) indicate that diabetes featured prominently among the top 10 causes of admission and death. Irrespective of the numerous efforts made by health care workers to reduce the burden the disease imposes on clients, lots of complications and death are still recorded at KATH. This may be due to a low level of compliance to treatment regimen. However, the contributing factors for clients' compliance to their treatment

regimen have not been fully exploited. This has necessitated the conduct of a study to assess the factors that influence compliance to treatment among type 2 diabetics.

1.1 Problem statement

The prevalence of type 2 DM is on the rise globally and is considered one of the major public health problems. As a result, Oputa (2012) says that DM epidemic is centered on type 2 as only half a million people have type 1 diabetes mellitus globally.

According to the WHO, non-adherence to treatment for chronic conditions like diabetes mellitus is a predicament which results in grievous health benefits as well as severe financial consequence in relation to wasted resources like hard cash, time in addition to ill managed disease (Cramer et al., 2008). In 2012, the death rate attributable to diabetes in Africa for persons aged 35-64 was 7.1% for males and 7.9% for females, drawing more attention to diabetes in the developing world (Kratzer, 2012).

Even though type 2 diabetes mostly affect adults aged 40 years and above, it is progressively becoming frequent among juveniles and young adults on account of infrequent exercising and excessive consumption of health compromising meals resulting in obesity (Garcia-Perez et al., 2013).

In dealing with this epidemic, a lot of financial and human resources are put into the management of type 2 diabetes by various governments. Regardless of these efforts, type 2 diabetes continues to threaten the human resource capacity of various nations. This may be attributed to the numerous complications that type 2 diabetics develop including amputation of limbs, neuropathy, and retinopathy leading to blindness and nephropathy just to mention a few.

These complications may be credited to decrease compliance to treatment regimen. At the Komfo Anokye Teaching Hospital, majority of the type 2 diabetics who are admitted usually are as a result of complications or poorly controlled blood glucose level. In Ghana, it has been confirmed that DM of which type 2 accounts for 90% is the main cause of prolonged ill health in at least 2.2 million Ghanaians. At KATH, irrespective of efforts being made to improve the quality of life of type 2 diabetics, a high rate of mortality and disability still persist which may be due to a low level of compliance to therapy. It is therefore critical to investigate the reasons why clients with type 2 diabetes do or do not comply with their treatment regimen as a lesson learning to improve compliance to treatment regimen and to justify the enormous resources put into the management of type 2 diabetes.

1.2 Rationale for the study

Studies have shown that type 2 diabetics can achieve good glycemic control if they conformed to the treatment regimen recommended by their physicians. This might reduce the rate of complications and death caused by type 2 DM. For this to happen, it will be expedient to carry out this study to assess the reasons why type 2 diabetics do or do not comply with the recommended treatment regimen prescribed by healthcare providers. This will provide lesson learning for healthcare providers to improve upon the existing management system. This will ultimately improve the quality of lives of type 2 diabetics and therefore preserve the human resource the country loses from the death of type 2 diabetics as well as the numerous complications associated with it. Furthermore, the financial resources invested by the government in the management of type 2 DM will be channeled into other areas of the economy.

1.3 Conceptual framework

Compliance or non-compliance to treatment in patients with type 2 diabetes mellitus is dependent upon a number of factors, including those specific to the patient, to the provider, and type of treatment regimen as shown in figure 1.1.

Factors that can lead to compliance to treatment includes desire to stay healthy, easy access to healthcare, pleasant client staff relationship, social support. Also, factors like fear of side effects of medication, forgetfulness, unfriendly staff client relationship, multi drug regimen can lead to non-compliance to type 2 DM treatment. Compliance to treatment among type two diabetics may result in a good glycemic control, possible reduction in the development of complications and a further reduction in the rate of death among type 2 diabetics as indicated in figure 1.1. However, non-compliance to treatment may result in poor glycemic control leading to diabetic ketoacidosis, blindness, heart attack, and stroke, and acute kidney failure, chronic ulcers resulting in amputation and subsequently chronic disability and premature death.

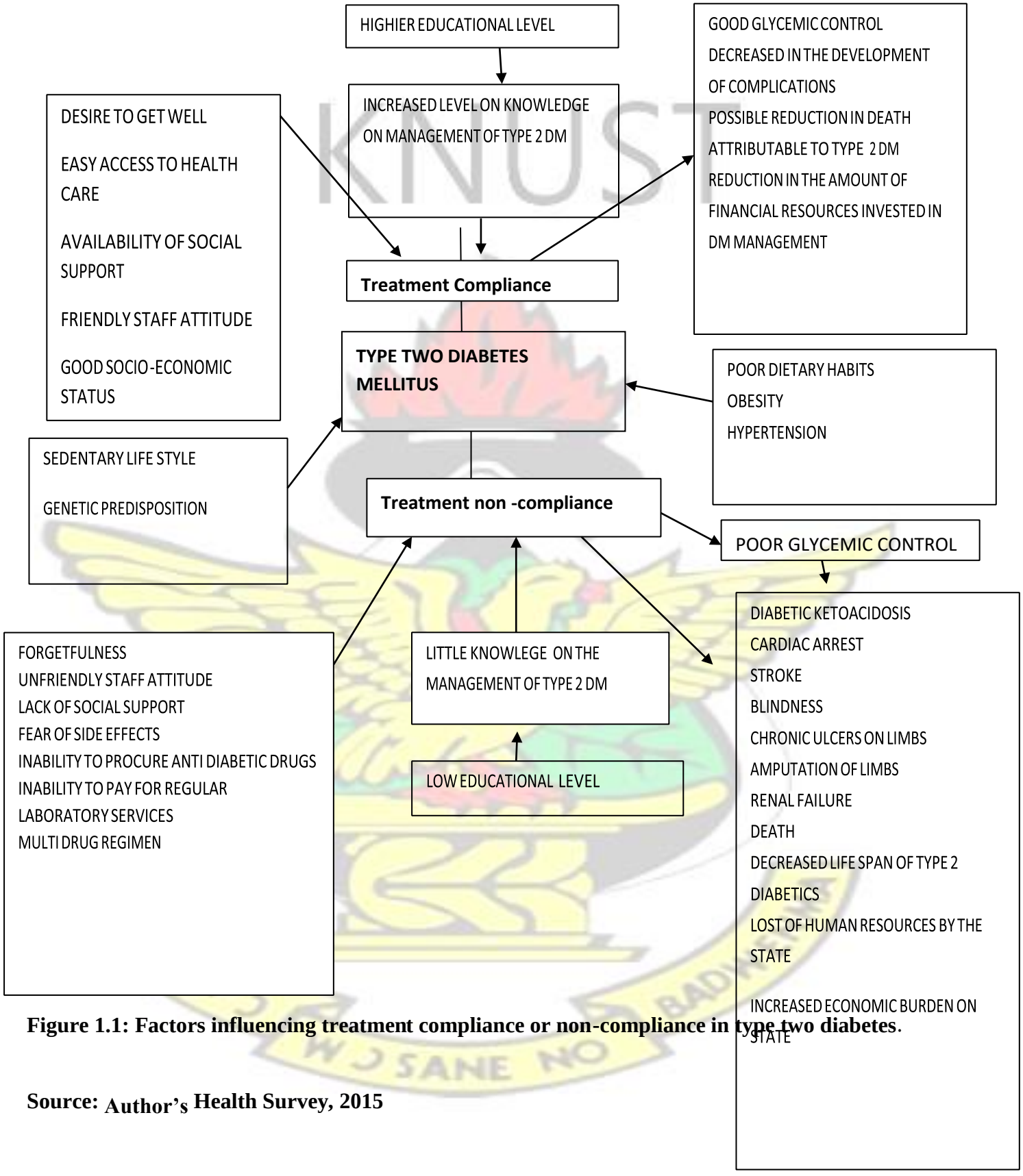

Figure 1.1: Factors influencing treatment compliance or non-compliance in type two diabetes.

Source: Author's Health Survey, 2015

1.4 Research questions

1. What is the level of knowledge of clients on type 2 diabetes' management?
2. What are the factors that facilitate or inhibit compliance to type 2 diabetes treatment from the perspective of client?
3. Are there any relationship between the number of drugs prescribed, side effect and compliance to medication among type 2 diabetics?
4. Are there any relationships between socio-demographic characteristics and treatment compliance among type 2 diabetics?

1.5 Objectives of the study

1.5.1 Main objective

To assess the factors that influence compliance to treatment in clients with type 2 diabetes at the KATH Diabetic Center.

1.5.2 Specific objectives

1. To assess clients knowledge on the management of type 2 diabetes.
2. To identity factors influencing compliance to treatment based on clients' perspective.
3. To establish any relationship between the number of drugs prescribed, side effect and compliance to medication.
4. To establish any relationship between clients' socio demographic characteristics and treatment compliance.

1.6 Profile of the study area

The study was conducted at KATH, a referral and tertiary teaching hospital with over1000 beds. The hospital is located in Kumasi which is the capital town of the Ashanti Region of Ghana. Among the most populated cities in Ghana, Kumasi is rated second. Owing to the crucial location as well as the political influence of the city, Kumasi advanced into a dominant merchandising center with all dominant marketing roads merging on it.

The city has expanded, thereby making it second only to Accra in terms of land area, population size, social life and economic activity. Its strategic location has also endowed it with the status of the principal transport terminal and has assured its pivotal role in the vast and profitable distribution of goods in the country and beyond. This has also made KATH one of the most accessible tertiary medical facilities in the country. The 2000 population census kept the population at 1,170,270.

Kumasi is located in the transitional forest zone and is about 270km north of the national capital, Accra. It is between latitude 6.35o – 6.40o and longitude 1.30o – 1.35o, an elevation which ranges between 250 – 300 meters above sea level with an area of about 254 square kilometers. There are nine sub metros in Kumasi including the Bantama Sub Metro where KATH can be located. The Komfo Anokye Teaching Hospital is the second-largest hospital in Ghana, and the only tertiary health institution in the Ashanti Region. It is the main referral hospital for the Ashanti, Brong Ahafo, Northern Regions and Western Region of Ghana. It also receives referrals from other neighboring countries.

The hospital has the following directorates: Obstetrics and Gynecology, Surgery, Child Health,

Polyclinic, Anesthetics and Intensive Care Unit, Medicine, Diagnostic, Oncology, Accident and Emergency, Dental, Technical Services, Domestic Services. The diabetic clinic of KATH falls under the jurisdiction of the directorate of medicine.

This clinic is rated the biggest diabetes clinic in the region. It has been estimated that 6% of adults in this region are affected by DM type 2 (Ghana Health Service, 2006). The clinic has on its staff enrollment physician consultants as well as specialist and professional nurses who run the day to day activities of the clinic. In addition, the clinic is well equipped for the management of diabetes. Data available from the clinic's record office indicated that more than 100 clients visit the clinic weekly and the morbidity rate of type 2 DM at KATH for the year 2013 was 6%. .

1.7 Scope of the study

The study takes a critical look at the factors that influence treatment compliance among type 2 diabetics at the KATH diabetic clinic. Much attention was paid to the knowledge of clients on the management of type 2 diabetes, factors influencing treatment compliance based on clients' perspective, any possible relationship between clients' socio- demographic characteristics and treatment compliance, relationship between the number of drugs prescribed, side effect and compliance to medication and suggestions on how treatment compliance could be improved.

1.8 Organization of the study

The report is sectioned into chapters one to six where details of the work are provided as introduction, literature review, research methodology, results, discussions, recommendations, references and appendices.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter reviews a wide range of literature pertinent to this thesis. These are grouped into four parts. The first part is on the theoretical framework of diabetes, followed by risk factors for Diabetes Mellitus, management of Type 2 Diabetes and lastly Type 2 Diabetes treatment compliance or non-compliance.

2.1 Theoretical framework of diabetes

It is important to sample a few definitions of what diabetes is. Thus, according to the World Health Organization (2013), Diabetes which is also known technically as Diabetes mellitus (DM) is a group of metabolic diseases in which there are high blood sugar levels over a prolonged period. On their part, Joshi and Shrestha (2010) emphasized that diabetes is a chronic disease caused by inherited and/or acquired deficiency in production of insulin by the pancreas, or by the ineffectiveness of the insulin produced. In further explanation, Zheng et al (2007) affirm that such a deficiency results in increased concentrations of glucose in the blood, which in turn damage many of the body's systems, in particular the blood vessels and nerves. Furthermore, it is said that manifestations of hyperglycemia consist of regular passage of urine, excessive thirstiness, as well as elevated craving for food and untreated diabetes often results in numerous complications according to World Health Organization (2013). On the same score, Kitabchi et al (2009) indicated that acute complications may results from diabetes and these include diabetic ketoacidosis and non-ketotic hyperosmolar coma. Yet again, there may be serious chronic complexities of diabetes which could include cardiac conditions, cardio vascular accidents, renal impairment, ulceration of

the foot and hands as well as destruction of the eyes (WHO, 2013). In summary, diabetes is due to either the pancreas not producing enough insulin or the cells of the body not responding properly to the insulin produced (WHO, 2011).

In addition to the above exposition on diabetes, the American Diabetes Associations as cited in Medical News Today (2013) states that diabetes (otherwise known as diabetes mellitus, DM) is described as a metabolic disorder in which an individual's body cannot properly store and use fuel for energy. Explaining these further, Medical News Today (2013) indicates that the fuel that one's body needs is called glucose (sugar) and that glucose comes from foods such as breads, cereals, pasta, rice, potatoes, fruits and some vegetables and is also made in a person's liver and muscles. Owing to this explanation, it can be said that an individual's blood carries glucose to all of the body's cells to use for energy such that to use glucose, the body needs insulin and insulin is the hormone made by a gland in the body called the pancreas. Insulin regulates blood glucose by stimulating the removal of glucose from the blood and its uptake into muscle, liver and fat cells where it can be stored for energy. Furthermore, it is reckoned that sometimes a person's body does not make enough insulin or the insulin does not work the way it should. When that happens glucose then stays in the blood and does not reach the person's cells. In that case the person's blood glucose levels get too high (hyperglycemia) and can cause diabetes or pre diabetes. Pre diabetes is when blood glucose levels are higher than normal but not high enough for a diagnosis of diabetes. This means that over time, when one has too much glucose in the blood it can cause health problems.

Generally, it is believed that there are three main types of diabetes and they are type 1, 2 and 3 (ADA, 2013). In diabetes development, there is a stage called pre-diabetes. Under this condition, the situation is known as impaired glucose tolerance and it is a condition where one's Blood sugar

level elevates to a level higher than the normal range for most people, but is still low enough not to be considered diabetes. People who have pre-diabetes are at risk of developing type 2 diabetes later in life, if they do not monitor their condition carefully. People who have been diagnosed with pre-diabetes can help keep from progressing to a full blown diagnosis of type 2 diabetes by watching their weight, exercising and eating the right foods (Lichtenstein, 2014).

Type 1 diabetes mellitus is characterized by loss of the insulin-producing beta cells of the islets of Langerhans in the pancreas, leading to insulin deficiency. This type can be further classified as immune-mediated or idiopathic. The majority of type 1 diabetes is of the immune-mediated nature, in which a T-cell-mediated autoimmune attack leads to the loss of beta cells and thus insulin (Rother, 2007). It causes approximately 10% of diabetes mellitus cases in North America and Europe. Most affected people are otherwise healthy and of a healthy weight when onset occurs. Sensitivity and responsiveness to insulin are usually normal, especially in the early stages. Type 1 diabetes can affect children or adults, but was traditionally termed "juvenile diabetes" because a majority of these diabetes cases were in children. "Brittle" diabetes, also known as unstable diabetes or labile diabetes is a term that was traditionally used to describe the dramatic and recurrent swings in glucose levels, often occurring for no apparent reason in insulin-dependent diabetes. This term, however, has no biologic basis and should not be used (Kishore, 2014). Still, type 1 diabetes can be accompanied by irregular and unpredictable hyperglycemia, frequently with ketosis, and sometimes with serious hypoglycemia. Other complications include an impaired counter regulatory response to hypoglycemia, infection, gastro paresis (which leads to erratic absorption of dietary carbohydrates), and endocrinopathies.

These phenomena are believed to occur no more frequently than in 1% to 2% of persons with type 1 diabetes (Rother, 2007).

According to Buse et al (2011), Type 2 diabetes is a lifelong (chronic) disease in which there is a high level of sugar (glucose) in the blood. Type 2 diabetes is the most common form of diabetes. From the perspective of Medline Plus (2014), type 2 diabetes is caused by insulin not working properly in the body system. This is because the beta cells of the pancreas; located below and behind the stomach produces insulin which transports blood glucose into the cells. The cells of the body reserve glucose and later convert it into energy for use by the body. Individuals with type 2 diabetes have their muscle cells as well as their fat and liver cells not responding accurately to insulin. This is often referred to as resistance to insulin, leading to blood glucose not being stored in the cells for energy. Consequently, hyperglycemia (high level of glucose in the blood) occurs and subsequently type 2 diabetes over time

Individuals who are diagnosed with type 2 diabetes are usually obese or plump. Higher levels of fat in the body result in inaccurate use of insulin. However, type 2 DM can also affect people who are slim and it is prevalent in the aged. Other risk factors for type 2 diabetes include family history, decreased physical activity, eating unhealthy meals and truncal obesity (Pories et al., 2011).

People with Type 2 diabetes often have no symptoms at first. They may not have symptoms for many years. Early symptoms of diabetes may include: Bladder, kidney, skin, or other infections that are more frequent or heal slowly. Also, fatigue, hunger, increased thirst and increased urination may be experienced by the person with Type 2 diabetes. Additionally, a prospective diabetic would experience blurred vision, erectile dysfunction and pain or numbness in the feet or hands (Stone et al., 2014).

The third main type of diabetes is gestational diabetes, which is a condition that women can get when they are in the second trimester of pregnancy. About 4 percent of all pregnant women will

develop gestational diabetes. Unlike Type 1 and Type 2 diabetes, gestational diabetes will disappear after the baby is born. When a woman has an occurrence of gestational diabetes during pregnancy, she is more likely to have it again in the next pregnancy and puts the woman at a higher risk of developing Type 2 diabetes later in life. The older a woman is when she is pregnant, the higher the risk of developing gestational diabetes during pregnancy (Carolan et al., 2012).

2.2 Risk factors for Diabetes Mellitus

2.2.1 Hereditary factors

According to Elbein (2009), Type 2 diabetes mellitus is among the many common diseases with a strong genetic component, however until recently, the variants causing disease remained largely undiscovered. The hereditary factors are also known as genetic factors. It has been noted that most cases of diabetes mellitus type 2 involved many genes contributing small amount to the overall condition (ADA, 2010). As of 2011 more than 36 genes have been found that contribute to the risk of type 2 diabetes. All of these genes together still only account for 10% of the total genetic component of the disease (Herder & Roden, 2011). There are a number of rare cases of diabetes that arise due to an abnormality in a single gene (known as monogenic forms of diabetes). These include maturity onset diabetes of the young (MODY), Donohue syndrome, and Rabson-Mendenhall syndrome, among others. Maturity onset diabetes of the young constitutes 1–5% of all cases of diabetes in young people (National Diabetes Information Clearinghouse, 2008).

Family history has been noted to double the risk of diabetes, equal to the risk of obesity, which is also heritable. Obesity and family history quadruple the risk of developing diabetes (Elbein, 2009).

Dabelea et al (2000) found out that the risk of developing diabetes was higher in siblings born after mother developed diabetes than those born before mother developed diabetes. However, no difference was observed in the risk of developing type 2 diabetes whether an individual born before or after his father developed diabetes. In contrast, Lindsay et al (2000) reported an association between paternal but not maternal type 2 diabetes. From the above studies it can be concluded that individuals with family history of type 2 diabetes are at risk of developing it too.

2.2.2 Factors relating to hypertension

Hypertension and diabetes are two of the leading risk factors for atherosclerosis and its complications, including heart attacks and strokes. There is substantial overlap between diabetes and hypertension, reflecting substantial overlap in their etiology and disease mechanisms. In the Hong Kong Cardiovascular Risk Factor Prevalence Study, only 42% of people with diabetes had normal blood pressure and only 56% of people with hypertension had normal glucose tolerance (Cheung, 2010). In the US population, hypertension occurs in approximately 30% of patients with type 1 diabetes and in 50% to 80% of patients with type 2 diabetes (Landsberg & Molitch, 2004). A prospective cohort study in the United States reported that type 2 diabetes mellitus was almost 2.5 times as likely to develop in subjects with hypertension as in subjects with normal blood pressure (Gress et al., 2000). In reality, diabetes and hypertension are found in the same individual more often than would occur by chance, whereas the overlap between dysglycemia and raised blood pressure is even more substantial than that between diabetes and hypertension (Cheung et al., 2008). This suggests either shared genetic or environmental factors in the etiology (Cheung, 2010).

2.2.3 Dietary factors

Diet is known to influence body weight and thus is recognized as a modifiable risk factor for type 2 diabetes (Meyer et al., 2000). Dietary trans fatty acids, according to Salmeron et al (2001) increase the risk of developing type 2 diabetes and dietary polyunsaturated fatty acids reduce the risk of developing type 2 diabetes. A prospective study carried out by Van Dam et al (2002) to examine the relation between dietary fat and meat intake and the risk of developing type 2 DM concluded that there is an association between saturated fat intake and a higher risk of developing type2 diabetes. In addition, frequent consumption of processed meats may increase risk of type 2 diabetes.

Schultze et al (2004) found out that a diet high in refined carbohydrates and low in cereal fiber is associated with an increased risk of type 2 diabetes. Adding to this, a higher consumption of beverages sweetened with sugar was found to be related to increased levels of weight gain and elevated chance of being diagnosed with type 2 DM among women.

2.2.4 Factors relating to alcohol and smoking

Lifestyle factors associated with the onset of type 2 DM include alcohol use and smoking habits (Mozaffarian et al., 2009). A prospective cohort studies carried out in 2009 by Mozaffarian et al found smoking and alcoholism to be independently associated with the development of type 2 DM. A meta-analysis they did revealed that participants who had never smoked had a 22% lower risk of developing type 2 diabetes in comparison with participants who had ever smoked and those who were currently smoking. According to Kaur (2014) smoking is inflammatory and may also induce insulin resistance and visceral adiposity which are all risk factors for diabetes.

Kao et al (2001) concluded that high alcohol intake increases diabetes risk among middle–aged men. However, they indicated that more moderate levels of alcohol consumption do not increase the risk of type 2 diabetes in neither middle aged men nor women. Baliunas (2009) confirmed previous research findings that moderate alcohol consumption is protective for type 2 DM in men and women, indicating a U shape relationship. Possible reasons given for this assertion is that moderate alcohol consumption may increase the sensitivity of insulin (Mozaffarian et al., 2009). However, the biological mechanism responsible for the pathogenesis of type 2 DM and alcohol intake requires further research (Liu et al., 2010).

2.2.5 Physical inactivity factors

Physical activity benefits at least 23 different health conditions (Lee et al., 2012). Irrespective of this, less than 50% of people engage in adequate physical activity to gain such benefits (WHO, 2012). A prospective study carried out by Gill et al (2008) concluded that physical inactivity is an independent and modifiable risk factor for type 2 DM. Specifically, physical activity interventions reduce the risk of developing diabetes (Knowler et al., 1995). Hu et al (2001) added that physical inactivity further elevates once risk of developing type 2 diabetes.

2.2.6 Obesity

Excess body fat is a single most significant contributing factor for the development of type 2 diabetes (Hu et al., 2001). According to Wang et al (2005) abdominal adiposity and overall obesity are strongly and independently associated with the risk of developing type 2 DM. Results from various studies have provided enough evidence that obesity and weight gain are associated with a higher risk of developing type 2 diabetes (Mokdad et al., 2003).

2.2.7 Medical conditions

Hepatitis C Virus

The suggestion that hepatitis c virus (HCV) may be associated with type 2 diabetes was first made by Allison in 1994 (Allison et al., 1994). Ever since then, many epidemiological studies have shown an association between HCV and type 2 DM (Antonelli et al., 2014). A metaanalysis carried out by Naing et al (2012) concluded that an association existed between HCV and type 2 DM. However, the direction of the association needs further investigation.

2.3 Management of type 2 diabetes

Type 2 diabetes (T2DM) is a major cause of premature morbidity and mortality particularly from cardiovascular disease (CVD), blindness, amputations and renal failure (ADA, 2012).

Therefore, one of the major aims in the management of type 2 DM is to produce near to normal glucose levels in order to avert the development of diabetic complications (Robert et al., 2013). Also worth noting is the contribution of heart disease to the premature mortality among diabetes; accounting for about half of all death (Dejesus et al., 2009). Therefore, T2DM management aims at blood pressure control to reduce the risk of CVD and renal failure (Dejesus et al., 2009).

According to the ADA (2012) the essentials of the management of type 2 diabetes include selfcare program involving team based care and patient education, monitoring of glycemic control, dietary management (food planning), physical activity, pharmacological management of hyperglycemia and the prevention and management of complications.

2.3.1 Self-care programme

Diabetes is best managed in a team made up of the patient and health professionals. The health professionals are made up of the dietician, general practitioner or the physician specialist, diabetes educator and depending on the clients condition a cardiologist, nephrologist, ophthalmologist, psychologist, obstetrician and a podiatrist (International Diabetes Federation, 2013). Diabetes patients are given health education on the nature of the condition, symptoms, risk of complications, importance of regular exercise, lifestyle modification and meal planning, self-monitoring of blood or urine glucose, how to cope with emergencies e.g. hypoglycemia and on their medication.

2.3.2 Dietary management

High intake of dietary fiber particularly of the soluble type improves glycemic control, decreases hyperinsulinemia and lowers plasma lipid concentrations in type 2 diabetics (Chandalia et al., 2000). Therefore, dietary guidelines for patients with diabetes emphasize an overall increase in dietary fiber through the consumption of unfortified foods e.g. vegetables, whole grain cereals, root tubers like yam and fruits rather than the use of fiber supplements. Carbohydrates should provide about 50%-55% of the total energy required (Guariguata, 2012). According to Tuomilehto et al (2001), type 2 diabetics should consume mono and polyunsaturated fats in place of saturated. Also, they are to avoid or limit the following: fatty meats, full cream dairy products, palm oil, coconut oil and processed foods and saturated fat is to be restricted to less than 10% of total energy intake. In addition, Tuomilehto et al (2001) recommends that small amount of sugar can be consumed as part of a healthy eating plan and non-nutritive sweeteners may be used to replace larger quantities of sugar, such as in soft drinks and confectionery.

Furthermore, it is recommended that diabetics eat three meals daily to distribute carbohydrate intake during the day. It is also recommended that protein should provide 15% - 20% of total energy intake. Again, it has been observed that good sources of protein are fish, seafood, lean meat, chicken, low-fat dairy products, legumes and nuts (Norris et al., 2001).

Once more, diabetics are to restrict alcohol intake to not more than 1-2 standard e.g. 285ml beer, 375ml light beer, 100ml wine or 30ml spirits, which contain 10g of alcohol per day. This is because alcohol may cause hypoglycemia in diabetics on sulphonylureas or insulin. With regards to the intake of salt, diabetics are to restrict salt intake to less than 6g/day, particularly in people with hypertension. Foods which are high in salt such as preserved and processed foods and sauces e.g. soy, oyster and fish sauces are to be reduced (Peterson & Karen, 1999).

2.3.3 Blood and urine glucose monitoring

Glycated hemoglobin (HbA1c) according to Spraul et al (1987) is the gold standard for assessing long-term glycemic control. This should be assessed every 3-6 months. However, for diabetics with haemoglobinopathies, HbA1c is unreliable. In place of HbA1c, a fasting blood glucose level is a sound alternative. Where there are no laboratory facilities, a finger-prick fasting capillary glucose can be used (Bain et al., 1989).

Glucose monitoring can be done using blood or urine testing even though blood testing is optimal. The frequency of monitoring is dependent on the available resources to the client or the country as a whole (Latter et al., 2011). Self-monitoring of blood glucose levels is considered as very important in improving the safety and quality of treatment for clients who are managed with insulin and during pregnancy. It is also very essential in guarding against hypoglycemia.

Furthermore, Diabetes Atlas as cited in Ford and Lynch (2013) states that for stable clients, monitoring of blood glucose levels could be done once or twice a week. For clients with poorly controlled or unstable glucose levels, monitoring of blood glucose levels should be done daily until the expected targets are met. The expected targets for all diabetes according to the Diabetes Atlas (2012) are stated in Table 2.1

Table 2.1: Glucose Monitoring of diabetic patients

for most	HbA1c (%)	FPG/Pre Prandial PG	2Hour Post Prandial PG
Targets clients	≤ 6.5	4.4-6.1mmol/L 80-110mg/dl	4.4-8.0mmol/L 80-145mg/dl

Source: Diabetes Atlas, 2012

FPG: Fasting Plasma Glucose

PG: Plasma Glucose

2.3.4 Physical activity and regular exercise

The diabetes atlas fourth edition states that physical activity plays an important role in the management of type 2 DM. Physical activity improves insulin sensitivity, thus improving glycemic control and may help with weight reduction (Boule et al., 2001). Diabetics who engage in physical activity on a regular basis have been shown to have significantly lower mortality rates over 12-14 years (Hu et al., 2001).

The health goal regarding physical activity for diabetics is at least 150 minutes of moderate – intensity physical activity each week (Boule et al., 2001). Brisk walking, tai-chi, cycling, golf and

gardening are among activities diabetics can engage in. Additionally, more vigorous activities like dancing, aerobics, jogging, lap-swimming, cycling uphill or heavy digging in the garden can be beneficial as well as through longer durations of moderate-intensity activities (Reid et al., 2010). However, Reid et al state that physical activity should be suitable for a person's age, social, economic, cultural and physical status.

2.3.5 Pharmacological management

The pharmacological management of type 2 diabetes mellitus is based on two significant abnormalities of metabolism- impaired insulin secretion and insulin resistance (Moulin et al., 2007). As result, prescribed hypoglycemic drugs aim at one of the abnormalities above and to effectively address both abnormalities, combination of different hypoglycemic agents is required (Dworkin et al., 2010). Hypoglycemic agents used in the management of hyperglycemia include sulphonylureas and glinides which stimulate the secretion of insulin directly. Also, thiazolidinedione and metformin improve the sensitivity of insulin. In addition, glycosidase inhibitors reduce the rate of carbohydrate absorption thus decreasing the necessity for insulin secretion after meals. For clients with extremely high blood glucose level, pharmacological therapy ought to be initiated immediately as changes in diet and lifestyle may not achieve target (Zin et al., 2008).

Metformin is used as the first line therapy for both obese and non-obese type 2 diabetics in most part of the world including United Kingdom and United States of America (Robert et al, 2010). Besides, insulin is mostly administered when targeted glycemic control can no longer be attained with oral hypoglycemic agents only (Rosenstock et al., 2005). Type 2 diabetes is associated with progressive loss of function of beta cell. As a result, to achieve adequate glycemic control, insulin

is often required and ought to be considered for all type 2 diabetics on adequate oral therapy whose HbA1c is > 6.5%(Horvath et al., 2007). Insulin ought to be combined with oral hypoglycemic agents as they decrease hypoglycemia associated with insulin therapy and also limit weight gain (Yki-Järvinen et al., 2007).

2.3.6 Management of complications

Hypoglycemia

This is possibly a severe complication of the management in type 2 diabetes clients, particularly among the diabetics with renal inadequacies, the aged and diabetics with micro and macro angiopathy (Speckman et al., 2004). WHO defines it as blood glucose concentration of less than three millimole per litre (WHO, 2011). Causes of hypoglycemia include insulin therapy as well as sulphonylurea and glinides; which should be started with low dose with gradual increase in dose. Also delay, reduction or omitting meals can result in hypoglycemia (Gale, 1985). Another cause of hypoglycemia is increase in physical exercise which requires that extra complex carbohydrates ought to be eaten before exercises are carried out. In addition, too much alcohol intake especially on an empty stomach can lead to hypoglycemia (Diabetes Atlas, 2012). Furthermore, some herbal as well as traditional preparations which may contain glucose lowering agents could also result in hypoglycemia (Mehmet et al., 2001).

According to Frier (2008), hypoglycemia can be managed with oral carbohydrate or glucose for diabetics who are conscious. For unconscious clients, 20mls of 50% glucose should be administered intravenously, followed by oral carbohydrate as soon as client regains consciousness.

2.3.7 Diabetic foot problems

Diabetics are thirty times more likely to undergo a lower limb amputation in comparison with the general population as a result of foot problems (Kenealy et al., 2009). Diabetic foot problems usually occur as a result of complex interactions between peripheral neuropathy and peripheral arterial disease and poor foot hygiene. In addition, physicians have estimated that, nearly half of the amputations caused by neuropathy and poor circulation could be prevented by careful foot care (Abdul-Ghani, 2006). As a result, the diabetes atlas urges that comprehensive education on the care of the foot should be given to all diabetics.

The important points in foot care education are:

1. No bare foot walking, including sand and in the water.

2. Inspect feet every day and report any skin breaks or areas of redness or swelling to a healthcare professional.

3 check footwear for foreign objects before putting them on.
4. Keep feet clean and apply moisturizing cream to dry skin, and check for skin cracks, infection, state of the nails, callus (a sign of repetitive pressure), deformities and suitability of footwear" (Nather et al., 2008).

2.3.8 Dyslipidemia and hypertension

According to Kanaya et al (2002), diabetes increases an individual's chance of developing heart conditions by 2-4 times. Therefore, diabetes with consistent blood pressure values greater than

130\80mmHg ought to be treated with the objective of attaining a blood pressure value of 130\80mmHg as this helps in the reduction of micro vascular complications as well as cardiovascular diseases (Adler et al., 2000).

The initial stage of hypertension in a diabetic is managed with lifestyle interventions with emphasis on exercise, weight loss, and restriction of salt and intake of alcohol. If these measures do not help in achieving the desired blood pressure, then pharmacological management using either an angiotensin converting enzyme inhibitor, angiotensin II receptor blockers (Garcia et al., 2012), beta blockers (Lindholm et al., 2002), calcium channel blocker (Pepine et al.,2003) or thiazide diuretics (Siragy et al., 2003) becomes an important part of the management. Most of the time, combination of these therapies is required to achieve targets. This is because type 2 diabetics usually have higher triglycerides and low levels of high density lipoproteins in comparison with the general population. Therefore, lipid lowering drugs are also given to anti diabetics with high lipid levels. In addition, aspirin therapy is also given to type 2 diabetics as it has been proven to lower the risk of cardiovascular diseases (Carey & Siragy, 2003).

2.3.9 Client's knowledge on the management of type 2 diabetes

According to Jin et al (2008), the knowledge of clients on their disease condition as well as its management is never enough. Some clients do not recognize the role their treatments play in the management of their condition (Ponnusankar et al., 2004) and others do not have adequate knowledge on their condition and the effect of poor compliance (Gascon et al., 2004). On their part, Lawson et al (2005) found out that some clients do not know the essence of honoring their review appointments, which if it was done would have helped in the management of their diabetic condition. Furthermore, Bender and Bender (2005) found out that some clients deliberately

suspend their medications to observe their health without medications as they considered their drug intake to be intermittent. For these reasons, Jin et al (2008) concluded that educating clients on their disease condition as well as its management is very essential and thus health care providers ought to make it a priority. In addition, Rubin (2005) intimated that educating clients on their condition and their in depth understanding of their medications could enhance compliance to diabetes treatment modalities. Furthermore, Butterworth et al (2005) found out that clients who are health literate (able to read and comprehend drug labels) to have good compliance to treatment guidelines of diabetes.

2.4 Type 2 diabetes' treatment compliance or non-compliance

Type 2 diabetes management follows a rigorous medical regime; this is where the issue of treatment compliance comes. In various scholarly articles, this topic had been treated taking into consideration what is considered as the norm in that direction. According to Berger et al (2003), adherence and persistence are two common methods of measuring compliance. Adherence (used as a synonym for compliance) describes the amount of pills a person takes within a specified time period whilst persistence describes an individual's continuous usage (in time) of prescribed treatment. In the same way, it has been observed that to simplify research in compliance, acceptable worldwide meaning of compliance to drugs (adherence) as well as persistence has been proposed by Special Interest Group of Medication Compliance and Persistence (SIG MCP) of the International Society for Pharmaco-economics and Outcomes Research (Postma, 2006).

As a matter of fact, in the past two decades, compliance to treatment has become the aim of important research as well as the interest of clinical practice. Treatment compliance is the word used in describing a person's act of following a prescribed treatment regimen at the primary level

(Royal Pharmaceutical Society of Great Britain (RPSGB), 1997). Similarly, Urquhart (1996) indicates that treatment compliance plays a major role in research, health economics as well as health care. It is therefore significant to note that treatment compliance is a vital between procedure and results in medical care. Consequently, it is important to every segment of medical care, together with diabetes and subsequently management of wound. In the same vein, Chatterjee (2006) emphasizes that compliance is a key concept in health care and affects all areas of health care including diabetes. Non_compliance has previously been a label attached to many patients without much thought having been given to the causes of poor compliance.

Further to what had been said about treatment compliance, Penfornis (2003) observed that compliance is an old issue but crucial in the management of chronic diseases. He stated that it is the case in type 2 diabetes mellitus, which requires several drugs, either to treat diabetes or to prevent cardiovascular complications. In the study under review, Penfornis discussed the relationships between drug treatment regimens and treatment compliance in type 2 diabetes and other chronic diseases. It was observed that the greater the number of daily drug intakes, the worst the compliance, even if a single daily intake may cause an increased risk of overdosing. Although the number of tablets or treatments is less frequently linked to compliance level than the number of daily intake, poly therapy is generally associated with a poor compliance. The consequences of a poor compliance on the prognosis or the management of these diseases are analyzed based on cardiovascular studies. Even if nearly no studies exist in type 2 diabetes, improving treatment compliance represents a major challenge in these patients. Such improvement requires to preferentially using once-a-day intake, but this is still difficult with several oral anti-diabetics. Fixed combinations such as the glibenclamide plus metformin combination, cause a decrease in the number of daily tablets and this permit a better compliance. Such approaches, to be fully

beneficial, should be part of a global management of these type 2 diabetic patients, taking into account all their difficulties to follow their treatments, and based on a strong physician and patient relationship.

It is amply clear that non-compliance with laid down rules for treatment could be fatal to the patient as we would see in the scholarly views that are put together in this section of the literature review. First and foremost, Osterberg and Blaschke (2005) indicate that drugs do not work in patients who do not take them. Thus, it is clear that full benefit of many of the effective medications that are available will be achieved only if patients follow prescribed treatment regimen reasonably closely. They affirm that most health care systems have been designed in such a way that acute diseases are taken care of in a better way than chronic diseases. Adherence rates are typically higher among patients with acute conditions as compared to those with chronic conditions. Adherence is defined as the extent to which patients take medications as prescribed by their health care providers (Sharma et al., 2014). Studies on this subject show that adherence for medications in chronic diseases averages only 50% (Joan et al., 2008; Turpin, 2007).

Diabetes is a challenging disease to be managed successfully. It requires frequent selfmonitoring of blood glucose (SMBG), dietary modifications, exercise, and administration of medications as per schedule. Therefore, regimen adherence problems are common in individuals with diabetes; making glycemic control difficult to attain (Hernandez-Ronquillo et al., 2003).

Recent data from the American Diabetes Association targets HbA1c level less than 6% (American Diabetes Association, 2010). It is widely used as the standard biomarker for the adequacy of glycemic control that further associates with reduced mortality and reduced incidence of complications in patients with type 2 DM (Anderson & Swardsudd, 1995).

Poor adherence to the therapy of chronic diseases including type 2 DM is a big challenge all over the world (Sabate, 2003). In the developed countries, adherence to treatment of chronic diseases is estimated to be 50% and the rate reduces in the developing countries (WHO, 2003). Previously the problem of poor compliance to treatment was blamed on patients to the relative neglect of health system as well as health provider factors (Sabate, 2003). The ability of type 2 diabetics to comply with treatment plan is simultaneously influenced by several factors including social and economic factors, the healthcare team/system, the characteristic of the disease as well as it therapies and patient related factors (Sabate, 2003).

The consequences of poor compliance to long term therapies among type 2 diabetics are poor health outcomes and increased cost of health. Increasing the effectiveness of adherence intervention may have a far greater impact on the health of the population than any improvement in specific medical treatments (WHO, 2003).

Moreover, compliance to medical therapy refers to health seeking behavior of clients being in congruence with the prescribed recommendations of healthcare provider regarding their medications, diet, exercise and lifestyle changes (Jin et al., 2008). Besides, low compliance to prescribed medical treatments has been a complex challenge particularly among clients with chronic illnesses and has been acknowledged as a major public health problem causing huge financial burden on healthcare systems of the nations of the world (Vermiere et al., 2009).

2.4.1 Client's perspective on factors influencing treatment compliance in type 2 diabetics

Several factors from the diabetics' perspective account for good or poor compliance to treatment. First of all, the financial status and income of clients is considered to be a factor that influence

compliance as the treatment could be lifelong (Ellis et al., 2004). In support of the above, Jin et al (2008) noted that for clients with high source of livelihood or indemnity benefits, the cost of healthcare shouldn't be a challenge. In addition to the above, Mishra et al, 2005 found out that clients with no insurance cover or a low financial status have a greater chance of not complying with their therapy.

Other factors according to Delamater (2006) that could influence treatment compliance would be forgetfulness which is another factor that has been found to be contributing to non-compliance to medication and review appointment for diabetics. Yet again, Patient Prescriber relationship has also been found to be a strong factor which influences compliance to treatment (Gonzalez et al., 2005). Various researchers have discovered that clients adhere better to treatment whenever healthcare providers reassure clients, offer emotional support and treat clients on an equal level (Lawson et al., 2005).

From other perspectives, studies conducted by Kaplan et al (2004) found out that side effects of medications are threats to treatment compliance of diabetes. On a positive side, Fienstein et al (2005) as well as Voils et al (2005) found out that clients who were supported emotionally by members of their families, companions and health personnel had an acceptable level of compliance to their treatment systems. Conversely, Ponnusankar et al (2004) maintain that inaccessibility to healthcare, waiting for longer hours at the clinic, difficulty in getting prescriptions filled and unhappy or unsatisfied clinic visits all influence compliance to treatment of diabetics.

2.4.2 Relationship between number of drugs prescribed, side effects and compliance to medication.

Several studies have been conducted on the effect of multiple drugs therapy; more than two drugs (Dailey et al., 2001) and client's compliance to therapy. Grant et al (2003) found a high rate of compliance to medications among type 2 diabetics irrespective of the number of drugs prescribed for clients. However, Donnan et al (2002) concluded that one tablet a day was associated with a higher rate of compliance in comparison with multiple tablets. Relating to this, Cramer (2004) said poly therapy was associated with decreasing compliance to treatment. In the same vein, Dailey et al (2001) discovered that a simple one drug therapy resulted in better compliance as well as persistence than a complex multiple drug regimens in type 2 diabetics. These results indicate that multiple drug therapy may influence compliance to treatment among type 2 diabetics. Factors that have been identified to be associated with medication noncompliance include forgetfulness, fear of side effects and fatigue from taking drugs for a long period of (Cramer, 2004).

2.4.3 Relationship between client's socio-demographic characteristics and treatment compliance in type 2 diabetes

Socio demographic characteristics usually associated with treatment compliance among type 2 diabetics include age, ethnicity, gender, education and marital status (Jin et al., 2008). Gender has been identified by various studies to be associated with treatment compliance (Lindberg et al., 2001). Balbay et al (2005) and Choi-Kwon (2005) discovered that female clients are more compliant than the males. However, researches conducted by Caspard et al (2005) proposed a contrary view. In addition, some studies found no association between gender and treatment compliance (Spikmans et al., 2003; Senior et al., 2004).

Educational level which is classified as low or high has been found by some researchers to be associated with compliance to treatment in type 2 diabetes (Jin et al., 2008). Ghods and

Nasrollahzadeh (2003) indicated that higher education might be associated with a high level of compliance. Naturally, clients who are highly educated are expected to have more knowledge on the management of diabetes. Owing to this, such clients are expected to be compliant (Jin et al., 2008). Nonetheless, Spikmans et al (2003) identified no association. In addition, Senior et al (2004) stated that clients with lower education comply better to treatment as they may have a lot of trust in their healthcare provider and therefore comply with whatever they are told (Jin et al., 2008). These results indicate the level of education of type 2 diabetics does not predict their compliance to treatment.

Marital status may also have a positive influence on treatment compliance due to the support and help a spouse may offer (Cooper et al., 2005). However, in the study conducted by Kaona et al (2004), marital status was not found to be related to treatment compliance. Thus, marital status may also not be a good forecaster of compliance.

CHAPTER THREE: METHODOLOGY

3.0 Introduction

This section focuses on the research techniques adopted for this study with the aim of achieving the research objectives. It elaborates the research design and provides details regarding the study population, sample size, sampling techniques, data collection techniques, data analysis, ethical consideration and limitation of the study.

3.1 Study design

Descriptive cross-sectional study which describes the frequency of an exposure and outcome simultaneously, in a defined population (Araoye, 2003) was employed for the study. This study design was employed as it does not require huge amount of financial resources and also can be applied to studies like this which needs to be accomplished within a short period of time. This study took place from August 2015 to October 2015.

3.2 Sample size and sampling method

3.2.1 Sample size

For the purpose of this study a proportion of 50% was used as the prevalence of compliance is not known. Also 0.05 was used as the degree of accuracy and a confidence level of 95% was used. Based on these values, the sample size was calculated as

$$n = \frac{Z^2 pq}{d^2}$$

Where; n= the desired sample size

z = the standard normal deviation usually set at 1.96

P = the proportion in the target population estimated to have a particular characteristic.

$$q = 1 - p$$

$$= \quad d = \text{degree of accuracy desired, set at } 0.05$$

$$n = \frac{(1.96)^2(0.5)(0.5)}{(0.05)^2}$$ Therefore

$$= 384.16$$

$$= 384$$

A non-respondent rate of 10% was used for this study and therefore the total sample size was 422.

3.2.2 Sampling method

Systematic random sampling technique was adopted to select the respondents for the study. The total number of clients who assessed the clinic is ten thousand and the needed sample size was 424. Therefore, using the sample frame of 10,000 and a sample size of 424, the sample interval was calculated as 23.5, which was approximated to 24. After a random start was chosen, the 25th person was chosen as the second. Therefore, using a sampling interval of 24, every 25th respondent after first respondent was selected for this study. This continued and was repeated in subsequent days until the total sample size of 424 was attained.

Inclusion criteria

Clients who had been diagnosed of type 2 diabetes for at least a year and had been put on a fixed therapy for at least six months receiving healthcare at the KATH Diabetic Clinic were selected voluntarily to be a part of this study.

Exclusion criteria

Newly diagnosed type 2 diabetics and subjects who had been diagnosed of type 2 DM for less than a year and had been put on a fixed therapy for less than six months, receiving treatment at the KATH Diabetic Clinic was excluded.

3.3 Data collection technique and tools

A quantitative study using a structured questionnaire was employed to gather data from study participants. Prior to this, a pilot study was conducted by the researcher at the in patients' wards D 3 and 5 of the KATH. A total of 10 and 5 structured questionnaires were administered to clients with a diagnosis of type 2 diabetes on admission at KATH. The intention was to establish the effectiveness of the questionnaire in gathering the needed data and also to help in restructuring of the questionnaire where necessary. An information sheet was prepared and given to the study participants to read. For those who could not read, the information on the sheet was explained to them. Those who agreed to participate in the study were asked to sign or thumbprint a consent form. The structured questionnaires were administered to clients at the diabetic clinic. The data was collected by the researcher and the five research assistants who were trained by the researcher. For participants who could read and write, the questionnaires were given to them personally to answer. However, the questions and answers were explained to illiterate clients and answers given were written or indicated on the questionnaire by the researcher and the trained assistants. This was done on daily basis until the desired number of participants was obtained. The data that was gathered from the clients included socio demographic characteristics, the knowledge level of clients on the management of type 2 diabetes; clients' perspective on factors that influence

compliance to type 2 diabetes treatment and the relationship between the number of drugs prescribed, side effects and compliance to medication.

3.4 Data analysis

Initial data was captured on Microsoft access 2013 and exported for analysis using Stata version 12 software. The data was presented in frequencies and charts where necessary. Also statistical significance for all testing was set at 0.05.

Describing the background of the respondents

Descriptive statistics of demographic variables of clients such as age, sex, profession, income levels, and educational level were reported.

Clients' knowledge on type 2 diabetes management

Descriptive statistics approaches were used to assess clients' level of knowledge on the management of type 2 diabetes. Variables assessed were clients knowledge on management of type 2 diabetes specifically on the diet; exercise, monitoring; medication and accident prevention.

Client's perspective on factors inhibiting or facilitating treatment compliance

Descriptive statistics approaches were used to assess clients' views on factors influencing treatment compliance. Variables assessed included accessibility of KATH from clients' place of residence, cost of transportation to and from KATH, contribution of NHIS and clients ability to purchase non-insured drugs.

Relationship between numbers of drugs prescribed, side effect and compliance to medication.

Descriptive and analytical statistics were used to determine any relationship between the number of drugs prescribed, side effect and compliance to medication. Variables used included the number of drugs prescribed for clients' and whether they are able to comply or not. In determining any relationship between the number of drugs clients took and compliance as well as non-compliance, chi- square analysis was used.

Relationship between Socio-Demographic Characteristics and Treatment Compliance

In establishing any relationship between client's socio-demographic characteristics and treatment compliance, chi-square analysis was used.

3.5 Ethical consideration

A written informed consent was obtained voluntarily from all participants. Ethical approval was sought from the human research, publications and ethics committee of KATH and the University of Science and Technology's School of Medical Sciences, Kumasi. Also confidentiality of respondents was maintained by keeping respondents anonymous. Furthermore, the answered questionnaire was kept under lock and key in a suitcase which was handled by the researcher alone. Permission was sought from the management of medicine directorate of KATH before the study was commenced.

3.6 Limitation of the study

There were various barriers to the collection and exchange of information. Some clients were reluctant to offer information as they felt it would negatively affect their chances of receiving treatment. In most cases, explaining the purpose of the research to the clients allayed their fears.

However, some still refused to consent. As a result, the sample size was statistically calculated as 424 but 400 questionnaires were administered. Another limitation was language barrier where majority of the respondents could not comprehend and communicate in English and therefore translating the information from English to the local language and from local language to English was left to the discretion of the researcher. Lack of time was also a limiting factor that affected the comprehensiveness of this study since it had to be completed within a limited time frame.

CHAPTER FOUR: RESULTS

4.0 Introduction

This chapter displays the results of data on factors that influence treatment compliance in type 2 Diabetics Mellitus among clients at the Komfo Anokye Teaching Hospital (KATH) Diabetic Clinic. The findings presented in this chapter are based on the background of the study participants (type 2 diabetic patients) at KATH Diabetic Clinic, knowledge on DM management (medication, exercising, injury prevention, and monitoring), factors influencing compliance to type 2 DM treatment based on clients' perspective, the relationship between the number of drugs prescribed, side effects and compliance to medication and any relationship between sociodemographic characteristics and compliance to treatment.

4.1 Background of study participants

Table 4.1 below shows details of the background characteristics of the type 2 diabetic clients and covers their age, gender, marital status, educational level, occupation and religion. Out of the four hundred (400) clients interviewed, most of them (70.5%) were 50 years and above, followed by those from 30 – 39 years (27.2%). Over seventy percent (74.2%) of the clients were females. Majority of the clients (95.5%) interviewed had ever married whilst few (4.5%) had never married. On the educational level of clients, greater percent of them (74.7%) had attained some level of education and 25.3% of them had never been formally educated. Among those educated, 24.7% had attended middle school (primary and junior high), 37.0% of them attended senior high (secondary) school, and 13.0% were tertiary graduates. With respect to the occupation of clients, more than half of the clients (56.8%) were working in the informal sector, 18.0% of them were

engaged in formal jobs and 25.2% were unemployed. Out of the 400 clients, 90.7% of them were Christians and 8.3% of them were Muslims.

Table 4.1: Background characteristics of clients

Variable	Frequency (N=400)	Percentage (%)
Age group (in years)		
<30	9	2.3
30-39	109	27.2
50 and above	282	70.5
Gender		
Male	103	25.8
Female	297	74.2
Marital status		
Ever married	382	95.5
Never married	18	4.5
Education level		
Middle school	99	24.7
Secondary	148	37.0
Tertiary	52	13.0
Uneducated	101	25.3
Occupation		
Informal skilled	227	56.8
Formal skilled	72	18.0
Unemployed	101	25.2
Religion		
Christian	363	90.7
Muslim	33	8.3
Other	4	1.0

Source: Author's field study, 2015

4.2 Duration of diagnosis and treatment of type 2 DM

Table 4.2 shows the period of diagnosis and years of treatment and management of the type 2 DM. Majority of the clients (49.8%) had been diagnosed of type 2 DM for 6-10 years, followed by those diagnosed for 1-5 years (22.5%) and those diagnosed for 11-15 years (22.3%). Lastly, few clients (5.5%) have been diagnosed for over 20 years. With respect to period of treatment of type 2 DM, 44.8% of the clients had been under treatment within 6-12 months, 27.8% of the clients have been treated within 1-5 years, 16.5% of them had been under treatment within 11-15 years and 11.0% of them had been under treatment for 20 years and above.

Table 4.2 Duration of diagnosis and treatment of type 2 DM

Variables	Number of respondents (N=400)	Percentage (%)
Duration of diagnosis		
1 – 5 years	90	22.5 49.8
6 – 10 years	199	22.3
11 – 15 years	89	5.5
> 20 years	22	
Period of treatment		
6 – 12 months	179	44.8
1 – 5 years	111	27.8
11 – 15 years	66	16.5
≥ 20year	44	11.0

Source: Author's field study, 2015

4.3 Knowledge on the management of type 2 DM

Generally, 99.0% indicated that type 2 DM can be managed by compliance to treatment, 0.5% of them disagreed and 0.8% was indifferent as indicated in Figure 4.1. Also, from Figure 4.2, 38.8% of the clients have been well educated on the importance of taking DM medications,

22.3% of clients have been educated on accident prevention, 17.0% of them educated on dietary management and 11.0% of the clients also well-educated on the important of exercising in Diabetics Mellitus management. The detailed knowledge of clients on the management of type 2 DM were assessed under; Dietary, Medication, Monitoring, Exercise and Injury preventions.

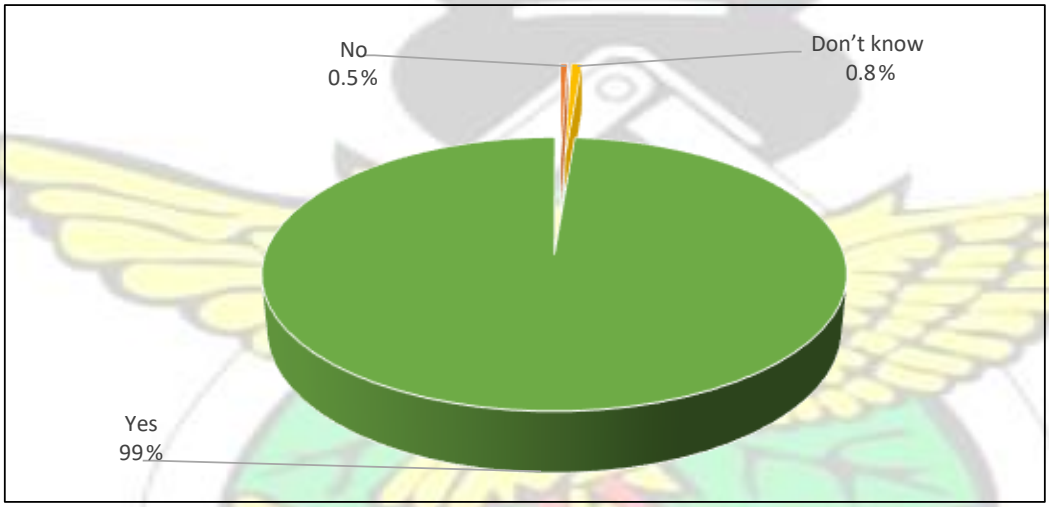

Figure 4.1: Knowledge on type 2 diabetes management

Source: Author's field study, 2015

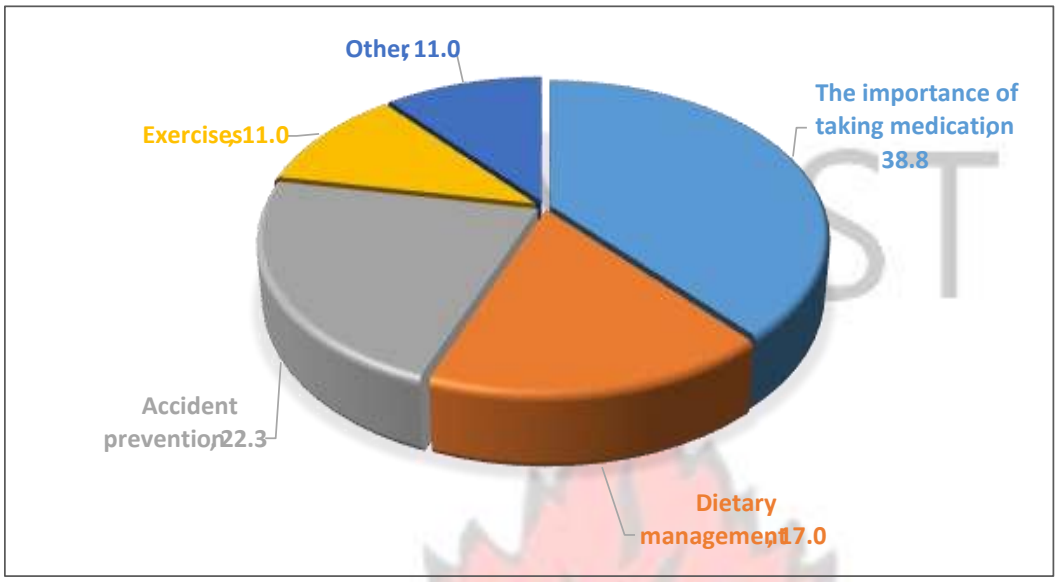

Figure 4.2: Clients education on type 2 DM management

Source: Author's field study 2015

4.3.1 Diet management

Table 4.3 presents clients' knowledge on diet management of type 2 DM. Out of the 400 diabetic clients, greater percent of them (94.0%) were in agreement that, all diabetic clients should be on special diet with some diet restrictions, 2.0% of them disagreed and 4.0%of the clients were indifferent. From perspective of most clients (54.0%), complex sugars (roots tubers, whole grains fruits and vegetables) is the most appropriate food for type 2 diabetic patients, 2.8% of the clients were indifferent and 43.2% of them had other specific food requirements. From Figure 4.3, among those with other food specification, 13.3% of them indicated that diabetics can eat all kinds of food, 29.2% of them also indicated that diabetics can eat all foodstuffs but in moderation and 0.7% of them indicated that diabetics should avoid sugar completely. On the types of food to be avoided by diabetics, a significant proportion of them (94.3%) mentioned fatty foods (sugar, soft drinks and refined products), 1.4% of them disagreed to avoiding fatty foods and 4.3% of them were indifferent. As detailed in Figure 4.3, 88.2% of the clients indicated that fatty foods increase blood

sugar level and weight, 3.3% of them indicated that they impede circulation and thereby increases blood pressure and 8.5% of them had no idea of the effect of eating fatty foods.

Also, majority of the clients (82.5%) knew they had to eat three main meals in a day, 12.8% of them agreed eating twice, 2.5% of them agreed eating more than three (3) in a day. With respect to eating snacks in a day, greater proportion of the clients (90.0%) agreed to eat snacks during the day, 7.8% of them disagreed and 2.8% of them were indifferent. Figure 4.3 shows the type of snacks consumed by clients which included; fruits and fresh juice (89.5%), refined pastries (0.3%) and unrefined pastries (1.0%).

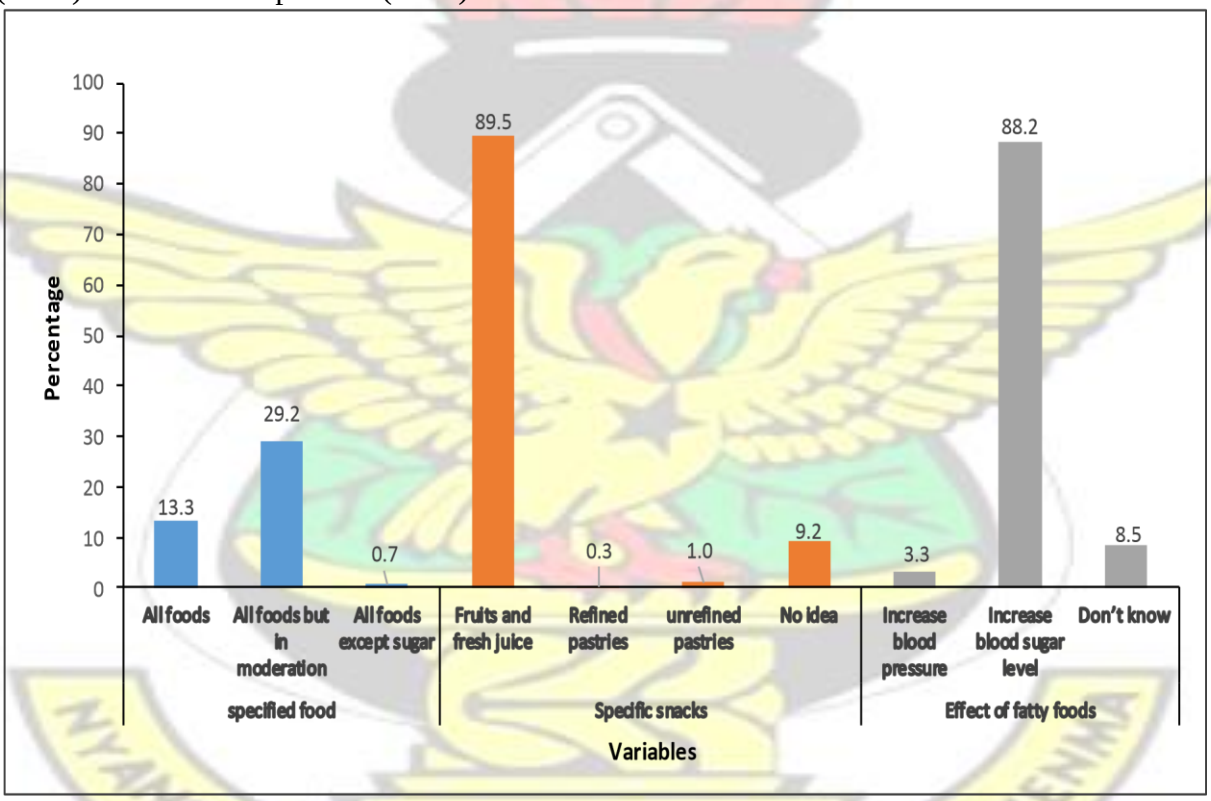

Figure 4.3: Specified diet management

Source: Author's field study, 2015

Table 4.3: Clients knowledge on diet management

Variables	frequency n= 400	Percentage %
Special foods for diabetes clients		
Yes	376	94.0
No	8	2
Not sure	16	4
Complex sugars eg. roots tubers, whole grains fruits and vegetables		
Yes	216	54.0
Don't know	11	2.8
Other	173	43.2
Avoiding fatty foods, fatty meat, sugar, soft drinks, gared refined pastries su		
Yes	377	94.3
No	6	1.4
Not sure	17	4.3
Daily meal pattern Twice	51	12.8
Thrice	330	82.5
More than 3	10	2.5
Unregularly	9	2.2

Eating snacks in a day		
Yes	360	90.0
No	29	7.2
Not sure	11	2.8

Source: Author's field study, 2015

4.3.2 Medication management

Table 4.4 presents knowledge on medication in managing type 2 DM from the client's perspective. Out of the 400 diabetic clients, majority of them (96.8%) were of the view that DM cannot be completely treated and cured whilst 1.2% of them were of the view that DM can be treated and cured. Also a significant proportion of the clients (95.2%) were of the view that diabetics take anti-diabetic drugs for lifetime, 1.0% of them indicated that drugs are not taking for the rest of life and 3.8% of the clients were indifferent. With respect to their knowledge on the names of their prescribed medications, more than half of the clients (57.2%) were able to mention the names of their medications whilst the rest (42.5%) could not. Education by physicians on how medications should be taken included; those asked to take anti-diabetics before meals (45.2%), take medication after meals (40.5 %) and take their medication with meals (13.8%). However, 0.5% of the clients were not sure of the specific education given by their physician to take their prescribed medication.

Over sixteen percent of the clients (16.3%) seldom skip doses without having any harmful effects whilst majority of them (79.2%) always comply with their medication. The decisions taking by clients after missing their medication included; wait till the next dose (59.0%), take medication immediately on remembrance (9.9%), add missed or skipped dosage to the next dosage (1.1%) and omit the missing or skipped dosage completely (6.2%). Furthermore, 21.5% of the clients

knew the therapeutic and side effects of their medications, 1.0% knew partially whilst 77.3% were not aware of the side effects of their medication. From the perspective of 389 clients (98.0%), anti-diabetics are taken primarily for good glycemic control whilst 2.0% had no idea on the importance of taking anti-diabetics. Clients reasons for taking medications prescribed by physicians included; managing both pressure and sugar level (63.0%), reducing blood sugar

level (16.0%), to stay healthy (4.3%), because of physician's prescription (0.2%) and 16.5% had no specific reason.

Table 4.4: Clients knowledge on medication management

Variables	frequency n= 400	Percentage %
DM can be treated and cured		
Yes	5	1.2
No	387	96.8
Not sure	8	2.0
Diabetics take drugs for the rest of life		
Yes	381	95.2
No	4	1.0
Not sure	15	3.8
Knowledge on names of diabetes medications		
Yes	229	57.2
No	171	42.8
Time to take medication		
Before meals	181	45.2
After meals	162	40.5
With meals	55	13.8
Not sure	2	0.5
Decision to skip dose without harmful effects		
Yes	65	16.3
No	317	79.2
Not sure	18	4.5

Source: Author's field study, 2015

Table 4.4: Client's knowledge on medication management cont.

Variables	Frequency	Percentage
Action taken after skipping a dose (n=354)		
Wait till the next dose	209	59.0
Take immediately	35	9.9
Add to the next dose	4	1.1
Omit the dose	22	6.2
No idea	84	23.7
Knowledge on the therapeutic and side effect of medication		
Yes	86	21.5
Partially	4	1.0
No	309	77.3
Don't know	1	0.2
Importance of taking anti-diabetics		
Good glycemic control	392	98.0
Don't know	8	2.0
Reason for compliance to taking drugs		
Physician request	1	0.2
Manage diabetes (both blood pressure and sugar level)	252	63.0

Reduce blood sugar level	64	16.0
Stay healthy	17	4.3
Not told	66	16.5

Source: Author's field study, 2015

4.3.3 Monitoring management

Table 4.5 presents the knowledge of clients on monitoring the signs and symptoms of type 2 DM. Majority of the clients (98.5%) agreed that diabetics patients should monitor their blood sugar level, 0.2% of the clients disagreed and 1.3% of the clients were indifferent. From the perspective of 390 clients, 97.5% of them said monitoring blood sugar level aid in identifying hypoglycemia and hyperglycemia. However, 2.5% of them had no idea on the importance of monitoring blood sugar level. The symptoms of hypoglycemia as mentioned by clients included; sweating (11.5%), hunger (2.8%), dizziness (6.5%), restlessness (25.3%), weakness (10.0%) and body shake (7.8%). (See figure 4.5). Initiatives taken by clients to stabilize hypoglycemia were taking in sugar and soft drinks (28.5%), eating (2.0%), taking medication (1.3%), stop taking prescribed medication (0.5%) and 2.7% visit hospital to see physicians. However most of the clients (65.0%) do nothing specific to stabilize themselves in case of hypoglycemia as shown in figure 4.5.

Also body pains and headache (14.0%), restlessness (19.5%), dizziness and weakness (30.5%) frequent test for water (19.3%) and urinating continuously (18.3%) were the signs and symptoms of hyperglycemia mentioned by clients as shown in Figure 4.6. Clients' response in stabilizing hyperglycemia condition were doubling prescribed medication (1.0%), exercising (1.8%), taking sugar (3.0%), taking medication (20.0%), visiting physician (24.7%) and adhering to diet

restrictions (5.5%). However, 44.0% of them do nothing specific to stabilize themselves in case of hyperglycemia as detailed in figure 4.6.

From the views of the clients, 6.2% of them indicated that diabetics should monitor their sugar level daily, 21.7% of them indicated weekly, 24.8% of them indicated monthly, and 43.8% of

them indicated different monitoring routines. Figure 4.4 depicts other specified routines indicated by the 43.8% of the clients. These were monitoring their sugar level yearly (2.5%), monitoring 2-5 times in a year (33.6%), five (5) times in a year (2.5%) and monitor only when requested by the physician (6.1%). However, from Table 4.5, 3.5 % of the patients had no blood sugar level monitoring routine.

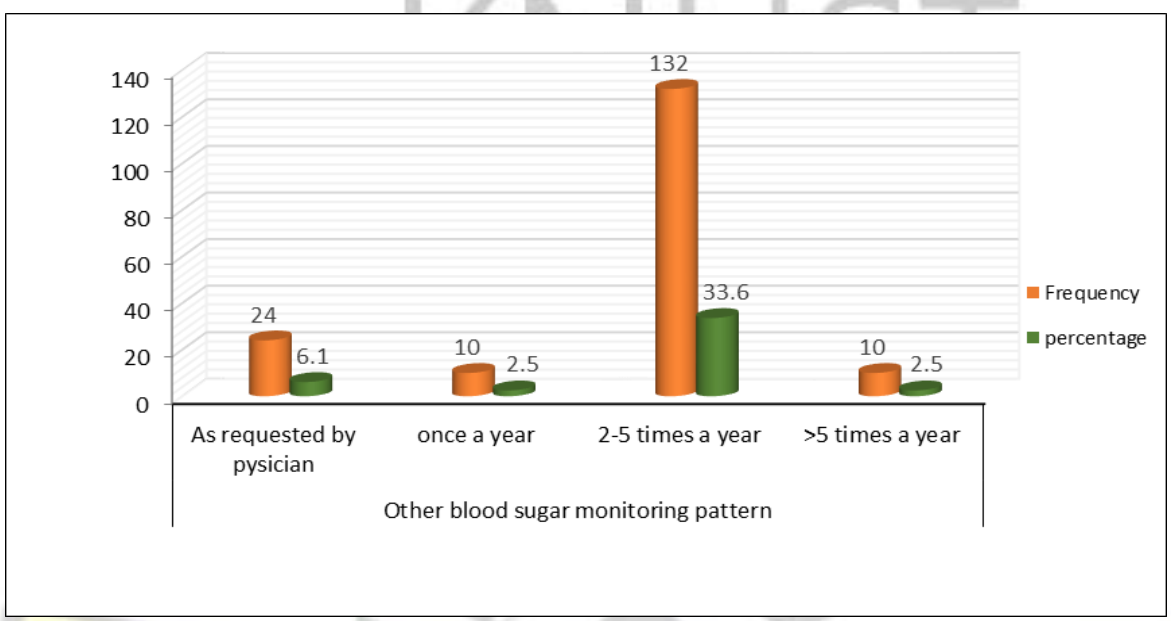

Figure 4.4: Distribution of other blood sugar monitoring routine

Source: Author's field study, 2015

Table 4.5: Clients knowledge on monitoring management

Variables	'equency n= 400	Percentage %
Diabetics required to check blood sugar level		
Yes	394	98.5
No	1	0.2
Don't know	5	1.3
Importance of regular monitoring of blood sugar level		
Identify Hypoglycemia and Hyperglycemia	390	97.5
No idea	10	2.5
Routine of monitoring blood sugar level		
Daily	25	6.2
Weekly	262	65.5
Monthly	99	24.8
None	14	3.5

Source: Author's field study, 2015

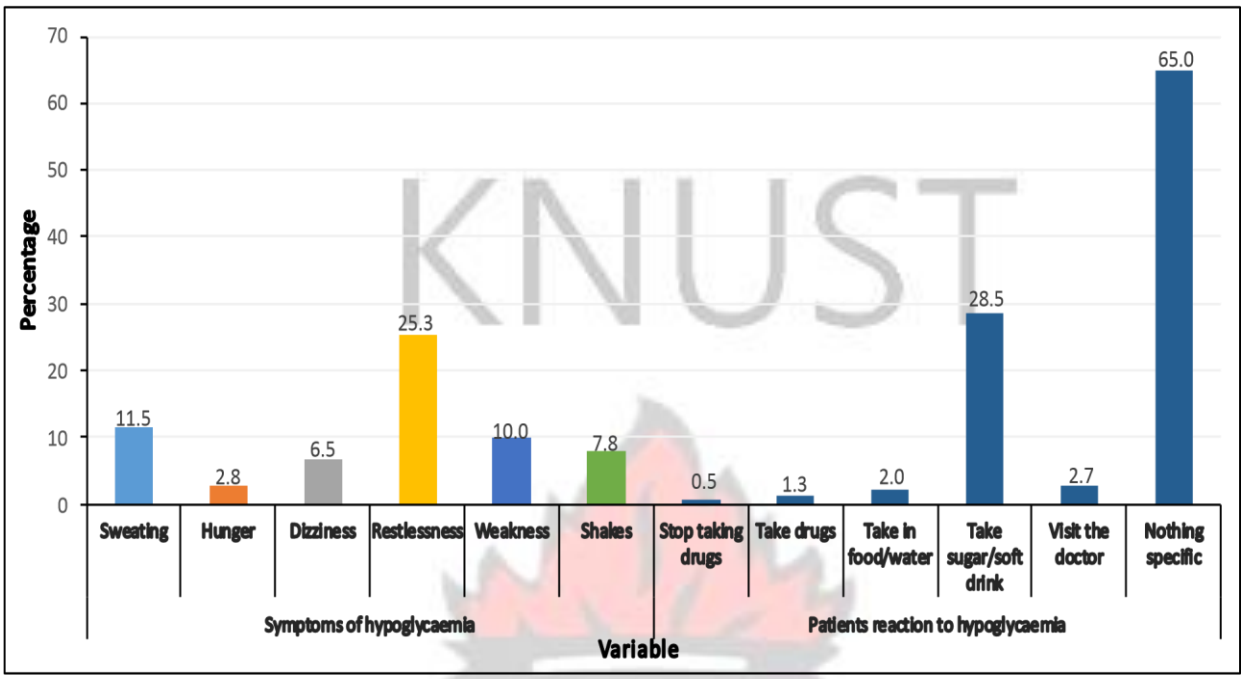

Figure 4.5: Symptoms and reaction to stabilize hypoglycemia

Source: Author's field study, 2015

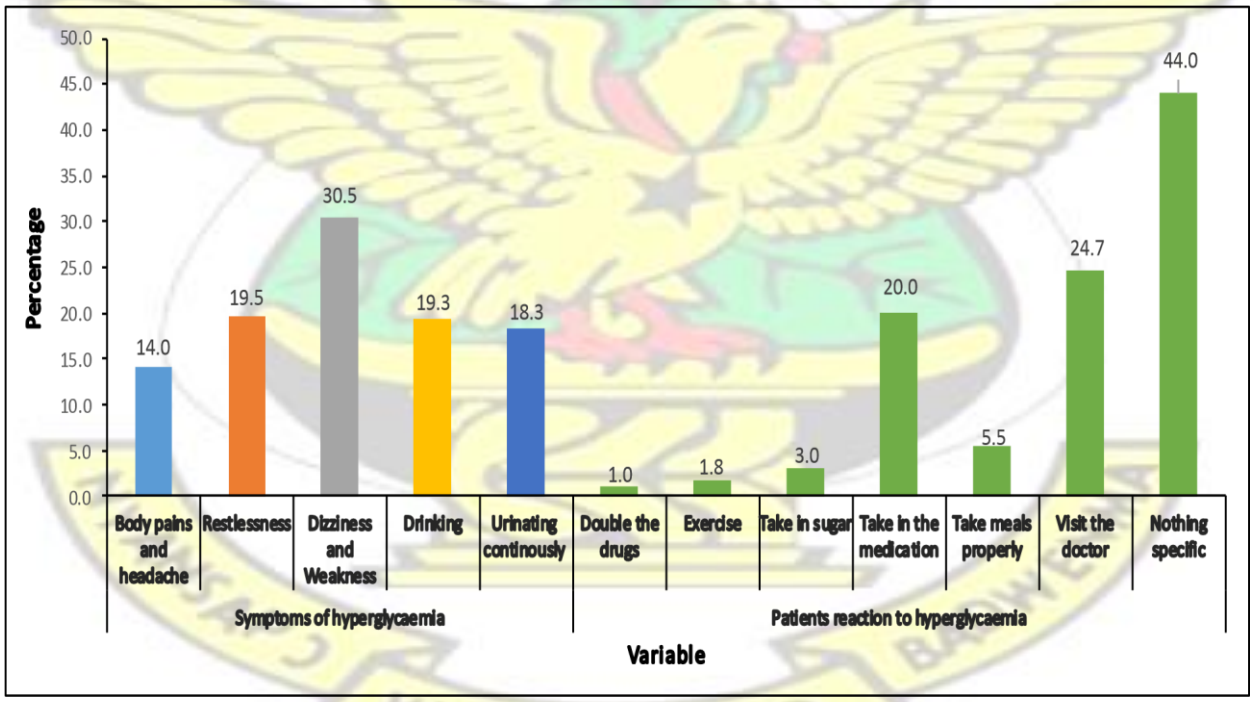

Figure 4.6: Symptoms and reaction to stabilize hyperglycemia

Source: Author's field study, 2015

4.3.4 Injury Prevention and management

Table 4.6 presents knowledge of clients on injury prevention. With respect to clients' knowledge on injury prevention, majority of them (52.7%) said it was not harmful for diabetics to touch very hot or cold objects with their bare hands, 20.0% of them said it was harmful and 27.3% of them had no idea about the subject. In response to whether it was safe for diabetics to use sharp objects to cut their nails, more than half of the clients (51.7%) answered in the negative with 44.8% answering in the affirmative and 3.5% of them had no idea about the subject. From Table 4.6, over ninety percent of the clients (93.7%) said diabetics have to inspect their feet and hands regularly for abnormalities, 1.3% of them said it was not necessary and 5.0% of them were indifferent. From perspective of the clients, 45.2% indicated that there was nothing wrong with diabetics walking bear footed. However, 49.8% of the clients disagreed indicating that walking bear footed has negative effects on feet and 5.0% of the clients were indifferent. On the kind of foot wear appropriate for diabetics, majority of them (53.6%) preferred foot wears which allows aeration followed by those (13.5%) preferring loose fitting foot wears and then tight fitting wears (1.5%). Also, other clients (28.7%) preferred different categories of foot wears.

Table 4.6: Clients knowledge on injury prevention and management

Variables	frequency N = 400	Percentage %
Nothing wrong with diabetics using sharp object to cut their nails		
True	179	44.8
False	207	51.7
Don't know	14	3.5
Diabetics exposure to injury when hot or cold object are touched		
True	81	20.0
False	211	52.7
Don't know	109	27.3
Daily inspection of feet (blisters, redness, swelling cuts)		
True	375	93.7
False	5	1.3
Don't know	20	5.0
Walking bear footed without negative effects		
True	181	45.2
False	199	49.8
Don't know	20	5.0
Type of Footwear for Diabetics		
Tight fitting foot wear	110	28
Well-fitting foot wear	230	57.5
No idea	60	15

Source: Author's field study, 2015

4.3.5 Exercising

The knowledge of clients on exercising as a type 2 DM management is detailed in Table 4.7. Over eighty percent of the clients (87.7%)) were aware that exercising is an essential requirement in type 2 DM management whilst 12.3% were not aware of the importance of exercising. Out of the 400 clients interviewed, majority of the clients (86.8%) were aware of adherence to exercising improving circulation and regulating the blood sugar level of diabetics whilst 13.2% of them had no idea on exercise improving circulation and regulating blood sugar level. Over ninety percent of the clients (90.5%) were complying with exercising and 7.5% were not exercising. In response to how often clients' exercise, 69.5% of them were exercising daily, 14.8% of them were exercising weekly, 3.0% of them were exercising monthly and 12.7% had no routine in exercising. Health walk was the major type of exercise been done by 59.5% of the clients followed by range of motion exercises being done by 24.8% of the clients. Also 2.7% of clients were engaged in other type of exercises and 12.0% had no specific type of exercise.

Table 4.7: Clients knowledge on exercise management

Variables	frequency n = 400	Percentage %
Exercises forming important part of type 2 DM		
True	351	87.7
Don't know	49	12.3
Patients exercising		
Yes	362	90.5
No	30	7.5
Not sure	8	2.0
Exercising routine		
Daily	278	69.5
Weekly	59	14.8
Monthly	12	3.0
No idea	51	12.7
Type of exercise for diabetics		
Range of motion	99	24.8
Taking a walk	238	59.5
Other(jogging, farming, performing chores)	15	3.7
No idea	48	12.0
Exercise improving circulation and reducing bloo d sugar in diabetics		
True	347	86.8

Don't know	53	13.2

Source: Author's field study, 2015

4.4. Factors influencing compliance to treatment

The factors influencing compliance to treatment based on clients' perspective is detailed in Table 4.8. Majority of the clients (71.5%) who perceived diabetes clinic of KATH easily accessible complied with treatment as compared with 28.5% of them who disagreed. as detailed in Table 4.8. On the average, the cost of transportation from the residence of clients to the diabetes clinic ranges from less than 1 Ghana Cedis (2.1%), 1-5 Ghana Cedis (65.7%) and more than 5 Ghana Cedis (32.2%) per visit. Majority of the clients (56.9%) whose cost of transportation ranges from 1 -5 Ghana Cedis complied with treatment as compared with those whose cost of transportation were either less than 1 Ghana Cedis (1.3%) or more than 5 Ghana Cedis (27.1%). Out of 400 clients, 94.3% of them were insured under National Health Insurance (NHI) Scheme and 5.7% were not insured. Majority of the clients (80.0%) registered under NHIS complied with treatment as compared with those (3.7%) not registered under the NHIS. Majority of the clients (58.0%) indicated that their prescribed medications were not covered by NHIS, 37.8% of their prescriptions were covered by NHIS and 4.2% of the clients indicated that not all of their prescriptions were covered by NHIS. Also most of the clients (48.7%) whose prescriptions were not covered by NHIS complied with treatment as compared with those (33.0%) whose prescriptions were covered by NHIS.

Lastly, majority of the clients (61.0%) who were able to afford medications not covered by NHIS complied with treatment as compared with those (18.9%) who were not able to afford medication not covered by NHIS as detailed in Table 4.8.

Table 4.8 Factors influencing treatment compliance from the perspective of clients

Variables	Frequency	Percentage
Accessibility of KATH		
Yes	286	71.5
No	114	28.5
Cost of transportation to KATH (n=376)		
<1	8	2.1
1-5	247	65.7
>5	121	32.2
NHIS registration		
NHIS holder	377	94.3
Non-NHIS holder	23	5.7
Medication covered by NHIS		
Yes	151	37.8
No	232	58.0
Not all	17	4.2
Afford medication not covered by NHIS (n=249)		
Yes	184	73.9
No	55	22.1

Not all	10	4.0

Source: Author's field study, 2015

4.5. Relationship between the numbers of drugs prescribed, side effect and compliance to medication.

The relationship between the number of drugs prescribed, side effects and compliance to medication is detailed in Table 4.9. Generally, 349 of the clients (87.2%) were taking all their medication prescribed by physicians whilst 12.8% of them were not taking all their medication as prescribed. Out of the 349 clients who were taking their full prescription as prescribed, 9.0% of them were on one anti-diabetic medication, 19.2% of them were on two medications, 20.5% of them were on three medications, 19.2% of them were on four medications and 19.2% of them were also on more than four medications. Furthermore, amongst those (12.8%) who could not take their drugs as prescribed, 6.3% of them were taking at least four medications as detailed in Table 4.9. The difference in number of drugs prescribed was significant (chi=10.13; pvalue=0.04). In response to a question whether clients would be able to comply with drug intake if they had less than three drugs, 84.7% of them answered in the affirmative, 10.8% said "No" and 4.5% of them were indifferent. The difference was statistically significant (chi=89.14; pvalue=0.00). Majority of the clients (82.0%) had no one to remind them in taking medication whilst 18.0% had someone to remind them in taking medication. The difference was statistically not significant (chi=1.21; p-value=0.27).

From Table 4.9, over nineteen percent of the clients (19.5%) had ever experienced side effects of their medication, 71.3% of clients had not experienced side effect and 9.2% of them were not sure of side effects. The difference in experiencing side effects was statistically significant (chi=30.97; p-value=0.00). Action taken by clients in case of side effects were to stop taking their medication (4.6%), reduces dosage of medication (1.7%), report to the hospital (81.0%) and report to the pharmacy (2.2%). The difference was statistically significant (chi=76.70; pvalue=0.00). In

response to whether clients were afraid of side effects of prescribed ant-diabetic medications, 48.3% were afraid of side effect, 47.5% were not afraid of side effect and 4.2% were afraid to some extent. The difference in fear of side effect of medications was statistically significant (chi=32.00; p-value=0.00).

4.9 Relationship between the number of drugs prescribed, side effect and compliance to medication

Variables	Taking all medication as prescribed n (%)		quency	Percentage %	X^2 (p-value)
	Yes n=349	No n=51			
Number of drugs prescribed					10.13 (0.01)
One	36 (9.0)	1 (0.2)	37	9.2	
Two	77 (19.2)	10 (2.5)	87	21.7	
Three	82 (20.5)	9 (2.3)	91	22.8	
Four	77 (19.2)	6 (1.6)	83	20.8	
> Four	77 (19.2)	25 (6.3)	102	25.5	
Comply with taking less number of anti-diabetics					89.14 (0.00)
Yes	318 (79.5)	21 (5.2)	339	84.7	
No	24 (6.0)	19 (4.8)	43	10.8	
Not sure	7 (1.7)	11 (2.8)	18	4.5	
Reminded in taking medication					1.21 (0.27)
Yes	60 (15.0)	12 (3.0)	72	18.0	
No	289 (72.2)	39 (9.8)	328	82.0	
Side Effect					
Experienced side effect					30.97 (0.00)
Yes	66 (16.5)	12 (3.0)	78	19.5	

No	261 (65.3)	24 (6.0)	285	71.3
Not sure	22 (5.5)	15 (3.7)	37	9.2

Source: Author's field study, 2015

4.9 Relationship between multi drug regimen, side effect and compliance to medication cont.

Variables	**Taking all medication as prescribed n (%)**		**Frequency**	**Percentage %**	**X^2 (p-value)**
	Yes n=349	**No n=51**			
Action taken in case of side effects of medication					76.70 (0.00)
Stop taking medication	9 (2.3)	9 (2.3)	18	4.6	
Reduce dosage of medication	4 (1.0)	3 (0.7)	7	1.7	
Report to the hospital	305 (76.2)	19 (4.8)	324	81.0	
Report to pharmacy	4 (1.0)	5 (1.2)	9	2.2	
No idea	27 (6.8)	15 (3.7)	42	10.5	
Fear of side effect					32.00 (0.00)
Yes	185 (46.3)	8 (2.0)	193	48.3	
No	147 (36.8)	43 (10.7)	190	47.5	
To some extent	17 (4.2)	0 (0.0)	17	4.2	

Source: Author's field study, 2015

4.6 Relationship between socio-demographic characteristics and compliance to treatment

The relationship between the socio-demographic characteristics of clients with respect to the age group, gender, marital status, educational level, and occupation of clients and their compliance with exercise, dietary restriction, medication and injury prevention practices as treatment of type 2 DM is detailed in T able 4.10 to table 4.13.

4.6.1 Socio-demographic characteristics and compliance to exercise

From table 4.10, 56.7% of the clients aged 50 years and above, 21.7% of those aged 30-39 years and 2.3% aged less than 30 years complied with exercising as required. The difference in compliance with exercising across age group of clients was not significant (chi=2.22; pvalue=0.33). Also, 22.0% of the males and 58.7% of the females were able to exercise as required. The difference in compliance with exercising across the gender of clients was not significant (chi=1.96; p-value=0.16). Similarly, the difference in compliance with exercising across marital status, educational level and occupation of clients were statistically not significant (chi=2.27, p-value =0.13; chi=5.52, p-value=0.14; chi=2.14, p-value=0.34) respectively.

Table 4.10: Socio-demographic characteristics and compliance to exercise

Variables	Compliance to Exercise		X^2 (P-value)
	Yes n (%)	**No** n (%)	
Age			**2.22 (0.33)**
<30	9 (2.3)	0 (0.0)	
30-39	87 (21.7)	22(5.5)	
50 and above	227 (56.7)	55 (13.8)	
Gender			1.96 (0.16)
Male	88 (22.0)	15 (3.8)	
Female	235 (58.7)	62 (15.5)	
Marital status			2.27 (0.13)
Ever married	306 (76.5)	76 (19.0)	
Never married	17 (4.3)	1 (0.2)	
Educational level			5.52 (0.14)
Middle school	74 (18.5)	25 (6.2)	
Secondary	121 (30.3)	27 (6.7)	
Tertiary	47 (11.8)	5 (1.2)	
Uneducated	81 (20.3)	20 (5.0)	
Occupation			2.14 (0.34)
Informal skilled	183 (45.8)	44 (11.0)	
Formal skilled	62 (15.5)	10 (2.5)	
Unemployed	78 (19.5)	23 (5.7)	

Source: Author's field study, 2015

4.6.2 Socio-demographic characteristics and compliance to diet restrictions

From the Table 4.11, 85.5% of ever married clients and 4.0% of never married clients adhered to diet restrictions. The difference in adhering to diet restriction across the marital status of clients

was statistically not significant (chi=2.27; p-value=0.13). Similarly, the difference in adhering to diet restrictions across age group, gender and occupation of clients were statistically not significant (chi=1.14, p-value=0.56; chi=0.19, p-value=0.66; chi=0.06, p-value=0.97) respectively. However, over sixty percent (66.5%) of educated clients and 23.6% of uneducated clients adhered to diet restrictions. Conversely, 8.7% of educated clients and 1.7% of uneducated clients did not adhere to diet restriction. The difference in adhering to diet restrictions across educational level of clients was statistically significant (chi=8.99; p-value=0.03).

Table 4.11: Socio-demographic characteristics and compliance to diet restrictions

Variables	**Compliance to diet restrictions n (%)**		**X^2 (P-value)**
	Yes n (%)	**No** n (%)	
Age			1.14 (0.56)
<30	9 (2.3)	0 (0.0)	
30-39	98 (24.5)	11 (2.7)	
50 and above	251 (62.7)	31 (7.8)	
Gender			0.19 (0.66)
Male	91 (22.8)	12 (3.0)	
Female	267 (66.7)	30 (7.5)	
Marital status			0.01 (0.93)
Ever married	342 (85.5)	40 (10.0)	
Never married	16 (4.0)	2 (0.5)	
Educational level			8.99 (0.03)
Middle school	81 (20.2)	18 (4.5)	
Secondary	134 (33.5)	14 (3.5)	
Tertiary	49 (12.8)	3 (0.7)	
Uneducated	94 (23.6)	7 (1.7)	

Occupation			0.06 (0.97)
Informal skilled	203 (50.8)	24 (6.0)	
Formal skilled	65 (16.3)	7 (1.7)	
Unemployed	90 (22.5)	11 (2.2)	

Source: Author's field study, 2015

4.6.3 Socio-demographic characteristics and compliance with medication

From Table 4.12, 64.0% of formally educated clients were taking their medication as prescribed and taught whilst 10.7% were not taking their medication. Also 23.3% of formally uneducated clients were taking their medication as prescribed and taught whilst 2.0% were not taking their medication. The difference in compliance with medication across the educational level of clients was significant (chi=16.76; p-value=0.01). Similarly, the difference in compliance with medication across the occupation of clients was significant (chi=9.67; p-value=0.01). However, the difference in compliance with medication across age group, gender and marital status of clients were statistically not significant (chi=1.71, p-value=0.43; chi=0.53, p-value=0.46; chi=1.52, p-value=0.22) respectively.

Table 4.12: Socio-demographic characteristics and compliance to medication

Variables	**Compliance with prescribed medication**		**X^2 (P-value)**
	Yes n (%)	**No** n (%)	
Age			1.71 (0.43)
<30	9 (2.3)	0 (0.0)	
30-39	93 (23.2)	16 (4.0)	
50 and above	247 (61.7)	35 (8.8)	
Gender			0.53 (0.46)
Male	92 (23.0)	11 (2.8)	

Female	257 (64.2)	40 (10.0)	
Marital status			1.52 (0.22)
Ever married	335 (83.7)	47 (11.8)	
Never married	14 (3.5)	4 (1.0)	
Educational level			16.76 (0.01)
Middle school	75 (18.7)	24 (6.0)	
Secondary	136 (34.0)	12 (3.0)	
Tertiary	45 (11.3)	7 (1.7)	
Uneducated	93 (23.3)	8 (2.0)	
Occupation			9.67 (0.01)
Informal skilled	190 (47.5)	37 (9.3)	
Formal skilled	62 (15.5)	10 (2.5)	
Unemployed	97 (24.2)	4 (1.0)	

Source: Author's field study, 2015

4.6.4 Socio-demographic characteristics and compliance with injury prevention

From Table 4.13, amongst 96.0% of clients who were adhering to injury prevention practices, 71.2% of them were formally educated (middle, secondary and tertiary) and 24.8% were formally uneducated. The difference in adhering to injury prevention practices across educational level was significant (chi=8.99; p-value=0.03). However, the difference in adhering to injury prevention practices across age group, gender and marital status and occupation of clients were statistically not significant (chi=1.22, p-value=0.54; chi=0.43, p-value=0.51; chi=2.48, pvalue=0.12: chi=2.23, p=0.31) respectively.

Table 4.13: Socio-demographic characteristics and compliance to injury prevention

Variables	**Compliance with injury prevention**		**X^2 (P-value)**
	Yes n (%)	**No** n (%)	

Age			1.22 (0.54)
<30	8 (2.1)	1 (0.2)	
30-39	105 (26.2)	4 (1.0)	
50 and above	271 (67.8)	11 (2.7)	
Gender			0.43 (0.51)
Male	100 (25.0)	3 (0.8)	
Female	284 (71.0)	13 (3.2)	
Marital status			2.48 (0.12)
Ever married	368 (92.0)	14 (3.5)	
Never married	16 (4.0)	2 (0.5)	
Educational level			8.99 (0.03)
Middle school	90 (22.4)	9 (2.3)	
Secondary	144 (36.0)	4 (1.0)	
Tertiary	51 (12.8)	1 (0.2)	
Uneducated	99 (24.8)	2 (0.5)	
Occupation			2.33 (0.31)
Informal skilled	215 (53.8)	12 (3.0)	
Formal skilled	70 (17.5)	2 (0.5)	
Unemployed	99 (24.7)	2 (0.5)	

Source: Author's field study, 2015

CHAPTER FIVE: DISCUSSION

5.0 Introduction

In this chapter of the study, the results are discussed within the context of existing literature on the subject matter.

5.1 Socio-demographic characteristics of the respondents

Majority of the diabetic clients (70.5%) interviewed were 50 years with few of them (2.3%) less than 30 years as detailed in Table 4.1. This confirms why majority of them (95.5%) had ever married which included those married, divorced, widowed and separated as detailed in Table 4.1. Also, the age distribution of clients confirmed that type 2 diabetes mostly affect persons aged 40 and above. However, it is becoming more prevalent in juveniles and young adults as a result of decreased exercises and increased consumption of health compromising meals (Garcia-Perez et al., 2013). This might explain why a few of the clients aged less than 30 years had type 2 diabetes. On gender, majority of the clients (74.2%) were females as detailed in Table 4.1. This is not surprising since females have been found more likely to be diabetic than males. This is evident in a study conducted by Choi-Kwon (2005) in South Korea which indicated that females are mostly affected by type 2 diabetes and were more compliant than males. With respect to clients' formal education, sixty-one percent had attained only middle school and senior high education and few clients (13.0%) were tertiary graduates as shown in Table 4.1. In most developing countries, one's educational level could partly account for the type of occupation to be engaged. This might explain why most of them (56.8%) were working in the informal sector and a few who had tertiary education might account for 18.0% of the clients working in the formal sector as detailed in Table 4.1.

5.2 Knowledge on the management of type 2 DM

Diabetes Mellitus is a challenging disease which can be managed successfully over periods but patients have a major role to play in its treatment and management (Ponnusankar et al., 2004). It was therefore encouraging to note that ninety-nine per cent of the clients were aware of the fact that type 2 DM can be managed by treatment compliance as detailed in Figure 4.2. This knowledge

might have been acquired from the education clients had received on management of their conditions with respect to medications, accident prevention, diet management and importance of exercising (See Figure 4.3). The knowledge of clients on the management of diabetes is further discussed under diet, medication, monitoring of sugar level, regular exercising and injury prevention.

Diet management

People who have been diagnosed with diabetes can help keep the condition from progressing into fatal complications by watching their weight and eating the right foods (Lichtenstein, 2014). Undoubtedly, it is the responsibility of all diabetics to practice food planning (ADA, 2012). As a result, over ninety percent of the clients were in agreement that all diabetic patients should be on special diet with some diet restrictions (See Table 4.3). Dietary guidelines for diabetics emphasize an overall increase in dietary fiber through the consumption of foods like vegetables, whole grain cereals, root tubers and fruits (Guariguata, 2012). High intake of fiber particularly of the soluble type improves glycemic control and decreases hyperinsulinemia in type 2 diabetics (Chandalia et al., 2000). This might explain why a significant proportion of clients (54.0%) indicated that complex sugars (roots tubers, whole grains fruits and vegetables) were the most appropriate food for diabetics compared to those with other specific food categories (See Table 4.3). Among clients who had other food categories in mind, some claimed that diabetics could eat all kinds of food; others thought they could eat all kinds of food but in minimum quantity and few clients had decided to avoid sugar completely as shown in Figure 4.4. According to Tuomilehto et al (2001), type 2 diabetics should consume mono and polyunsaturated fats in place of saturated. They are to avoid or limit fatty meats, full cream dairy products, palm oil, coconut oil, processed foods and saturated fat is to be restricted to less than 10% of total energy intake. This might be the

reason why a significant proportion of clients (94.3%) indicated they have been educated to avoid fatty foods as detailed in Table 4.3. The consequences of eating fatty foods mentioned by these clients included; fatty foods increasing blood sugar level and weight, and impeding blood circulation and thereby increasing blood pressure (See Figure 4.4). However, few clients claimed there is nothing wrong with eating fatty foods and this might explain why some clients (8.5%) had no idea on the consequences of eating fatty foods (See Figure 4.4).

Carbohydrates should provide about 50%-55% of the total energy required by diabetics (Guariguata, 2012) and protein should provide 15% - 20% of total energy intake (Norris et al., 2001). Furthermore, it is recommended that diabetics eat three meals daily to distribute carbohydrate intake during the day (Norris et al., 2001). This might explain why a significant proportion of clients were eating three meals daily (82.5%) as detailed in Table 4.3. Additionally, clients were taking fruits and fresh juice as snacks as mentioned by them in figure 4.4. These fruits including vegetables have been identified as fuel needed by the body (Medical News Today, 2013).

Medication management

Type 2 diabetes is a chronic disease and as such it requires lifelong treatment and management (Buse et al., 2011). This might be the reason why a significant proportion of the clients (96.8%) acknowledged that, their condition cannot be completely cured as detailed in Table 4.4. As a result, over ninety-five percent of the clients affirmed that diabetics take anti-diabetic drugs for lifetime as detailed in Table 4.4. This has probably made majority of the clients (57.2%) had knowledge on the names of their prescribed medications as detailed in Table 4.4. This is because studies have confirmed that most of these diabetic clients are health literate (able to read, understanding and comprehend drug labels) and therefore have good treatment modalities (Butterworth et al., 2005).

Compliance to the appropriate time in taking anti-diabetic drugs is very importance in the management and treatment of diabetes and this differs based on the type of drugs prescribed to reduce the rate of abnormalities of metabolism (Moulin et al., 2007). For example, glycosidase inhibitors reduce the rate of carbohydrate absorption thus decreasing the necessity for insulin secretion after meals and this might explain why a significant proportion of clients (40.5%) were advised to take their medications after meals (Zin et al., 2008). Drugs such as sulphonylureas and glinides stimulate the secretion of insulin directly. As a result, a significant proportion of clients (45.2%) were advised to take their medications before meals. The abnormalities of some diabetic patients requires the combination of different hypoglycemic agents (Dworkin et al., 2010) and this might explain why the appropriate time in taking prescribed medications varied as detailed in Table 4.4. Some of the reasons provided by clients for complying with prescribed medications included; managing blood pressure, reducing glucose level, and staying healthy. In spite of the importance of complying with treatment, some of the clients (16.3%) continuously skipped doses without any harm or side effects of the medication as detailed in Table 4.4. This revelation is not different from a study conducted by Bender and Bender (2005) which reported that some clients deliberately skipped their medications to observe their health without medications.

Monitoring management

Monitoring of blood or urine glucose and the general body is another important subject in the management of diabetes (ADA, 2012). Additionally, the knowledge of diabetic clients on the signs, symptoms and complications of their condition is of much recognition in diabetes management (ADA, 2012). According to Diabetes Atlas (2005) diabetic patients are given health education on monitoring of blood or urine glucose and its importance. This might explain why a significant proportion of the clients (98.5%) indicated that it is required of all diabetic patients to

monitor their blood sugar level as detailed in Table 4.5. As a result, majority of the clients (97.5%) acknowledged that, regular monitoring of blood or urine glucose helps diabetics to identify hypoglycemia and hyperglycemia as detailed in Table 4.5. This has probably made clients to identify sweating, hunger, dizziness, restlessness, general weakness and body shaking as the signs and symptoms they experienced in hypoglycemia (See Figure 4.6). Some of the known causes of hypoglycemia are delay, reduction or omitting meals (Gale, 1985). This might be the reason why some of the clients were eating food, taking sugar, and soft drink to stabilize hypoglycemia as detailed in Table 4.5. Another cause of hypoglycemia is inappropriate administration of drugs (WHO, 2011) and this might also explain why some of the clients resort to taking their medication properly as being directed by providers to stabilize hypoglycemia as detailed in Table 4.5. With respect to symptoms of hyperglycemia, headache, restlessness, frequent thirst for water and continuous urinating were the signs and symptoms mostly identified by clients (See Figure 4.7). Compliance to medication intake and diet restrictions were measures taken by clients to stabilize themselves in case of hyperglycemia (See Figure 4.7). Most of the clients had no specific remedy to stabilize themselves in case of hypoglycemia (See Figure 4.6) and hyperglycemia (See Figure 4.7). Furthermore, lack of adequate education on hyperglycemia made some of the clients take in sugar (3.0%) and double prescribed medications (1.0%) as detailed in Figure 4.7. According to Ford and Lynch (2013), the monitoring of blood glucose levels in stable patients can be done once or twice a week, and that for patients with poorly controlled or unstable glucose levels can be done daily until the expected targets are met. This could be the reason why the routine for monitoring glucose level of clients significantly differed; daily (6.2%), weekly (21.7%), monthly (24.8%), and over months (43.8%) as detailed in Table

4.5.

Injury Prevention management

Diabetic patients are vulnerable to injury and are thirty times more likely to undergo limb amputation in comparison with the general population (Kenealy et al., 2009). In addition, physicians have estimated that, nearly half of the amputations caused by neuropathy and poor circulation could be prevented by careful foot care (Abdul-Ghani, 2006). As a result, a significant proportion of the clients (94.3%) were in agreement that all diabetics ought to inspect their lower and upper limbs for sore, blisters or injuries as loss of sensation in the limbs could lead to injuries occurring without being noticed as detailed in Table 4.6. Lack of prompt treatment of small cuts, blisters and scratch injuries increases a diabetic's risk of infection and so diabetic patients should be extra careful to prevent injuries (Diabetes Atlas, 2005). Contrary, most of the clients did not know that it was not safe for them to cut their nails with sharp objects, touch hot or cold objects with their bare hands or feet and walk bear footed (See Table 4.6) as cuts, cracks, and blisters could go unnoticed (Kenealy et al., 2009). This presupposes that most of the clients did not have adequate knowledge on the importance of injury prevention management. For this reason, Diabetes Atlas (2005) urges that comprehensive education on the care of the foot should be given to all diabetics on bare foot walking, inspecting feet daily, and keeping the feet clean and the use of appropriate footwear.

Exercising management

Regular physical activity among diabetics plays an important role in the management of type 2 diabetes (Boule et al., 2001). This might account for a significant proportion of clients (90.5%) agreeing that it is the responsibility of all diabetic patients to exercise as detailed in Table 4.7. In addition, majority of these clients (87.7%) considered exercise as an essential component in the

management of their condition (See Table 4.7). Exercising has been proven to improve insulin sensitivity, thus improving glycemic control and may help with weight reduction as well (ADA, 2013). As a result, majority of the clients (86.8%) accorded that exercising improves blood circulation and help to reduce high blood sugar level and weight as detailed in Table 4.7. The recommended duration and routine of physical activity for diabetics is at least 150 minutes of moderate –intensity each week (Boule et al., 2001) and as a result some of the clients (14.8%) complied with exercising each week as well. However, the routine and type of physical activity is dependent on a person's age, social, economic and physical strength (Reid et al., 2010) and this might explain why the routine of clients in exercising varied as detailed in Table 4.7. The major physical activities in which most of the clients were engaged were range of motion and health walk (See Table 4.7). Similarly, vigorous activities like dancing, aerobics, jogging, lapswimming, digging and cycling uphill were recommended for diabetics (Reid et al., 2010).

5.3 Factors influencing treatment compliance based on clients' perspective in type 2 DM

The accessibility of health facility to clients is of much concern especially in terms of expenses made on transportation to visit health facility for healthcare services. This might contribute to treatment compliance and non-compliance to review appointments. This is evident in the study where majority of the clients who spent between 1 Ghana cedis and 5 Ghana cedis complied with treatment as compared with those who spent more than 5 Ghana cedis (See table 4.9). This is because, according to Zhang et al (2010), patients who spend less on transportation to health facilities mostly comply with treatment.

Also, the cost of healthcare should not be a burden if clients have insurance benefits (Jin et al., 2008). This might explain why clients (94.3%) insured under NHIS had higher treatment compliance compared with those (5.7%) who were not insured under NHIS as detailed in Table

4.9. However, the NHIS did not cover all the prescribed medications for most of the clients (58.0%) as detailed in Table 4.8. According to Choi-Kwon et al (2005), clients with this situation have a greater chance of being non-compliant to their therapy regimen. Surprisingly, most of the clients (48.7%) whose prescriptions were not covered by the NHIS complied with their treatment as detailed in table 4.9. This is probably because those clients had the desire to stay healthy and to live longer. Therefore, they were motivated to purchase those medications not covered by the NHIS.

5.4 Relationship between the number of drugs prescribed, side effect and compliance to medication

About 50% to 80% of type 2 diabetics are also found to be hypertensive (Landsberg and Molitch, 2004). As a result, most diabetics are on two or more treatment medications and therefore are considered to be under the effect of multiple drug therapy (Dailey et al., 2001). This might explain why majority of the clients (69.1%) were under multiple drug therapy as detailed in Table 4.9. However, the treatment compliance of these diabetics under multiple drug regimens is notably found to be very poor (Cramer, 2004; Donnan et al., 2002). This might explain why clients (12.9%) who were non-compliant to prescribed medications were mostly those under multiple drug regimens (See Table 4.9). Alternatively, Dailey et al (2001) discovered that the treatment compliance as well as the persistence of these patients would improve tremendously if their prescribed medications are reduced to a simple one drug therapy. This might explain why a significant proportion of the clients (84.7%) perceived their treatment compliance to be optimum if their drug regimen were to be mono therapy (REF Table 4.9.).

Another factor which threatens type 2 diabetics' compliance to their treatment is fear of side effects from medications (Kaplan et al., 2004). Some of the clients (19.5%) had experienced side effects

of their prescribed anti-diabetic medications as detailed in Table 4.9. According to Cramer (2004), these patients mostly refuse to take their prescribed medications and therefore are mostly non-compliant to treatment. This might explain why the treatment compliance of the clients (48.3%) was influenced by the fear of side effects of their prescribed medication (See Table 4.9). From the perspectives of clients who had experienced side effects of their prescribed medications, actions they took included reducing dosage of medications, and others refusing to take their medications (See Table 4.9). These accounted for some of the clients' non-compliance to their prescribed medication.

5.5 Relationship between socio- demographic characteristics and compliance treatment

Female patients formed the majority in the diabetes clinic of Komfo Anokye Teaching Hospital (See Table 4.1). However, this difference in gender had no significant relationship with treatment compliance. This revelation is not different from a study conducted by Spikmans (2003) which reported no correlation in gender and treatment compliance. Also, majority of these clients had ever married (widow or separated, in marriage) as detailed in Table 4.1 and therefore Cooper et al (2005) perceived them to be compliant to treatment due to the support a spouse and or children may offer. Surprisingly, some of the married clients could not comply with medications (See Table 4.12), exercising (See Table 4.10), diet planning (See Table 4.11), and injury prevention management (See Table 4 13). This might explain why there was no significant relationship between clients' marital status and their treatment compliance. This revelation is also not different from study conducted by Kaona et al (2004) which discovered no association between marital status and treatment compliance.

Educational level which can be classified as low or high has been found by some researchers to be associated with treatment compliance in type 2 diabetes (Jin et al., 2008). Higher education

according to Ghods and Nasrollahzadeh (2003) is associated with a high level of compliance. The study revealed that only 20.3% of the clients were not formally educated (See Table 4.1). This presupposes that majority of the clients were formally educated and as such their educational background might influence their treatment compliance. Naturally, clients who are highly educated are expected to be knowledgeable about diabetes as well as its management. Owing to this, they are expected to be compliant (Jin et al., 2008). This might explain why a significant proportion of the clients complied with treatment in terms of diet (See Table 4.13), medications (See Table 4.14) and injury prevention (See Table 4.15). In the study, majority of the clients were working in the informal sector and few of them were unemployed (See Table 4.1). A significant proportion of the clients employed complied with their medications as detailed in Table 4.14. Undoubtedly, as indicated earlier, diabetes is chronic disease which requires high financial expenses in its treatment (Ellis et al., 2004). In most developing countries, occupation is a determinant of one's financial status and income level. Obviously, patients with high income can afford hospital bills and medications and therefore are more compliant than those with low income (Jin et al, 2008). This might account for the significant relationship between clients' occupation and their treatment compliance in medications.

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.0 Introduction

This chapter presents the conclusion of the findings based on the objectives for the study of the under listed headings and suggests the necessary recommendations required for improving compliance to treatment among type 2 diabetics.

i. Knowledge of clients on the management of type 2 diabetes ii. Clients' perspective on the factors influencing treatment compliance in type 2 DM iii. Relationship between the number of drugs prescribed, side effects and compliance to medication.

iv. Relationship between clients' socio-demographic characteristic and treatment compliance

6.1 Conclusions

Background of participants

Majority of the type 2 diabetics were females and were mostly 50 years and above. Also, more than half of the clients had attained some level of formal education and were working in the informal sector.

The knowledge of clients on diabetes management

Majority of the clients were aware of the fact that type 2 DM can be managed by treatment compliance to medications, diet planning, exercising, monitoring and injury prevention management. On medication management, a greater percentage of the diabetics were aware that their condition cannot be completely cured and therefore they are to take anti-diabetic drugs for

lifetime. Only a few of the diabetic were aware of the side effects of their medications and majority of them were aware that anti-diabetic medications are taken primarily for good glycemic control.

On diet management, majority of the diabetics acknowledged that complex sugars were the most appropriate food for them and fatty foods were to be avoided or consumed in limited amount. On exercising, majority of the diabetics considered exercise as an essential component in the management of their condition and therefore they were mostly engaged in walking and range of motion activities. Most of them were aware of the importance of exercising as improving blood circulation and helping to reduce high blood sugar level and weight.

On monitoring of blood glucose, most of the diabetics were aware of the importance of monitoring their blood sugar level frequently. Also, most of them mentioned regular monitoring of blood glucose level as helping to identify hypoglycemia and hyperglycemia complications.

Finally, on injury prevention management, most of the clients were aware that all diabetics ought to inspect their lower and upper limbs for sore, blisters or injuries as loss of sensation in the limbs could lead to injuries occurring without being noticed. However, most of the clients did not know that it was not safe for them to cut their nails with sharp objects, touch hot or cold objects and to walk barefooted

Factors influencing treatment compliance in type 2 DM from the perspective of clients

Most of the clients mentioned factors such as accessibility of KATH, registration with NHIS, medications covered by NHIS, ability to afford medications not covered by NHIS as perceived factors influencing treatment compliance. Also, cost of transportation to diabetes clinic was mentioned as a factor influencing treatment compliance.

Relationship between the number of drugs prescribed, side effect and medication compliance

A significant proportion of the clients who were on multiple drug therapy complied with medication. However, majority of the clients perceived their willingness to comply with treatment to be positive if they were on mono therapy. Also, the fear of side effects of their prescribed medications significantly influenced medication compliance.

Relationship between socio-demographic characteristics of clients and treatment compliance

There was no significant relationship between the socio-demographic characteristics such as age group of clients, their gender, marital status and compliance to dietary management, exercise, medication and injury prevention. Also, the relationship between socio-demographic characteristics such as educational level and compliance to exercises was not statistically significant. However, the relationship between socio-demographic characteristics such as educational level of clients and their compliance to diet, medication and injury prevention was statistically significant. Also, the relationship between socio-demographic characteristics such as occupational status of clients and their compliance to medication was statistically significant.

6.2 RECOMMENDATION

Government of Ghana

1. Government through the Health Ministry in conjunction with the Media and NGOs should draw up and intensify awareness campaign on diabetes to equip type 2 diabetics with the requisite knowledge on the therapeutic and side effects of their medications and the desired

response if a side effect is experienced. Also, the campaign must stress on the measures which help diabetics to prevent injury as this will go a long way to reduce the number of complications due to neuropathy and subsequently reduce ulcers and amputations among diabetics.

2. Private organizations such as banks, pharmaceutical companies can subsidize the prize of non-insured anti diabetic drugs as a corporate social responsibility.
3. The government of Ghana in conjunction with pharmaceutical companies can attempt to produce single tablets containing a combination of common anti diabetes drugs to reduce the number of drugs clients take.
4. More qualified physicians should be posted to satellite health facilities so that clients would not have to travel long distance to seek diabetic care to improve compliance.

Health facilities

1. Education on the management of type 2 diabetes must be intensified at the health facilities by all health personnel at the diabetic clinics through the country especially on the therapeutic and side effects of medications and the desired response. In addition, diabetics should be educated on how best they can avoid injuries to their limbs to decrease the rate of ulcer development and subsequent amputations. Also, the education must be standard and uniformed in order to ensure consistent knowledge of type 2 diabetics on the therapeutic and side effect of their medications.
2. KATH management must build a strong collaboration with Diabetes support organizations such International Diabetes Federation so that diabetics and their families can be counseled on the importance of treatment compliance

Diabetes Support Organizations or NGOs.

1. A fund could be created by the support organizations such the International Diabetes Federation to assist diabetes patients in the purchasing of non-insured medications. All diabetes clients should be encouraged by health personnel to register with the NHIS.

Recommendation for further studies

Further studies can be carried out on the perspective of the health staff on factors that influence treatment compliance among type 2 diabetics.

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APPENDICES

APPENDIX I

QUESTIONNAIRE

TOPIC

FACTORS INFLUENCING TREATMENT COMPLIANCE IN TYPE 2 DIABETES MELLITUS CLIENTS AT THE KOMFO ANOKYE TEACHING HOSPITAL DIABETIC CLINIC.

INSTRUCTIONS: CIRCLE THE APPROPRIATE ANSWER (S)

SECTION A: SOCIO - DEMOGRAPHICS CHARACTERISTICS	
1. Sex of respondents	1. [Male] 2. [Female]

2. Age of respondents 3. Highest educational level	4. What is your marital status 1. [NEVER] 2. [JSS] 3. [SSS] 4. [TERTIARY]	1. [Single] 2. [Married] 3. [Divorced] 4. [Widow] 5. [Separation] 6. [Cohabiting]
5. What is your highest main occupation	1. [Informal] 2. [Formal skilled] 3. [Housewife] 4. [Unemployed] 5. [Other]	6. What is your monthly income…… 7. Additional/other sources of income ……
	specify…… …..	
8. Religious affiliation 1. [Christian] 2. [Muslim] 3. [Traditionalist] Other specify……...		

HISTORY OF [CONDITION]
9. How long have you had type 2 DM? **1. [1—5 years] 2. [6 – 10 years]** **3. [11 – 15 years] 4. [16—20 years]]** **5. [> 20 years]**

10. How long have you been on treatment?	**1. [6 – 12 months] 2. [1 – 5years]** **3. [11 – 15 years] 4. [16 – 20 years]** **5. [> 20year]**
SECTION B : KNOWLEDGE LEVEL OF CLIENTS ON THE MANAGEMENT OF TYPE 2 DM	
11. What do you know about the management of your condition?	**1. [The importance of taking medication** **2.[dietary management]** **3.[accident prevention]** **4. [exercises]** **5.[other specify]**
12. DM is managed.	**1. [Yes] 2.[No] 3. [Not sure]**
13. DM can be treated and cured.	**1. [Yes] 2.[No] 3. [not sure]**
14. Do you know the names of your medications? **15.If yes, mention them**	**1. Yes 2. No**
16. Anti diabetics are taken primarily for :	**1. Good glycemic control**
	2. To increase blood sugar **3. To reduce blood pressure** **4. To loose weight** **5. Other specify .....**

17. Side effects of anti-diabetics include	**1. Itchy skin , dark urine, dizziness, metallic taste in the mouth.** **2. Swelling of the hands and feet and weakness** **3. Chills, headache, vomitting, cold sweats, hypoglycemia** **4. None of the above** **5. No idea**
18. When have you been told to take your drugs?	**1. bef ore meals** **2. After meals** **3. With meals** **4. Not sure**
19. Why do you have to take your drugs at the said time?	**1. Before meals because my body cannot produce insulin so the drug will lower the level of glucose in my body by preventing the liver from producing glucose before i eat** **2. After meals because the drug will stimulate my body to produce more insulin so the glucose from the food i eat can be transported to the tissues.** **3. With meals because my body cannot produce insulin.** **4. Not sure**
20. Can you decide to skip a dose without any harmful effects?	**1. Yes 2. No 3. Not sure**

21. What do you have to do when you skip a dose?	**1. Wait till the next dose** **2. Take it immediately you remember** **3. Add it to the next dose** **4. Omit the dose** **5. No idea**
22. What are some of the effects of defaulting your medications?	**1. Poor glycemic control, weight loss, low blood pressure, reduced risk of complications** **2. Good glycemic control, weight gain, increased risk of complications,** **3. Poor glycemic control, increased risk of complications, amputation of wounded limbs, death** **4. No idea**
23. What do you have to do when you experience side effects of your medications?	**1. Stop taking the medication** **2. Reduce the dosage yourself** **3. Report to a pharmacy shop for treatment** **4. Report immediately to the hospital** **5. No idea** **6. Other specify** **.....**
24. Do diabetics take drugs for the rest of their lives?	**1. Yes 2. No 3. No idea**
DIETARY MANAGEMENT	
25. What foods do diabetics eat?	**1. Complex sugars 2. Refined sugars** **2. Both 3. Other specify.....** **3. No idea**
26. How many main meals do you have to eat a day?	**1. Once 2. Twice 3. Thrice 4. No idea** **4. Other specify.....**

27. Do diabetics take snacks during the day?	**1. Yes 2. No 3. No idea**
28. What type of snacks do diabetics take?	**1. Fruits or Fresh juice 2. Refined pastries** **3. Unrefined pastries 4.refined drinks** **5. no idea**
29 Should diabetics eat balanced diet?	**1. Yes 2. No 3. No idea**
30. What type of foods should you avoid/?	**1. Fatty foods, cholestrol foods, red meat, pastries made with refined flour, refined drinks** **2. Fruits and vegetables, fish, root tuber , whole grains** **3. No idea**
31. Why do you have to avoid these foods?	**1. They increase blood sugar and your weight** **2. They reduce blood sugar** **3. They improve ciculation** **4. They impede circulation and thereby increase blood pressure** **5. No idea**
EXERCISE	
32. Should diabetics exercise?	**1. Yes 2. No 3. No idea**
33. How often should diabetics exercise?	**1. Daily 2. Weekly 3. Monthly 2.**

34. What kind of exercise should diabetes engage in?	**1. Range of motion and** **2. taking a walk** **3. vigorous exercises** **4. Those that can be tolerated** **5. No idea**

35. In the process of exercising, what precautions should be taken?	**1. Stop once a diabetic gets tired.** **2. Continue until one has no energy left** **3. Always keep refined sugar around** **4. Take refined sugar if a feeling of excessive weakness including other signs of hypoglycemia is experienced.** **5. No idea**
36. Exercises help improve circulation and aids in digestion especially among diabetics	**1. True 2. False 3. No idea**
37. Exercises form an important part of the management of type 2 DM	**1. True 2. False 3. No idea**
MONITORING	
38. Is it important to check your blood sugar level on a regular basis?	**1. Yes 2. No 3. No idea**
39. Regular monitoring of blood sugar is important because	**1. Its helps to identify hypoglycemia and hyperglycemia quickly.** **2. It helps to measure the level of a persons blood pressure.** **3. No idea** **4. None of the above**

40. How often should a diabetic monitor his blood sugar level?	
INJURY PREVENTION	
41. Diabetics expose themselves to injury when they touch very cold or very hot object.	**1.True 2. False 3. No idea**

42. What kind of footwear should diabetics wear?	
43. There is nothing wrong with a diabetic using sharps like blade to cut their overgrown nails	**1. True 2. False 3. No idea**
44. A diabetic can walk bear footed without any negative effect.	**2. True 2. False 3. No idea**
45. Diabetics should inspect their feet for blisters, redness, swelling and cuts on a daily basis.	

SECTION C : MULTIPLE DRUG REGIMEN	
46. How many anti diabetic drugs have been prescribed for you?	**1. One 2. Two 3.three 4. Four 5. > four**

47. Are you able to take all your drugs as prescribed?	**1. Yes 2. No**
48. If no, what accounts for you missing a dose?	**1. Forgetfulness** **2. Fatigue from frequent intake of medications** **3. Fear of side effects** **4. Previous experience of side effect** **5. Multiple drug regimen** **6. Other specify.....**
49. Do you have someone who reminds you of your medication time?	**1. Yes 2. No**

50. Do you think you will be able to take your drugs as prescribed if you had just one or two drugs to take?	**1. Yes 2. No**
51. What do you do when you miss a dose?	**1. Skip and wait till the next dose** **2. Take it immediately** **3. Add to the next dose** **4. Other specify.....**
52. Do you know about the side effects of your medication?	**1. Yes 2. No**
53. Are you educated on your prescribed medication?	**1. Yes 2. No**
54. Have you experienced side effects of your medication before?	**1. Yes** **2. No**

55. What do you do when you experience side effects of your medication?	**1. Report to the hospital** **2. Stop taking the medication** **3. Resort to herbal treatment** **4. Nothing** **5. No idea** **6. Other specify.....**
SECTION D: CLIENTS PERSPECTIVE ON FACTORS THAT CONTRIBUTE TO NON COMPLIANCE	
56. Averagely, how many hours do you spend at the clinic during your review?	**1. < 1 hour 2. 1 –2 hours 3. 3 – 5 hours 4. > 5 hours**
57. Does the time you spend at the clinic influence your desire to honor the next review appointment?	**1. Yes 2. No**
COST OF TREATMENT	

58. How often do you attend clinic in a month?	**1. Once 2. Twice 3. Thrice 4. Other specify.....**
59. Is KATH accessible to you depending on your place of residence?	**1. Yes 2. No**
60. How much do you spend on transportation?	**1.< 1cedis 2. 1—5 cedis 3.> 5 cedis**
61. Are registered with the NHIS?	**1. Yes 2. No**
62. Are all your prescribed medications covered by the NHIS?	**1. YES 2. No**

63. If no, are you able to afford the rest of the prescribed medications not covered by the scheme	**1. Yes 2. No**
64. If you are not registered with the scheme, are you able to afford your medications	**1. Yes 2. No**
OTHER FACTORS	
65. Are you able to exercise?	**1. Yes 2. No**
66. What makes you exercise or not?	**1. Desire to stay healthy** **2. Because Im told to do so** **3. Lack of time** **4. No social support** **5. Other specify.....**
67. Are you able to practise injury prevention techniques you are taught?	**1. Yes 2. No**
68. What makes you practise or not?	**1. Desire to stay healthy** **2. Because Im told to do so** **3. Forgetfulness** **4. Social support** **5. Lack of social support** **6. Other specify.....**
69. Are you able to adhere to dietary restrictions?	**1. Yes 2. No**
69. What makes you adhere or not to adhere to dietary restrictions	**1. Desire to stay healthy** **2. Because im told to do so** **3. Forgetfulness** **4. Inability to control my appetite for foods in to avoid** **5. Unavailability of required diet** **6. Other specify.....**

70. Does the fear of side effects affect your compliance to your medication?	**1. Yes 2. No 3. To some extent**
71. What other factors account for your compliance to treatment?	
72. What other factors account for your non compliance to treatment?	

Appendix II

ETHICAL CLEARANCE

KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY
COLLEGE OF HEALTH SCIENCES

SCHOOL OF MEDICAL SCIENCES / KOMFO ANOKYE TEACHING HOSPITAL
COMMITTEE ON HUMAN RESEARCH, PUBLICATION AND ETHICS

Our Ref: CHRPE/AP/381/14 — 27th November, 2014.

Miss Sarah Asamoah
Department of Community Health
School of Medical Sciences
KNUST- Kumasi.

Dear Madam,

LETTER OF APPROVAL

Protocol Title: ***"Assessing the Factors Influencing Treatment Compliance in Type 2 Diabetes Mellitus among Clients at the Komfo Anokye Teaching Hospital's Diabetic Clinic."***

Proposed Site: Komfo Anokye Teaching Hospital, Kumasi.

Sponsor: Principal Investigator.

Your submission to the Committee on Human Research, Publications and Ethics on the above named protocol refers.

The Committee reviewed the following documents:

- A notification letter of 9th October, 2014 from the Komfo Anokye Teaching Hospital (study site) indicating approval for the conduct of the study in the Hospital.
- A Completed CHRPE Application Form.
- Participant Information Leaflet and Consent Form.
- Research Proposal.
- Questionnaire.

The Committee has considered the ethical merit of your submission and approved the protocol. The approval is for a fixed period of one year, renewable annually thereafter. The Committee may however, suspend or withdraw ethical approval at anytime if your study is found to contravene the approved protocol.

Data gathered for the study should be used for the approved purposes only. Permission should be sought from the Committee if any amendment to the protocol or use, other than submitted, is made of your research data.

The Committee should be notified of the actual start date of the project and would expect a report on your study, annually or at the close of the project, whichever one comes first. It should also be informed of any publication arising from the study.

Thank you Madam, for your application.

Yours faithfully,

Osomfoar Prof. Sir J. W. Acheampong MD, FWACP
Chairman

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