NON ADHERENCE TO MANAGEMENT REGIMEN AMONG ADULTS WITH TYPE 2 DIABETES MELLITUS ATTENDING OUTPATIENT CLINIC OF UNIVERSITY OF NIGERIA TEACHING HOSPITAL ENUGU.

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To God Almighty who gave me grace throughout this programme.
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ABSTRACT

Chronic diseases such as diabetes mellitus require daily self management and long term therapies. Regimen adherence poses a unique challenge for patients with chronic illnesses including diabetics resulting to repeated hospital admissions, amputations and even death. There is paucity of information on regimen adherence behaviour among diabetic patients attending diabetic clinic at University of Nigeria Teaching Hospital (UNTH) Enugu. Thus the study was done to determine the prevalence and associated factors of non adherence among adults with type 2 diabetes mellitus in UNTH Enugu. A cross sectional study was done and a researcher- developed- questionnaire was used to collect data from October and December 2010. Majority, 63.5% of the respondents were females while 36.5% were males. Their mean age was 60.1 years and 88% were married. The prevalence of non adherence to medication was 24.5%, while 57.5% of the respondents did not have glucometer for self monitoring of blood glucose. Majority, (86.1%) of those on oral hypoglycaemic agent (OHA) could not monitor their blood glucose level at least twice weekly. 49.0% of the respondents missed hospital appointments and most of them, 63.5% were eating irregularly. Age (p 0.006, C I 0.025 – 0.544) and marital status (p 0.025, C I 1.250 – 25.792) were found to be associated with non adherence to medication. This showed that age and marital status militated against adherence to medication in the respondents. Cost of transportation (p 0.000, C I 0.069 – 0.472), discouraging attitudes of health workers (p 0.003, C I 0.006 – 0.353) and late commencement of clinics (p 0.006, C I 0.007 – 0.448) were associated with non adherence to coming for checkups. Based on these findings, it was concluded that there was non adherence to various aspects of management regimen among the respondents. Recommendations included that healthcare providers (physicians, nurses, pharmacists) should screen patients for non adherence when they report no improvement with their prescribed therapy. Also communication and patient-provider relationship should be improved and clinic activities commenced on time.
CHAPTER ONE

INTRODUCTION

Background to the study

Poor adherence to prescribed protocols of long term therapies is a pervasive and costly problem in the care of patients with chronic illnesses (Chang, Yeh, Lo & Shih, 2007). Poorer health outcomes and higher healthcare costs result when a patient does not adhere to recommended medication and lifestyle changes such as exercise, smoking cessation or prescribed nonpharmacologic interventions such as physical therapy or dietary plans (Eckland 2013).

Chronic diseases such as diabetes mellitus, hypertension and arthritis require daily self management and long term therapies. Diabetes mellitus is a serious chronic condition that is assuming epidemic proportions worldwide, as more than 230 million people are living with diabetes (Silink, 2007). This number is expected to escalate to 350 million (which is about 6.3% of the world population) within 20 years (Silink, 2007).

In United States, 800,000 new cases of diabetes are diagnosed yearly with type 2 diabetes accounting for 90%-95% of the diagnosed cases (Mokdad & Ford, 2008). Chronic diseases like diabetes mellitus contribute to over 70% of the disease burden in Australia and an increase of up to 80% is expected by
2020 while China is having 30 million out of its 1.3 billion population as diabetics. (Oputa & Chinenyе, 2012).

The traditional rural communities of Africa still have low prevalence of diabetes of about 1-2% while in urban communities you can have up to 1-13% (Sobngwi, Jarvis, Vexian, Mbanya & Gautier 2007). Nigeria is reported to have up to 7% of its population as diabetics with a prevalence of 7.2% in the urban communities of Lagos Mainland, 4.7% in Lagos island and 6.8% in Port Harcourt (Oputa & Chinenyе 2012; Ajibade, Abdullahi & Oyedele 2010).

The American Diabetic Association’s Clinical Practice recommendation for the management of diabetes include tight plasma glucose control of 80-120mg/dl for fasting glucose measurement, eat as recommended for each individual by their dietician, take medication as prescribed, engage in physical exercises, go for checkups and perform other self care activities like foot and eye care. (Silink, 2007).

It has been reported that regimen adherence poses a unique challenge for diabetic children, adolescents and adults and thus will negatively impact on achieving management goals, negates the effectiveness of treatment and results in repeated hospital admissions, amputations and death (Eckland, 2013). Some patients in DAWNS study were found not to adhere to insulin therapy, others modify their regimen in an unprescribed way and some did not monitor their
blood sugar level, did not eat as instructed and did not exercise (Rubin & Peyrot, 2005).

In view of the rate at which diabetes is now increasing, especially in the developing countries and with its short term and long term complications, there is urgent need for diabetic patients to adhere to and maintain their management regimen. This will help to achieve diabetic management goals, retard the progress of diabetic complications and improve their quality of life (Kalyango, Owino & Nambuya, 2008). Non adherence to management regimen should therefore be a concern to all healthcare givers and all factors associated with it should be considered while caring for patients with diabetes.

In Enugu there is paucity of information on non adherence to management regimen among diabetic patients, the extent of the problem and factors that may be contributing to it. This underscores the need to ascertain the prevalence of non adherence to management regimen among adults with type 2 diabetes and to determine the factors associated with it in Enugu. Thus if the magnitude of the problem is ascertained, then appropriate intervention strategies can be initiated.

**Statement of the problem**

Currently there is no known cure for diabetes but the major element in diabetes care is tight glycaemic control which is achieved by strict adherence to
medication, informed dietary modification, appropriate physical exercise and other instructions (Kalyango et al, 2008; Eckland 2013).

In clinical practice both in developed and developing countries, reports have shown that most of the patients were poorly controlled due to non adherence to regimen (Huther, Wolff & Stange 2013). A non adherence rate of up to 66% in patients with diabetes was reported by John et al (2005) in South South zone of Nigeria while Kalyango et al (2008) recorded 28.9% prevalence rate in Uganda. To the best of the researcher’s knowledge, no empirical work was found on non adherence to management regimen among adults with diabetes at University of Nigeria teaching Hospital Enugu as at the time of this study.

However the researcher’s observation as a clinical nurse in medical wards showed that majority of adult patients with diabetes were admitted or re-admitted either in a comatose state or with uncontrolled high glucose levels. The question that stimulated this study is: to what extent could non adherence account for these patients’ conditions. This study has attempted to address this question.

**Purpose of the study**

The purpose of the study is to assess the prevalence and associated factors of non adherence to management regimen among adults with
type 2 diabetes at the outpatient clinic of University of Nigeria Teaching hospital Enugu.

**Objectives of the study are:**

1. To determine the prevalence of non adherence to prescribed medication, diet modification, self monitoring of blood glucose level and coming for checkups in adults with type 2 diabetes.
2. To identify demographic factors associated with non adherence.
3. To establish psychosocial factors associated with non adherence.
4. To identify health system/regimen related factors associated with non adherence.

Research questions to be addressed are:

1. What is the prevalence of non adherence to prescribed management regimen among adult patients with type 2 diabetes?
2. To what extent can the prevalence be explained by the respondents’ demographics.
3. What psychosocial factors are associated with non adherence.
4. Are there health system/regimen related factors associated with non adherence.

**Significance of the study**
Findings from this study will add to the existing knowledge about extent of non adherence to management regimen among diabetic patients. This knowledge will help healthcare givers to think of assessing non adherence when a regimen seems not to be effective thereby enhancing adherence and reduce the rate of developing complications.

Survival skills are essential for patients with diabetes. Findings from this study will give information on factors militating against adherence which the healthcare givers need in order to prioritize education programme in which the patients need to be active participants.

Further research can emanate from this study.

**Scope of the study**

The study is delimited to non adherence and associated factors among adults with type 2 diabetes attending outpatient diabetic clinic at University of Nigeria Teaching hospital Enugu from October to December 2010.

**Operational definition of terms**

Non adherence is defined as the extent to which a person’s behaviour (in taking medication, following diet, or executing lifestyle changes) coincides with medical or health advice (Kara, Caglar & Kilie, 2007). It includes failure to enter a treatment programme, premature termination of therapy, incomplete
implementation of instructions and non attendance at appointment (Barbin, Grey & Tansella, 2008).

In this study non adherence to the following treatment regimen among type 2 diabetics is defined and assessed in the following ways:

**Non adherence to prescribed medication** entails an adult with type 2 diabetes not taking up to 80% of the prescribed dose of injection insulin or oral hypoglycaemic agents (OHA). This is calculated as:

\[
\text{No of drugs taken} \times \frac{100}{\text{No prescribed}}
\]

**Non adherence to diet modification** entails taking less than three meals daily and the needed in between snacks; taking the meals at irregular times and not varying the choice of food from the six food groups.

**Non adherence to self monitoring** of blood glucose entails not having the meter for measuring blood glucose level at home; not measuring blood glucose level every other day or at least twice in a week for those on oral hypoglycaemic agent (OHA) and before each meal or at least daily for those on injection.

**Non adherence to out patient clinic attendance** entails patients not coming for appointments as booked.
**Adults with type 2 diabetes** are those patients who are 40 years and above who have been diagnosed and confirmed as having type 2 diabetes and placed on treatment by a medical officer.

**Associated factors** to non-adherence are those factors, features or circumstances within the patient, his environment or within the healthcare system or in the regimen that will make an adult with type 2 diabetes not to follow their management recommendations. For the purpose of this study the factors of interest are grouped into demographic, psychosocial and health system/regimen-related factors.

**Prevalence of non-adherence** is the proportion of adults with type 2 diabetes who were not able to follow the instructions given to them about the management of their illness within the study period of October to December 2010 as it concerns medication, diet, self-monitoring of blood glucose and keeping appointment.
CHAPTER TWO

LITERATURE REVIEW

This chapter presents related materials reviewed from books and journals such as published and unpublished articles from libraries and internet materials. This review is presented under the following headings:

Conceptual review – this includes concept of type 2 diabetes mellitus, non adherence to management regimen and associated factors to non adherence to management regimen. Theories underlying the study include Orem’s self care deficit theory and Health Belief Model including the researcher’s model of the study. Empirical review was also done of related studies.

Conceptual Review

The concept of Diabetes Mellitus

Diabetes mellitus (DM) is a group of metabolic diseases characterized by elevated levels of glucose in the blood (hyperglycaemia) (Iwueze, 2007; Smeltzer & Bare 2010) This results from defects in insulin secretion or insulin action or both (American Diabetes Association Experts Committee on the Diagnosis & Classification of Diabetes 2003, American Diabetes Association 2009). The defect leads to hyperglycaemia which may result to short term and long term complications such as coronary artery disease, kidney and eye diseases and neuropathies.
Classification of diabetes mellitus

American Diabetes Association Experts Committee on the Diagnosis and Classification of Diabetes (2003) classified diabetes based on the cause, clinical course and its treatment as follows:

- **Type 1 diabetes:** this was formerly called Insulin Dependent or Juvenile onset diabetes (IDDM). It is an autoimmune disease in which the body’s insulin producing cells are destroyed. It represents 5-10% of cases and occurs mostly in children and young adults (Silink, 2007).

- **Pre diabetes:** This is a condition where there is decreased insulin sensitivity or increased insulin resistance leading to rise in blood glucose level but not high enough to constitute diabetes (smeltzer &Bare 2010). The plasma glucose level in pre diabetes is 100-126mg/dl while 2 hour glucose tolerance level is 140-199mg/dl. People at pre diabetic stage may convert to become true diabetics if preventive measures are not employed.

- **Type 2 diabetes:** this is known as Non-insulin dependent or adult onset diabetes. It occurs mostly in adults over the age of 40. As a result of increased obesity and inactivity among young adults, type 2 diabetes is now seen among children and young adults. (Silink, 2007).

- **Secondary diabetes:** this is triggered by other underlying conditions like pregnancy leading to gestational diabetes. Disease induced diabetes can occur like in Cushing’s syndrome or surgical removal of pancreas or as a result of
long term use of steroids. Another form of secondary diabetes is tropical diabetes which can occur as a result of fibrocalculous pancreatic disease.

**Pathophysiology of type 2 diabetes**

Insulin is secreted by Beta cells in the Islets of Langerhans in the pancreas. It helps to move glucose from the blood into muscles, liver and fat cells. Insulin also inhibits the breakdown of stored glucose, protein and fat. During fasting periods, the pancreas continuously releases a small amount of basal insulin. When blood glucose decreases, alpha cells of the Langerhans produce glucagon that stimulates the liver to release stored glucose (Smeltzer & Bare, 2010).

In type 2 diabetes mellitus, there is the problem of insulin resistance and impaired insulin secretion (Silink, 2007). Insulin normally binds to special receptors on cell surfaces to aid glucose metabolism. In type 2 diabetes, this process is diminished making insulin less effective in stimulating glucose uptake by the body tissues and at regulating glucose release by the liver. This is called insulin resistance. In order to overcome this insulin resistance, an increased amount of insulin is needed. However, there is impaired insulin secretion making the plasma glucose level rise to abnormal levels.

This occurs mostly in adults that are about 40 years and above who are obese (Silink, 2007). The incidence is increasing in younger adults and children due to childhood obesity (Center for Disease Control, Diabetes Surveillance,
2002, Rothma, Mulvaney & Elasv, 2009). This is also called Mature Onset Diabetes of the Youth (MODY).

Type 2 diabetes is usually of insidious onset and up to 50% of the people with this condition are not aware that they have it (Silink, 2007). For some patients the diagnosis is made when routine laboratory investigations or eye examinations are performed. Undetected diabetes leads to the development of long term complication even before the actual diagnosis of diabetes is made (ADA Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 2003).

Insulin resistance is associated with obesity and the primary prevention of type 2 diabetes is weight loss that is achieved through exercise and physical activity. (ADA, 2009). Exercise enhances the effectiveness of insulin while healthy eating and increased physical activity can prevent or delay diabetes and its complications. (Wiznitzer, 2011).
Figure 2.1 - Pathogenesis of type 2 diabetes adapted from Smeltzer and Bare (2010) p. 1153
Risk factors for type 2 diabetes

American Diabetes Association (2009) identified these risk factors for type 2 diabetes:

- **Age:** up to and more than 45 years of age. Silink (2007) also stated that type 2 diabetes occurs most often in adults over the age of 40 although with increased obesity and inactivity among the young, it is now affecting children and younger adults.

- **Family history of diabetes:** having a parent or sibling as diabetic is likely to predispose one to developing diabetes.

- **Obesity and physical inactivity:** an adult with up to or more than 20% of desired body weight or body mass index of up to or more than 27kg/m² is at risk of type 2 diabetes (Smeltzer et al 2010). Dietary habits involving an increase in consumption of refined sugars and saturated fat, reduction in fibre intake and reduction in physical activity associated with urban lifestyle explain the higher rates of obesity in the cities. (Silink, 2007). Obesity is the strongest modifiable risk factor and accounts for approximately 55% of type 2 diabetes mellitus. It reduces insulin sensitivity and about 55% of type 2 diabetes patients are obese at diagnosis. Chronic obesity leads to increased insulin resistance that can develop into type 2 diabetes.
➢ History of gestational diabetes or delivery of a baby weighing more than 4kg.

➢ History of prediabetes: previously identified impaired fasting glucose or impaired glucose tolerance is a risk factor for type 2 diabetes.

➢ Hypertension or blood pressure of more than 140/90mmHg or any history of vascular disease.

➢ High density lipoprotein (HDL) cholesterol level of 35mg/dl or less or a triglyceride level of 250mg/dl or more.

➢ Race or ethnicity: diabetes tends to be more prevalent among African Americans, Latinos, Native Americans, Asian Americans and Native Hawaiians (Kazeem, 2005; Sobngwi et al, 2007.) Belonging to any of the races is a risk factor itself.

**Burden of diabetes mellitus**

Diabetes is one of the chronic diseases that is reaching epidemic proportions with more than 230 million people worldwide living with it. (Oputa et al 2012). It is graded as the 5th leading cause of death in most developed countries with the burden particularly harsh in the developing world (Silink, 2007).

The rural communities in Africa record 1-2% prevalence rate for type 1 and type 2 diabetes with type2 being predominant. The urban areas of Africa
have 5-7% prevalence rate which can be attributed to lifestyle changes associated with urbanisation and westernisation (Sobngwi et al, 2007).

In Nigeria, the prevalence rate varies between 1-7% depending on the area surveyed. (Enwere, Salako & Falade, 2006). Lagos Mainland has a prevalence rate of 7.2% while Port Harcourt has 6.8% prevalence rate for type 2 diabetes (Ajibade, Abdullahi & Oyedele, 2010). There is paucity of data on the prevalence rate of diabetes in Enugu.

The major part of the burden of people with diabetes is their impaired quantity and quality of life which is due to diabetes acute and chronic complications (Ogbera & Fasanmale, 2008). The acute complications which are related to short term imbalances in blood glucose levels include hypoglycaemia, diabetic ketoacidosis and hyperglycaemic-hyperosmolar-non ketotic syndrome.

The long term complications as seen in both type 1 and type 2 include the micro vascular complications (nephropathy, retinopathy) and macro vascular complications (coronary artery disease, cerebrovascular disease and peripheral vascular disease) (Ogbera et al, 2008).

Diabetes has also been noted as the leading cause of end-stage-renal disease both in developing and developed countries (Sanal, Nair & Adhikari 2013). Type 2 diabetes mellitus is associated with considerable cardiovascular morbidity and mortality and is a well recognized and significant risk factor for
stroke and coronary heart disease (Ho, Magid & Shetterly, 2008). Myocardial infarction is twice as common in diabetic men and thrice as common in diabetic women while arterial occlusive disease in the lower extremities is largely responsible for the increased incidence of gangrene and subsequent amputations in diabetic patients (Ogbera et al, 2008). In their study, of the 61 recorded lower limb amputations carried out in, 26 (42.6%) were diabetes-related. Furthermore hand ulcer/ infection (Tropical Diabetic Hand Syndrome) is an increasing cause of mortality and morbidity among adults with diabetes in recent times.

More than 3 million people die from diabetic-related causes yearly and 7 out of 10 countries with the highest number of diabetics are in the developing world (Silink, 2007). An estimated US $215 to $375 billion was spent on care for people with diabetes in 2007 worldwide and this amount is expected to rise to $411 billion over the next 20 years (Oputa et al 2012). In many parts of the world the psychological and economic impacts of diabetes are largely unrecognized (Silink, 2007).

**Diabetes management**

The therapeutic goal for diabetes management is to achieve normal blood glucose level, save life, alleviate symptoms and prevent long term complications (Smeltzer & Bare, 2010). The five components of diabetes management include nutrition, pharmacologic therapy, blood sugar monitoring, physical exercise and education on self care.
**Nutritional management**

Evidence now demonstrates that changes in diet and physical activity can prevent or delay type 2 diabetes and its complications (ADA, 2009). Nutritional management is based on individualized diet plan depending on patient’s caloric requirement, weight, age, activity and previous dietary intake. Following a daily meal plan with the right amount of carbohydrate (50-60%), protein (10-20%), fat (20-30%), dietary cholesterol less than 300mg/day and modifying calories to achieve and maintain a modest weight loss is one of the most important steps one should take to manage type 2 diabetes (Smeltzer et al, 2010).

To keep blood glucose level in control, ADA (2009) gave the following guideline:

1. eat about the same number of carbohydrate servings at meals and snacks each day.
2. eat meals and snacks at about the same time each day.
3. try not to skip or delay meals.
4. take your mealtime insulin when you eat your meals for those on injection.
5. check your blood glucose level regularly to determine when and where changes are needed.
6. be more physically active.
The six food groups from which the patient can eat or exchange one food for any other in the same group according to Smeltzer and Bare, (2010) include:

Starch (cereals, rice, bread, oatmeal, yam, garri, corn, cassava etc.)

Animal/plant protein: (meat, fish, chicken, egg, beans, peas, nuts, locally available legumes like bambara nut (okpa), pigeon pea (fio-fio), soya beans etc.

Fats/ oil: (peanut, cashew nut, margarine, diet salad palm oil).

Fruits :apples, grapes, pears, oranges, pawpaw, water melons, pineapple etc.

Vegetables: can be eaten freely without restriction especially the green leafy vegetables.

Milk and milk products: skimmed milk, non-fat yogurt, dry-non-fat milk, low fat-butter milk.

When the patient needs to eat more to reach the target calorie goal, a snack may be added.

**Exercise and physical activity**

Type 2 diabetes is more common (about 25%) among people that lead a sedentary, affluent lifestyle (ADA, 2009). The goals of exercise for persons with type 2 diabetes are to establish a daily activity and exercise pattern, reduce
the risk for cardiovascular complications and assist in reducing obesity (ADA 2009). Exercise promotes the uptake of glucose in the muscles for a period several times longer than the period of exercise and hence reduces blood glucose levels. (ADA, 2009.) Simple dynamic exercise like brisk walking for 30-50 minutes daily, 3-5 times weekly has been shown to be very helpful. Risk of diabetes is reduced by 50% among men who take moderately vigorous exercise.

**Self monitoring of blood glucose (SMBG)**

Studies have shown a correlation between tight glycaemic control and reduction in the progression of chronic complications associated with diabetes (Silink 2007). Data from United Kingdom Prospective Diabetes Study (UKPDS) indicated that intensive glycaemic control over a 10 year period may reduce the risk of myocardial infarction (Griffith 2009). Self monitoring of blood glucose is an aspect of self care that enables diabetic patients manage other self care activities e.g. adjust the treatment regimen to obtain optimal blood glucose levels and to detect hypoglycaemia or hyperglycaemia (ADA, 2003).

For patients requiring injection insulin, SMBG may be needed before meals and at bedtime while those on oral hypoglycaemic agents (OHA), will require at least two or three times per week check (Delamater 2006 in ADA, 2011). Some factors may affect SMBG performance such as visual acuity, fine
motor co-ordination, cognitive ability, comfort with technology (glucometer), willingness and cost of strips (Smeltzer & Bare, 2010).

**Pharmacologic therapy**

In type 1 diabetes, exogenous insulin must be administered for life because of body’s inability to produce insulin. In type 2 diabetes, injection insulin may be necessary if diet and oral hypoglycaemic agents fail or on temporary basis during illness, infection, pregnancy, surgery or stressful event (Smeltzer et al, 2010).

Insulin can be rapid acting (eg Humalog, Novalog); short acting (Regular Novolli, regular Humalog); intermediate acting (Humulin N); long acting (ultra Lente “UL”) and very long acting (Glargin). The dosage of insulin required by each patient depends on the blood glucose level, hence self monitoring of blood glucose becomes very essential in insulin therapy (Franz, 2006).

Oral hypoglycaemic agents used for type 2 diabetes include the Sulphonylureas (diabenes, glibenclamide, glipizide). The main actions of sulphonyureas are: to stimulate insulin secretion from pancreatic beta-cells, decrease hepatic gluconeogenesis in the liver and enhance the peripheral utilization of glucose by increasing insulin receptor binding sites in the muscles and fat cells (Smeltzer & Bare, 2010).
Biguanides (Metformin, glucovance, glucophage) is the drug of choice in obese patients where diabetes is inadequately controlled with sulphonylureas. It acts by direct stimulation of glycolysis in peripheral tissues with increased glucose removal from blood and reduction of hepatic gluconeogenesis (Obi & Obi 2012). Patients on these drugs should be taught to differentiate between symptoms of hypoglycaemia and hyperglycaemia and to observe for signs of any impending renal insufficiency.

Other self care behaviours

Diabetes mellitus as a chronic illness require a lifetime of special self-management behaviours (Smeltzer & Bare, 2010). Daily self care skills and preventive behaviours should be part of patient education (Delamater, 2006). Such self care skills include foot and eye care and stress management. More than 50% of lower extremity amputations done on diabetic patients are said to be preventable if patients would practice foot care on daily basis (ADA, 2009).

Preventive foot care measures include careful daily inspection of the feet for redness, blisters, fissures, calluses, ulcerations and changes in skin temperature. It also involves proper bathing, drying and lubricating the feet, wearing shoes that are not too tight and trimming toe nails straight across.

Retinopathy occurs both in type 1 and 2 diabetes over years (Silink, 2007). Regular ophthalmologic examination will help detect any impending
retinopathy early enough. Physiologic and emotional stress following surgery, infections and ordinary hassles are common in diabetes (Silink, 2007). Stress contributes to hyperglycaemia or hypoglycaemia as patient may alter their usual meal pattern, exercise and medication. They may stop eating at all in response to stress. Thus strategies for minimizing and coping with stress should be part of education programme for patients with diabetes.

**Non adherence to management regimen**

Non adherence is “failure to adhere to a treatment plan or to follow a regimen in a consistent manner” (Smeltzer & Bare, 2010). It is also the extent to which a person’s behaviour for taking medication, following diet, or executing lifestyle changes, coincides with medical advice (Kara, Caglar & Kilie, 2007). Non adherence can include failure to enter a treatment programme, premature termination of therapy, incomplete implementation of instruction and non attendance at appointment (Barbin, Grey & Tansella, 2008). The most meticulous diagnosis and evidenced-based, carefully weighted treatment plans and recommendations will become wasted effort if a patient does not adhere to the therapy (Morisky, 2009).

Discussion about adherence started by multidisciplinary teams as early as 1970s when studies showed that as many as 50% of patients diagnosed with hypertension were not taking sufficient amounts of their drugs. Non adherence was common particularly with long term treatments for conditions like diabetes,
asthma, hypertension and HIV/AIDS (Morisky, 2009). Non adherence entails not only taking medication but also failure to adhere to lifestyle changes such as exercise, smoking cessation, physical therapy or dietary plans (Griffith, 2007).

Non adherence was found to be used interchangeably with non compliance. Recently this term non compliance is sometimes regarded as a manifestation of irrational behaviour or wilful failure to observe instructions. Health professionals have viewed non compliance as the fault of the client. Nurses are responsible for promoting patients’ autonomy and respecting patient’s choice but labeling a patient non compliant threatens patient’s independence, refuses them the right to choose and maintains the provider’s power and expert status (Shay, 2008).

Non compliance was defined by North American Nursing Diagnosis Association (NANDA) as a behaviour of a person and or caregiver that fails to coincide with a health-promoting therapeutic plan agreed upon by the person, family and/or community and healthcare professional (Ankley, 2008). The implication of this definition is that there is a shared information that led to informed decision by the client. A word that is less offensive to the clients is needed to define this problem.

In this study non adherence is preferred and adopted. This assumes that patients with diabetes, through education have been motivated, have gained confidence and are convinced about the benefits of their needed lifestyle

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changes and treatment but were prevented from adhering by some factors (Berman et al, 2008).

Any patient can be non adherent. Most published studies showed that adherence does not correlate with age, sex, race, occupation, education, income level or socioeconomic status (Griffith, 2007). It is estimated that only 50% of patients suffering from chronic diseases follow treatment recommendations. Specific patient groups according to (Morisky, 2009) may tend to have more difficulty following a treatment regimen. Such as adolescents, elderly, psychologically dysfunctional ones, low income and minority patients and those with chronic conditions.

Regimen adherence problems are common in individuals with diabetes, making glycaemic control difficult to attain (Delamater, 2006). Many diabetic patients do not monitor their blood glucose level, only a minority monitor their blood glucose at least once a day while adherence to their medication, diet and exercise regimen is suboptimal (Smeltzer et al 2010). The pattern of non adherence may also range from either reducing the dose or altering the regularity of medication or not adhering at all.

Many diabetic patients fail to adhere to their regimen for a variety of reasons which may include forgetfulness, poor understanding of the nature of their disease, high cost of regimen and traditional beliefs about the disease (Fedrick & Justin-Temu 2012). Psychological problems (depression and
diabetes related-emotional distress), poor provider-patient relationship, unpleasantness of regimen, complicating everyday life, fear of hypoglycaemia and self-care ability can adversely influence the patient’s ability to adhere to regimen (Barret & Jonathan, 2007; Morisky, 2009).

Other situational factors like eating out at restaurants, inappropriate food offers from others, not being able to do without favourite foods and junks and conflict caused by diet modification in the family may account for non adherence to regimen (Morisky, 2009). Patients who have difficulties with basic needs (housing, finances, job, safe environment) have little motivation to address long term lifestyle issues and thus are at higher risk of being non adherent.

Diabetic adherence is not a unitary construct and varies across different components of regimen (Delamater, 2006). This means that non adherence is multidimensional because patients may adhere well to one aspect of the regimen but not to others (Delamater, 2006).

**Theories related to the study**

Two theories related to this study include Orem’s Selfcare deficit theory of nursing and Health Belief Model.
Orem’s self care deficit theory

Orem’s self care theory is composed of 3 inter-related theories namely: theories of self care, self care deficit and nursing systems.

Self care theory

Concepts contained in this theory include self care, self care agency, basic conditioning factors and therapeutic self care demands. Orem defined self-care as the performance or practice of activities that individuals initiate and perform on their own behalf to maintain life, health and well being (Orem, 2001 in George, 2010). When self care is effectively performed, it helps to maintain structural integrity and human functioning and contributes to human development.

Orem defined self care agency as the human’s acquired ability or power to engage in self care. This acquired ability is affected by basic conditioning factors such as age, gender, developmental state, health states, socio cultural factors and resource adequacy and availability (Berman et al, 2008). An individual who performs these self-care independently is called a self care agent while a person other than the individual who provides the care is called a dependent care agent.

Self care requisites (needs) are the reason for which self care is undertaken or the desired results (George, 2010) the 3 categories of this self
care needs include: universal self-care needs. These are activities common to all human beings and include maintaining intake and elimination of air, water, food, excretion, balancing rest and activity, solitude and social interaction, preventing hazards to life and well being and promoting normal human functioning. The ability to carry these out will depend on age, developmental state, life experience and socio cultural orientation (George, 2010).

Developmental need (requisites) result from maturation, conditions or events that took place in the individual’s life like adjusting to a change in body image after mastectomy, amputation or to the loss of a spouse. Health deviation needs occur when there is illness, injury or disease or it’s treatment (eg diabetes and its treatment). When disease or injury occurs, it results to changes in the individual’s body structure, physical functioning, behaviour or his activities of daily living. With this alteration, the individual makes added demand for self care (Berman et al, 2008). When there is any known self-care demand beyond capacity of the self-care agent, self-care deficit occurs (Orem, 2001). Nurses and family members help people to meet up with this self care deficit.

Patients with diabetes mellitus are faced with a lot of self care deficits which may include deficient knowledge about diabetes self care skills and information, imbalanced nutrition related to imbalance of insulin, food and physical activity. They also face risk for fluid volume deficit related to polyurea and dehydration, hypoglycaemia, hyperglycaemia and even anxiety related to
loss of control and fear of inability to manage diabetes (Smeltzer & Bare, 2010). Nurses assist people to meet up with these self-care deficits through five ways as highlighted by Orem. They either act or do it for the client, guide or teach the client and the relations or by supporting and providing an environment that promotes the individual’s abilities to meet current and future demands.

In relation to this study, Orem’s self-care agency can be related to diabetic patient’s acquired ability or power to engage in self-care. This ability or power is acquired through health education and teachings given by diabetic nurse educators, physicians and dieticians and also by experience. The basic conditioning factors that affect the self care agency can be compared to the factors that affect the adherence behaviour of diabetic patients. These basic conditioning factors Orem highlighted as age, gender, developmental state, health, socio-cultural factors, healthcare system factors, family system factors, environmental factors and resource - availability and adequacy (Orem, 2001). The influence of these basic conditioning factors can negatively lead to health deviation requisite (need) and hence non adherence.

Diabetic patients need to take care of themselves and manage their illness at home, thus Orem’s theory serves as good framework for identification of the basic conditioning factors that affect their ability for self-care and for determining the extent of their influence on patient’s adherence behaviour.
Health belief model (HBM)

Health belief model is a framework for understanding patient’s adherence to health behaviours (Janz & Becker, 1984 in Patino, 2005). It is the model designed to predict a person’s health behaviour, including the use of health services and to justify intervention to alter maladaptive health behaviour (ADA, 2009). It focuses on two aspects of a person’s conceptualization of health and health behaviour namely:

Threat perception which is dependent on perceived susceptibility to illness and anticipated severity of the consequences.

Behavioural evaluation which concerns the benefits of a health behaviour and the barriers to enacting the behaviours (Patino et al, 2005).

Health belief model (HBM) also consists of 3 main facets which include: individual perceptions, modifying factors and likelihood of action.

Perceived susceptibility focuses on which level the individual feels at risk of contracting the disease or condition. A family history of diabetes may make an individual be at high risk and therefore will affect the likelihood of being adherent or non adherent to preventive measures or prescribed regimen. When a person perceives the illness as leading to death or to serious consequences (perceived seriousness) there will be likelihood of taking recommended preventive health actions or adhere to prescribed regimen.
Factors that may influence a person’s perception (modifying factors) may include demographic factors (eg age, gender, race etc); psychosocial factors (eg social pressure, peer pressure, supportive family members) and structural variables (like knowledge about the disease, provider-patient relationship and past experience. (Berman et al, 2008).

Likelihood of action depends on the person’s perceived benefits of action (such as “if i adhere, does it make me feel better, or improve my quality of life and wellbeing”?). Likelihood to action also depends on perceived barriers to action which include those factors that pose a problem to adhering to prescribed regimen. Such barriers may include cost of the regimen, inconveniences, unpleasantness and extent of lifestyle changes needed (Berman et al, 2008; ADA, 2009).

Perception of risk is at the root of determining whether the individual will engage in appropriate health behaviours. Studies that investigated the role of health beliefs in the regimen adherence in adults and adolescents with diabetes discovered that health belief accounted for 52% of the variance in self reported adherence for the younger sample (mean age 18 years). Cost of regimen predicted adherence while perceived severity and susceptibility predicted metabolic control (Patino et al, 2005). A patient may perceive an illness as serious and will want to adhere to prescribed regimen but may be hindered by the modifying factors and perceived barriers to action.
In this study, Health Belief Model will give a guide in identifying those modifying factors and barriers which will deter a diabetic patient from adhering to management regimen, even when the patient perceives diabetes as a serious illness that can lead to complications and even death. From Orem’s Self-care theory, the contributory factors to non-adherence to regimen can be studied by looking at Orem’s basic conditioning factors that affect self-care. Looking at Health Belief Model, the modifying factors and barriers to action can help in understanding the contributing factors more.
Health belief model

Includes

Individual Perception of Susceptibility and Seriousness of illness

Affected by

Perceived barriers to action like cost, inconvenience, unpleasantness of regimen, extent of lifestyle changes

Orem’s self-care theory

Includes

Self-care agency

(DM patients ability/Power to

Affected by

Basic conditioning factors like age, gender, sociocultural, family system) factors,

Independent variables of Interest A

Intervening variables of Interest B

Intervening variables of Interest C

Problem of adhering to prescribed regimen and affects perception of risks (Dependent variables)

Resulting to

Health deviation requisites (Needs), (added demand and extra self care needed)

Need for supportive/educative (developmental system of care by the nurse or family members)

From figure 2:2, the variables of interest (independent variables) A and B from HBM include the Perceived barriers to action (like cost, inconvenience, unpleasantness of regimen and extent of life style changes) and the modifying factors (age, gender, race, social pressure, supportive members). The independent variables C from Orem’s theory represent the basic conditioning factors (like age, gender, sociocultural factors, family system and environmental factors. The influence of these factors will result to problem of adherence to prescribed regimen (dependent variable). When there is non adherence, there is likelihood of health deviation thus making the patient to be in need of developmental system of care either by the nurse or family members.

**Empirical review**

Many studies have been carried out on non adherence to regimen, especially medication non adherence. Poor adherence to diabetes management regimen has also been the focus of studies in different countries.

Chang et al (2007) in a cross sectional study of 101 Taiwanese children and adolescents with type 1 and type 2 diabetes examined their adherence behaviours in 5 aspects of regimen using questionnaire. They examined the number of calories consumed per day, frequency of meals, self monitoring of blood glucose, amount of time between injections and meals and frequency of exercise. They found out that overall, the patients had poor adherence behaviour in each aspect of diabetes management regimen. Only 25% consumed the ideal
daily number of calories, 18% ate the ideal daily number of 6 times per day, 43% did not exercise at all and only 7% of the patients met the good diabetic control of HbA1c of less than 7%. They did not explore factors related to this non adherence but suggested that further studies are needed to explore that.

Diabetes Attitude Wishes Needs Study (DAWNS) surveyed more than 5,000 patients with diabetes from 13 countries of the world including United States. They evaluated how closely diabetic patients followed treatment recommendations for eating, staying active, taking medication, monitoring glucose levels and keeping appointments. They also examined factors associated with treatment non adherence using questionnaire.

Of the 485 diabetic patients surveyed in the United States in their study, there was poor regimen adherence. Only 28% completely followed dietary recommendation, 26% followed exercise regimen and 34% followed all the treatment recommendations. Depression, diabetes-related emotional distress, poor patient-provider relationship, difficulty in having access to multidisciplinary care were among the factors associated with non adherence in the study.

John et al (2005) carried out a descriptive study on compliance and glycaemic control in adult diabetes patients in South South Zone of Nigeria using 59 subjects. They assessed compliance with diabetes treatment regimen, health instructions, pattern of non compliance, factors affecting compliance and
the relationship between compliance and glucose control using structured and unstructured questionnaire. 35.6% of the subjects complied with treatment prescriptions while 64.4% did not comply. 74.6% were non compliant to diet instruction while only 6.8% complied with glucose monitoring. Contributing factors to non adherence elicited in the study were high cost of medication, forgetfulness, frustration due to long duration of treatment and not being able to do without favourite foods and drinks.

Ajibade, Abdullahi and Oyedele (2010) carried out a study on factors militating against compliance with medical regimen among diabetic patients and implication for nursing practice in Osun State of Nigeria using 143 respondents. Their findings showed that gender and level of education were not related with level of compliance to medical regimen, however, financial and family supports were found to be necessary to enhance compliance to medical regimen in diabetic patients.

Stotland (2006) did a study on overcoming psychological barriers in insulin therapy with 115 patients with type 1 and type 2 diabetes treated with insulin. His study showed that 45% of the participants avoided injection insulin due to anxiety or needle phobia and injection associated pain. Insulin omission in women with type 1 diabetes was common with 31% of the women reporting intentional insulin omission for fear of anticipated weight gain associated with insulin use. This resulted to poorer glycaemic control, more diabetes-related
hospitalizations, greater psychological distress and higher rates of retinopathy and neuropathy. The study also identified reduction of caloric intake, missing meals, eating regular snacks as the pattern of non adherence to dietary recommendation.

Kalyango et al (2008) carried out a cross sectional study at Mulango Hospital Uganda on non adherence to diabetes treatment using structured and semi structured questionnaire. 402 participants with type 1 and type 2 diabetes were surveyed and a 28.9% non adherence prevalence rate was recorded. Factors independently associated with non adherence in the study were female gender, not understanding the drug regimen well, affording only some of the prescribed drugs and not keeping appointments. This study however was narrowed only to medication non adherence and the participants were both type 1 and type 2 diabetics.

Hopkins (2009) also conducted a study to determine if non adherence to medication among adults with type 2 diabetes increased their risk of hospitalization. They defined non adherence as patient having their diabetes medication less than 80% of the time. Their respondents were 900 men and women on diabetes drugs. About 29% of the patients were defined as non adherent and concluded that these patients were two and a half times more likely to be hospitalized during the following year. The only factor they
identified as being associated with non adherence was having no symptom or feeling better.

Yang et al (2009) carried a cross sectional study with patients with type 2 diabetes who had had at least one Potentially Avoidable Hospitalization (PAH). Among 52,176 patients on oral hypoglycaemic agents who had PAHS, 22,205 was due to uncontrolled diabetes following non adherence to oral hypoglycaemic. They defined poor adherence as 50-80% less than proportion of days covered. They identified age, gender and race as demographic factors associated with non adherence to oral hypoglycaemic agent.

**Summary of literature review**

Literature reviewed showed that major studies on non adherence among patients with diabetes were done in developed countries. Those done in developing countries concentrated mainly on medication non adherence. In Nigeria, few studies have been done on non adherence in patients with type 1 and type 2 diabetes in Osun State, Port Harcourt and Akwa Ibom. These studies concentrated on medication non adherence only. To the best of the researcher’s knowledge no study on non adherence to medication or other life style changes among type 2 diabetes patients attending the out patient clinic of University of Nigeria Teaching Hospital Enugu has been conducted.
This existing gap constitutes the need to assess non adherence to medication, diet, self monitoring of blood glucose and coming for check ups and to elicit factors associated with it among adults with type 2 diabetes attending out patient clinic in University of Nigeria Teaching Hospital.
CHAPTER THREE

RESEARCH METHODOLOGY

This chapter discussed the research design, area of study, study population, sample size, sampling procedure, instrument for data collection and data analysis.

Research design

A cross sectional study design was used for this study. This design was used successfully to determine the prevalence and factors in non adherence to diabetes treatment in Uganda by Kalyango et al (2008). Chang et al (2007) used it to study the non adherence behaviours of Taiwanese children with type 1 diabetes. Therefore it is deemed fit for this study.

Area of study

Enugu is the area of study. It is the capital of Enugu State in Nigeria. It was the capital of the former Eastern region, East Central State and the former Anambra State. There are four tertiary hospitals in Enugu State among which is University of Nigeria Teaching Hospital (UNTH). The hospital now operates at its permanent site at Ituku-Ozalla along Enugu-Port Harcourt express road. It was founded in 1971 and is the biggest referral and teaching hospital in the Eastern part of Nigeria. It has an out patient diabetic clinic that holds once in a
week and in-patient facilities where medical care is provided throughout the week. This outpatient clinic was the setting for this study.

**Study population**

Adults with type 2 diabetes mellitus that attended outpatient diabetic clinic within the study period of October to December 2010 formed the target population.

**Sample**

It was recorded that approximately 200 adults with type 2 diabetes visit diabetic clinic monthly (UNTH Medical Records 2010). Out of this number, more than half came for either weekly or two weekly checkups or were referred for the first time from other clinics (example eye clinic). Thus the number of patients with type 2 diabetes that attended the clinic only once in any one month was approximately 55 making up to 660 type 2 diabetics in one year that attended only once in a month.(Medical Record Department UNTH 2010). Using Yaro Yamene’s formular for finite population, the sample size required for statistical analysis was calculated (Uzoagulu 2008). The formular is given as:

\[ n = \frac{N \cdot (N-1)}{N+e^2} \]

where \( n = \) sample size
N = the finite population, e = level of significance or limit of tolerable error, for this study 0.05 is acceptable. \(1 = \text{constant. Thus the sample size, } n = \frac{660}{1 + 660 (0.05)^2} = \frac{660}{2.7} = 244.\)

**Sampling technique**

A purposive sampling technique was used to select the respondents who met the inclusion criteria. 244 participants who were willing to participate and who met the inclusion criteria were enlisted for the study. The inclusion criteria were:

- Participants must have been diagnosed as having type 2 diabetes mellitus by a medical officer.
- Should be about 40 years and above.
- Must be attending the diabetic out patient clinic during the study period of October to December 2010 during which the number of participants is completed.
- Must be coherent, alert and willing to participate in the study through giving of informed consent.

**Exclusion criteria included:**

- Patients with type 1 diabetes.
- Those who were coming to the clinic for the first time or those who were just being referred to the clinic from another clinic and have not been
confirmed as having diabetes. The participants answered the questionnaire once.

**Instrument for data collection**

A researcher-designed questionnaire was used to obtain information from the participants. The questionnaire had three sections. Section A obtained information on patients’ demographic characteristics, section B assessed prevalence of non-adherence to management regimen while section C elicited factors associated with non-adherence. The items in the questionnaire were derived from literature search based on the objectives set for the study.

**Validity of instrument**

Face validation of the instrument was done by the project supervisor. Her input was utilized to effect some corrections before using the instrument for field testing.

**Content Validity**

The researcher-made questionnaire was given to experts in the field of study to evaluate. These experts included Consultant physician in Endocrinology, dietician, diabetes nurse educator that covers the outpatient diabetic clinic, the head of Nursing Science Department who specialized in Medical-surgical nursing. They evaluated the relevance of the items in the tool using a rating
scale of 4 for very valid, 3 for valid, 2 for irrelevant and 1 for needed to be modified.

Any item with mean score of 2.5 was accepted and less than 2.5 was either discarded or modified. In addition to rating each item in the tool, they gave an overall rating of the relevance of the tool using a rating scale of 3 for excellent, 2 for good, and 1 for fair. An agreement rate index of 3/3 or 2/3 was acceptable. From the analysis of the experts’ validation, 2 items had mean scores of 1.6 and were modified. All other items were accepted. An agreement rating of 2.5/3 was obtained which made the tool acceptable to be used for data collection.

**Reliability of instrument**

Reliability testing using test-retest method at interval of two weeks was done for sections B and C of the questionnaire. They showed a coefficient reliability of 0.9 for each section which was computed using Pearson Product Moment correlation coefficient formula. Adults with type 2 diabetes attending a peripheral diabetic clinic manned by a consultant physician in Enugu were used for pre testing of the questionnaire. Corrections were made and the language of the questionnaire fine tuned to the level of the understanding of the study participants.
**Ethical considerations**

Ethical and administrative permit were obtained from the ethical committee of the University of Nigeria Teaching Hospital (UNTH) Enugu, the head of department in charge of diabetic clinic and the nurse managers. The consent of the respondents was solicited for and obtained. Anonymity was also maintained to enhance confidentiality.

**Procedure for data collection**

Two research assistants were trained on the use of the questionnaire. Data were collected at each clinic day (Wednesday) and the number of participants needed was completed from October to December 2010. Those who could not understand English very well were assisted by explaining the questions to them.

The data collection was conducted mostly before the routine consulting clinic activities started. This was to reduce patients’ distractions in the form of going for blood glucose monitoring and recording, sorting out their folders/laboratory investigation results and consultation with their doctors.

**Method of data analysis**

Quantitative data collected were cleaned and analysed using a Statistical Software Package for Social Sciences (SPSS) version 15. Descriptive statistics which included frequency count, percentages, mean and standard deviation
were used for general description of study participants profile and to obtain the prevalence of non adherence to diabetes management regimen.

Inferential statistics which included logistic regression was performed to determine variables significantly associated with non adherence at 0.05 level of significance. Odd ratios, their 95% confidence intervals and P-values were also obtained. Results were presented in frequency table. A P-value of <0.05 was considered statistically significant.
CHAPTER FOUR

Presentation of results

This chapter discussed the presentation of results of data collected. Results were presented in accordance with the objectives of the study and the research questions.

Of the two hundred and forty four (244) questionnaires distributed, two hundred (200) were completed and returned. This gave a return rate of 82%. The analysis was done based on the 200 completed questionnaires.

Demographic Characteristics of Respondents

Majority of the respondents 127 (63.5%) were females while 73 (36.5%) were males. More than half 111 (55.5%) were above 60 years of age, 58 (29%) were between the ages of 50 and 59. Their mean age was 60.1(± 10.7) years. Majority 85 (42.5%) had primary education, 58 (29%) had no formal education while 36 (18%) had tertiary education. Most of the respondents 176 (88%) were married while 15 (7.5%) and 5 (2.5%) were widowed and single respectively. Majority 79 (39.5%) had suffered diabetes for 6-10 years, 51 (25.5%) had suffered it for more than 11 years while 70 (35%) have had it for less than 5 years. The mean duration with diabetes was 7.4 years for the respondents. Main occupation for the respondents was trading 79 (39.5%), 63 (31.5%) were pensioners while 24 (12%) were farmers. Majority of the respondents 175
(87.5%) were on oral hypoglycaemic agents (OHA), 13 (6.5%) were taking OHA and injection insulin combined while 12 (6%) were on injection insulin only. See table 1 for details.

**Table 1: demographic characteristics of respondents. n=200**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex: males</td>
<td>73</td>
<td>36.5</td>
</tr>
<tr>
<td>Females</td>
<td>127</td>
<td>63.5</td>
</tr>
<tr>
<td>Age: 39 – 40</td>
<td>5</td>
<td>2.5</td>
</tr>
<tr>
<td>40 – 49</td>
<td>26</td>
<td>13.0</td>
</tr>
<tr>
<td>50 – 59</td>
<td>58</td>
<td>29.0</td>
</tr>
<tr>
<td>≥60</td>
<td>111</td>
<td>55.5</td>
</tr>
<tr>
<td>Level of education:</td>
<td>58</td>
<td>29.0</td>
</tr>
<tr>
<td>No formal education</td>
<td>85</td>
<td>42.5</td>
</tr>
<tr>
<td>Primary</td>
<td>21</td>
<td>10.5</td>
</tr>
<tr>
<td>Secondary</td>
<td>36</td>
<td>18.0</td>
</tr>
<tr>
<td>Tertiary</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital status:</td>
<td>4</td>
<td>2.0</td>
</tr>
<tr>
<td>Single</td>
<td>176</td>
<td>88.0</td>
</tr>
<tr>
<td>Married</td>
<td>5</td>
<td>2.5</td>
</tr>
<tr>
<td>Divorced</td>
<td>15</td>
<td>7.5</td>
</tr>
<tr>
<td>Widowed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration of diabetes:</td>
<td>70</td>
<td>35.0</td>
</tr>
<tr>
<td>≤ 5 years</td>
<td>79</td>
<td>39.5</td>
</tr>
<tr>
<td>6 – 10 years</td>
<td>51</td>
<td>25.5</td>
</tr>
<tr>
<td>≥ 11 years</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupation :</td>
<td>24</td>
<td>12</td>
</tr>
<tr>
<td>Profession</td>
<td>Count</td>
<td>Percentage</td>
</tr>
<tr>
<td>---------------------</td>
<td>-------</td>
<td>------------</td>
</tr>
<tr>
<td>Farming</td>
<td>79</td>
<td>39.5</td>
</tr>
<tr>
<td>Trading</td>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td>Pastors</td>
<td>5</td>
<td>2.5</td>
</tr>
<tr>
<td>Hospital workers</td>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td>Banking</td>
<td>2</td>
<td>1.0</td>
</tr>
<tr>
<td>Security men</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>Navy officer</td>
<td>3</td>
<td>1.5</td>
</tr>
<tr>
<td>Office attendant</td>
<td>4</td>
<td>2.0</td>
</tr>
<tr>
<td>Teacher</td>
<td>6</td>
<td>3.0</td>
</tr>
<tr>
<td>Administrative officers</td>
<td>63</td>
<td>31.5</td>
</tr>
<tr>
<td>Pensioners</td>
<td>9</td>
<td>4.5</td>
</tr>
<tr>
<td>Unemployed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Diabetes treatment option:**

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Injection insulin</td>
<td>12</td>
<td>6.0</td>
</tr>
<tr>
<td>Oral hypoglycaemic agent</td>
<td>175</td>
<td>87.5</td>
</tr>
<tr>
<td>Injection and tablets</td>
<td>13</td>
<td>6.5</td>
</tr>
</tbody>
</table>

**Research question 1:** What is the prevalence of non adherence to management regimen (namely medication, diet, self monitoring of blood glucose and coming for check up) among adults with type 2 diabetes?. Questions ii, iii, iv, v, vi, vii, viii, ix and x of the questionnaire answered the above question.
Table 2: Prevalence of non adherence to Medication

<table>
<thead>
<tr>
<th>Medication behaviour</th>
<th>Frequency</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥80% of drugs =adherence</td>
<td>145</td>
<td>75.5</td>
</tr>
<tr>
<td>≤80% of drug =non adherence</td>
<td>55</td>
<td>24.5</td>
</tr>
<tr>
<td><strong>Non adherence according to drug type:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Metformin (Glucophage) n= 190</td>
<td>49</td>
<td>25.8</td>
</tr>
<tr>
<td>Glibenclamide (Daonil) n= 145</td>
<td>39</td>
<td>26.9</td>
</tr>
<tr>
<td>Injection insulin, n= 17</td>
<td>2</td>
<td>11.8</td>
</tr>
</tbody>
</table>

NB: responses not exclusive.

Table 2 showed that 55 (24.5%) of the respondents did not take up to 80% of their prescribed medication, 49 (25.8%) of those on tablet Metformin/Glucophage did not take up to 80% of the their prescribed drugs, 39(26.9%) of those on Glibenclamide/Daonil did not take up to 80% of their drugs while 2 (11.8%) of those on injection soluble insulin did not adhere by taking up to 80% of the prescribed injection.
Table 3: Non adherence to diet, self monitoring of blood n=200

<table>
<thead>
<tr>
<th>Diet</th>
<th>Frequency</th>
<th>Percentage %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of meals per day</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eating ≥3times daily with needed snacks</td>
<td>142</td>
<td>71</td>
</tr>
<tr>
<td>Eating ≤3times daily without snacks</td>
<td>58</td>
<td>29</td>
</tr>
<tr>
<td>Eating meals at regular times</td>
<td>73</td>
<td>36.5</td>
</tr>
<tr>
<td>Eating meals at irregular times</td>
<td>127</td>
<td>63.5</td>
</tr>
</tbody>
</table>

| Self monitoring of blood glucose behaviour |           |              |
| Having glucometer                         | 85        | 42.5         |
| Not having glucometer                     | 115       | 57.5         |
| 2-3 times daily check for those on OHA = adherence | 25   | 13.9         |
| ≤2-3 times daily check for those on OHA = non adherence | 155  | 86.1         |
| ≥1 daily check for those on inj insulin   |           |              |
| ≤1 daily check for those on inj insulin = adherence | 4    | 21.1         |

**Non adherence for coming for check ups:**

| Able to come for check ups=adherence | 15 | 78.9 |
| Not able to come for check ups=non adherence | 102  | 51   |
|                           | 98  | 49   |

Table 3 showed that 115 (57.5%) of the respondents did not have glucometer for self monitoring of blood glucose at home. 155(86.1%) of those who were on
oral hypoglycaemic agents (OHA) failed to monitor their blood glucose level at least 2-3 times in a week while 15(78.9%) of those on injection insulin combined with OHA did not monitor their blood glucose level at least once daily. Also from table 3, 98 (49.0%) of the respondents were not able to come for their check ups as booked. This showed non adherence both to self monitoring of blood glucose and for coming for check ups.

The table showed that 58 (29%) of the respondents ate less than 3 meals in a given day and 127 (63.5%) of respondents did not have regular meal times. This means that this proportion of the respondents were eating less than 3 meals daily and the meals were eaten at irregular times.

**Table 4: 24 hours dietary consumption recall  n = 200**

<table>
<thead>
<tr>
<th>Food items</th>
<th>Break fast n, %</th>
<th>Lunch n, %</th>
<th>Supper n, %</th>
<th>Bed time snacks n, %</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n, %</td>
<td>n, %</td>
<td>n, %</td>
<td></td>
</tr>
<tr>
<td>Starch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pap</td>
<td>39, 19.1</td>
<td>2, 1</td>
<td>4, 2</td>
<td></td>
</tr>
<tr>
<td>Roasted corn</td>
<td>-</td>
<td>-</td>
<td>2, 1</td>
<td></td>
</tr>
<tr>
<td>Bread</td>
<td>37, 18.1</td>
<td>2, 1</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Yam</td>
<td>13, 6.5</td>
<td>31, 15.5</td>
<td>32, 16</td>
<td></td>
</tr>
<tr>
<td>Garri</td>
<td>8, 4</td>
<td>18, 9</td>
<td>30, 15</td>
<td></td>
</tr>
<tr>
<td>Cassava: (Foofoo)</td>
<td>6, 3</td>
<td>6, 3</td>
<td>5, 2.5</td>
<td></td>
</tr>
<tr>
<td>Tapioca (Abacha)</td>
<td>10, 5</td>
<td>5, 2.5</td>
<td>3, 1.5</td>
<td></td>
</tr>
<tr>
<td>Rice</td>
<td>11, 5.5</td>
<td>13, 6.5</td>
<td>13, 6.5</td>
<td></td>
</tr>
<tr>
<td>Plantain Dawa/Wheat</td>
<td>15, 7.5</td>
<td>14, 7</td>
<td>18, 9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>13, 6.5</td>
<td>48, 24</td>
<td>51, 25.5</td>
<td></td>
</tr>
</tbody>
</table>
Table 4 showed 24 hours dietary consumption recall. For breakfast, 39 (19.1%) of the respondents took pap, 37(18.1%) had bread, 13(6.5%) ate yam while 8(4%), 6(8%), 11(5.5%) and 15(7.5%) ate garri, cassava (foo foo), rice and
plantain respectively all from starch. From protein (plant/animal) group 13(6.5%) ate wheat, 35(17.5%) had beans, 60(30%) took Bambara nuts (Okpa) 49 (24.5%) took Tea in form of lipton and Milk, 10(5%) and 21(10.5%) had meat and fish respectively in their soup. 8(4%) had fruits while 45(22.5%) added vegetable to their food. For midday snacks, 2(1%) took groundnut, 12(6%) used fruit as their snack while 4(2%) ate crackers biscuit, 1 person (0.5%) ate gala and 30(15%) took garden egg for snacks.

For their lunch in the same day, 31(15.5%) ate yam, 18(9%) took garri, 6(3%) swallowed foo foo while 13(6.5%) and 14 (7%) ate rice and plantain respectively, all from starch. From protein group, 48(24%) ate wheat, 38(19%) took Beans, 4(2%) ate pigeon peas (fio fio) while 13(6.5%) and 19(9.5%) had meat or fish in their soup respectively. 1(0.5%) ate yam and red oil while 3 (1.5%) ate Melon (Egusi) soup. 56 (28%) added vegetables in their food. 20(10%) took fruits as their evening snacks, 4(2%) took crackers biscuit while 20(10%) at garden egg in place of snacks. (2(1%) said they drank malt.

During supper, from starch group, 51(15.5%) ate wheat 32(16%) ate yam, 30(15%) ate garri, 13(6.5%) ate rice, 18(9%) plantain and 5(2.5%) foo foo. From protein group 24 (12%) took beans and 8(4%) ate Bambara (Okpa), 16(8%), 23(11.5%) had meat and fish in their food respectively. 1 person (0.5%) also had yam with red oil, 3(1.5%) ate melon (egusi) soup. 99(49.5%) added vegetable to their food while 5(2.5%) took fruits Only 3(1.5%) had
crackers as bed time snacks while 7(3.5%) took garden egg. This showed that the respondents mixed food from the six food groups using locally available food items.

**Research Question ii: What demographic factors are associated with non adherence?** This question was answered using information on section A of the questionnaire on the demographic data of the respondents

**Table 5: Association between demographic factors and non adherence to Medication (Logistic regression result)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Non adherence</th>
<th>Odds Ratio</th>
<th>95% C.I</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medication</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes(n,%)</td>
<td>No(n,%)</td>
<td>Odds Ratio</td>
<td>95% C.I</td>
</tr>
<tr>
<td>Sex: Male</td>
<td></td>
<td></td>
<td>1.919</td>
<td>0.932 – 3.953</td>
</tr>
<tr>
<td>Male</td>
<td>16 (29.1%)</td>
<td>57 (39.3%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>39 (70.9)</td>
<td>88 (60.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age: &lt; 50 years</td>
<td></td>
<td></td>
<td>0.118</td>
<td>0.025 - 0.544</td>
</tr>
<tr>
<td>≥50 years</td>
<td>53 (96.4)</td>
<td>116 (80)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Level Of Education:</td>
<td></td>
<td></td>
<td>1.138</td>
<td>0.530 - 2.444</td>
</tr>
<tr>
<td>None Or Primary</td>
<td>40 (72.7)</td>
<td>103 (71)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary/Tertiary</td>
<td>15 (27.3)</td>
<td>42 (29)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td>5.678</td>
<td>1.250 - 25.792</td>
</tr>
<tr>
<td>Single</td>
<td>2 (3.6)</td>
<td>22 (15.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>53 (96.4)</td>
<td>123 (84.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unemployed</td>
<td>Employed</td>
<td></td>
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<tr>
<td>--------------------------------------</td>
<td>------------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
</tr>
<tr>
<td></td>
<td>18 (32.7)</td>
<td>46 (31.7)</td>
<td>0.982</td>
<td>0.472-2.042</td>
</tr>
<tr>
<td></td>
<td>37 (67.3)</td>
<td>99 (68.3)</td>
<td></td>
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</tr>
<tr>
<td>Duration with diabetes ≤4yrs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;4yrs</td>
<td>23 (41.8)</td>
<td>47 (32.4)</td>
<td>0.610</td>
<td>0.306-1.218</td>
</tr>
<tr>
<td></td>
<td>32 (58.2)</td>
<td>98 (67.6)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SMBG**

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>40 (34.8%)</td>
<td>33 (38.8%)</td>
<td>1.358</td>
<td>0.738-2.500</td>
</tr>
<tr>
<td><strong>Sex: Male</strong></td>
<td>75 (65.2)</td>
<td>52 (61.2)</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Age:</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;50years</td>
<td>94 (81.7)</td>
<td>75 (88.2)</td>
<td>1.679</td>
<td>0.710-3.972</td>
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<tr>
<td>≥50years</td>
<td>21 (18.3)</td>
<td>10 (11.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Level Of Education:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None Or Primary</td>
<td>77 (67.0)</td>
<td>66 (77.6)</td>
<td>1.687</td>
<td>0.858-3.318</td>
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<tr>
<td>Secondary or Tertiary</td>
<td>38 (33.0)</td>
<td>19 (22.4)</td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>12 (10.4)</td>
<td>12 (14.1)</td>
<td>1.327</td>
<td>0.556-3.168</td>
</tr>
<tr>
<td>Married</td>
<td>103 (89.6)</td>
<td>73 (85.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Occupation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>39 (33.9)</td>
<td>25 (29.4)</td>
<td>0.820</td>
<td>0.428-1.571</td>
</tr>
<tr>
<td>Employed</td>
<td>76 (66.1)</td>
<td>60 (70.6)</td>
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<td></td>
</tr>
<tr>
<td>Duration with diabetes</td>
<td>0-4yrs</td>
<td>&gt;4yrs</td>
<td>p-value</td>
<td>95% CI</td>
</tr>
<tr>
<td>------------------------</td>
<td>--------</td>
<td>-------</td>
<td>---------</td>
<td>-------</td>
</tr>
<tr>
<td></td>
<td>35 (30.4)</td>
<td>35 (41.2)</td>
<td>0.727</td>
<td>0.935-3.190</td>
</tr>
<tr>
<td></td>
<td>80 (69.6)</td>
<td>50 (58.8)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Coming for check ups</th>
<th>Sex: Male</th>
<th>Female</th>
<th>p-value</th>
<th>95% CI</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>33 (33.7%)</td>
<td>65 (66.3)</td>
<td>1.400</td>
<td>0.768-2.552</td>
<td>0.272</td>
</tr>
<tr>
<td></td>
<td>40 (39.2%)</td>
<td>62 (60.8)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age:</th>
<th>&lt; 50years</th>
<th>≥50years</th>
<th>p-value</th>
<th>95% CI</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>83 (84.7)</td>
<td>15 (15.3)</td>
<td>1.071</td>
<td>0.476-2.409</td>
<td>0.868</td>
</tr>
<tr>
<td></td>
<td>86 (84.3)</td>
<td>16 (15.7)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Level Of Education:</th>
<th>None Or Primary</th>
<th>Secondary or Tertiary</th>
<th>p-value</th>
<th>95% CI</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>71 (72.4)</td>
<td>72 (70.6)</td>
<td>0.928</td>
<td>0.487-1.771</td>
<td>0.822</td>
</tr>
<tr>
<td></td>
<td>27 (27.6)</td>
<td>30 (29.4)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Marital Status</th>
<th>Single</th>
<th>Married</th>
<th>p-value</th>
<th>95% CI</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>11 (11.2)</td>
<td>87 (88.8)</td>
<td>1.137</td>
<td>0.476-2.718</td>
<td>0.772</td>
</tr>
<tr>
<td></td>
<td>13 (12.7)</td>
<td>89 (87.3)</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Unemployed</th>
<th>Employed</th>
<th>p-value</th>
<th>95% CI</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>34 (34.7)</td>
<td>64 (65.3)</td>
<td>0.772</td>
<td>0.409-1.459</td>
<td>0.426</td>
</tr>
<tr>
<td></td>
<td>30 (29.4)</td>
<td>72 (70.6)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Duration with diabetes</th>
<th>≤4yrs</th>
<th>&gt;4yrs</th>
<th>p-value</th>
<th>95% CI</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>29 (29.6)</td>
<td>69 (70.4)</td>
<td>1.601</td>
<td>0.875-2.929</td>
<td>0.127</td>
</tr>
<tr>
<td></td>
<td>41 (40.2)</td>
<td>61 (59.8)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diet</th>
<th>Sex: Male</th>
<th>Male</th>
<th>p-value</th>
<th>95% CI</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>46 (36.2%)</td>
<td>27 (37.0%)</td>
<td>0.552-1.920</td>
<td>0.928</td>
<td></td>
</tr>
</tbody>
</table>
Demographic factors found to be significantly associated with non adherence to medication on logistic regression analysis were age ($P = 0.006$, OR 0.118, CI = 0.025 - 0.544), and marital status (OR = 5.678, 95% CI = 1.250 - 25.792 $P = 0.025$). This showed that age and marital status contributed to non adherence to medication among the respondents in this study.
Sex, level of education, occupation and duration with diabetes were not significantly associated with non adherence to medication as seen in table 5.

Demographic factors were not significantly associated with non adherence to self monitoring of blood glucose and coming for check up visits as seen in tables 5. Age was found to be significantly associated with non adherence to diet (OR = 2.689, CI = 1.016-7.120, $P$ 0.046). This shows that age of the respondents has impact on their adherence behavior. Sex, level of education, marital status, occupation and duration with diabetes were not significantly associated with non adherence to diet as seen in table 5.

**Research Question iii: What psychosocial factors are associated with non adherence?**. Questions i, ii, iii and iv of section C of the questionnaire were used to answer this question.

**Table 6: Association between psychosocial factors and non adherence to medication, SMBG, diet and coming for check ups**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Non adherence</th>
<th>Odds Ratio</th>
<th>95% CI</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medication</td>
<td>Yes (n,%)</td>
<td>No (n,%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inability to replace drugs due to cost/financial problem</td>
<td>31 (15.5%)</td>
<td>169 (84.5)</td>
<td>1.410</td>
<td>0.564-3.522</td>
</tr>
<tr>
<td>Forgetfulness</td>
<td>26 (13.0)</td>
<td>174 (87.0)</td>
<td>1.851</td>
<td>0.648-5.291</td>
</tr>
<tr>
<td>Issue</td>
<td>Frequency</td>
<td>Percentage</td>
<td>Odds Ratio</td>
<td>95% Confidence Interval</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>-----------</td>
<td>------------</td>
<td>------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>Fear of drug side effect</td>
<td>19</td>
<td>9.5</td>
<td>1.560</td>
<td>0.485-5.014</td>
</tr>
<tr>
<td>Drug seems not to be working</td>
<td>9</td>
<td>45</td>
<td>1.273</td>
<td>0.257-6.462</td>
</tr>
<tr>
<td>When fasting</td>
<td>12</td>
<td>6.0</td>
<td>0.705</td>
<td>0.195-2.543</td>
</tr>
<tr>
<td>Frustration due to long duration of treatment</td>
<td>16</td>
<td>8.0</td>
<td>1.226</td>
<td>0.369-4.078</td>
</tr>
<tr>
<td>No family member available to remind/assist me</td>
<td>10</td>
<td>5.0</td>
<td>0.565</td>
<td>0.150-2.136</td>
</tr>
<tr>
<td>Self monitoring of blood glucose:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Don’t have any meter</td>
<td>119</td>
<td>59.5</td>
<td>1.733</td>
<td>0.914-3.284</td>
</tr>
<tr>
<td>Have meter but cannot use it</td>
<td>5</td>
<td>2.5</td>
<td>.009</td>
<td>0.000</td>
</tr>
<tr>
<td>Fear of pricking myself</td>
<td>14</td>
<td>7.0</td>
<td>.759</td>
<td>0.218-2.647</td>
</tr>
<tr>
<td>Keeping appointment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distance is much</td>
<td>15</td>
<td>7.5</td>
<td>0.519</td>
<td>0.144-1.868</td>
</tr>
<tr>
<td>Could not due to cost of transport</td>
<td>31</td>
<td>15.5</td>
<td>0.181</td>
<td>0.069</td>
</tr>
<tr>
<td>Nobody to accompany me</td>
<td>19</td>
<td>4.5</td>
<td>0.088</td>
<td>0.011-0.723</td>
</tr>
<tr>
<td>Diet</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Diet is costly</td>
<td>24</td>
<td>12.0</td>
<td>0.864</td>
<td>0.349-2.136</td>
</tr>
<tr>
<td>Tempted by favourite foods</td>
<td>64</td>
<td>32.0</td>
<td>0.907</td>
<td>0.481-1.713</td>
</tr>
<tr>
<td>Inappropriate food offer</td>
<td>20</td>
<td>10.0</td>
<td>0.764</td>
<td>0.274-2.134</td>
</tr>
<tr>
<td>No body to prepare the food on time</td>
<td>13</td>
<td>6.5</td>
<td>1.482</td>
<td>0.476-4.619</td>
</tr>
</tbody>
</table>
From table 6, it was seen that no psychosocial factor was significantly associated with non adherence to medication and self monitoring of blood glucose. However 31(15.5%) of the respondents reported cost/financial constrain while 26(13.0%) agreed that forgetfulness contributed to their non adherence to medication.

Cost of transportation (OR = 0.181, 95% CI =0.069- 0.472, \( P \leq 0.000 \)) and no family member available to accompany respondent (OR = 0.088, 95% CI =0.011 - 0.723, \( P \leq 0.024 \)) were found to be significantly associated with non adherence to keeping appointments. This shows that these variables contributed to respondents non adherence behavior to keeping clinic visits. No psychosocial factor was found to be significantly associated with non adherence to diet even though 64 (32%) of the respondents reported that being tempted by favourite foods/drinks were contributory to their non adherence to diet modification.
Research Question iv: Are there health system/regimen factors that are associated with non adherence? This question was addressed by items i, ii, iii and iv of section C of the questionnaire.

Table 7: Association between health system/regimen factors and non adherence to medication

<table>
<thead>
<tr>
<th>Variable</th>
<th>Non adherence</th>
<th>Odds Ratio</th>
<th>95% CI</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medication</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (n,%), No (n,%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fear of pricking myself</td>
<td>9 (4.5%), 191(95.5%)</td>
<td>.008</td>
<td>0.000</td>
<td>0.999</td>
</tr>
<tr>
<td>Difficulty with drowsing</td>
<td>2 (1.0), 198 (99.0)</td>
<td>.951</td>
<td>0.000</td>
<td>1.000</td>
</tr>
<tr>
<td>correct dose</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fear of hypoglycaemia</td>
<td>9 (4.5), 191 (95.5)</td>
<td>3.413</td>
<td>0.415-28.051</td>
<td>0.253</td>
</tr>
<tr>
<td>Believes drug may not help</td>
<td>11 (5.5), 189 (94.5)</td>
<td>1.278</td>
<td>0.250-6.546</td>
<td>0.768</td>
</tr>
<tr>
<td>When blood sugar is high or</td>
<td>18 (9.0), 182 (91.0)</td>
<td>1.010</td>
<td>0.338-3.022</td>
<td>0.986</td>
</tr>
<tr>
<td>low</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SMBG:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficulty reading and</td>
<td>4 (2), 186 (98)</td>
<td>1.361</td>
<td>0.188-9.864</td>
<td>0.760</td>
</tr>
<tr>
<td>interpreting result</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diet</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Causing conflict in my home</td>
<td>6 (3.0), 194 (97.0)</td>
<td>0.618</td>
<td>0.096-3.961</td>
<td>0.611</td>
</tr>
<tr>
<td>Difficulty estimating desired</td>
<td>12 (6.0), 188 (94.0)</td>
<td>2.021</td>
<td>0.578-7.070</td>
<td>0.271</td>
</tr>
<tr>
<td>quantity</td>
<td>Coming for check ups:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>----------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Attitude of health workers is discouraging</td>
<td>18 (9.0)</td>
<td>182 (91.0)</td>
<td>0.046</td>
<td>0.006-0.353</td>
</tr>
<tr>
<td>Clinic activities are not commenced on time</td>
<td>15 (7.5)</td>
<td>185 (92.5)</td>
<td>0.057</td>
<td>0.007-0.448</td>
</tr>
</tbody>
</table>

Table 7 showed that no health system/regimen related factor was significantly associated with non adherence to medication, self monitoring of blood glucose and diet modification. But for keeping clinic appointments, discouraging attitude of health workers (OR = 0.046, CI=0.006 –0.0353, P 0.003) and clinic activities not commenced on time (OR= 0.057, P 0.006, CI= 0.007 – 0.0448) were found to be significantly associated with non adherence. This means that delay in commencing clinic activities and lack of second person impacted on the respondents and made them miss their clinic visits.
CHAPTER FIVE

DISCUSSION OF MAJOR FINDINGS.

This chapter discussed the major findings in relation to previous studies. It also covered the recommendations, limitations of the study, conclusion and summary.

Respondents’ characteristics:

Majority of the respondents were females. This may possibly be due to the fact that more females have the tendency to become obese than males (Ajibade et al, 2010). Obesity is the strongest risk factor for type 2 diabetes as noted by Silink (2007). Females also may have the tendency of reporting illness more than males thereby utilizing health facilities more than males. This finding is similar to the studies carried by John et al (2005); Kalyango (2008) and Ajibade et al (2010) where the percentages of females were higher than males.

Majority of the respondents were above 60 years of age. Type 2 diabetes typically develops in adults over the ages of 40 years but it can appear earlier in younger adults mainly as a consequence of obesity (Silink, 2007). In this study few respondents were less than 40 years old. This is contrary to the findings of Kalyango (2008) where the respondents mean age was 50 years with standard deviation of 13.8. This can be attributed to the fact that the respondents in
Kalyango (2008) included those from 18 years and those with type 1 diabetes in contrast to this study that was confined to type 2 diabetics only.

More than half of the respondents, were treated with only oral hypoglycaemic agents (OHA). Oral hypoglycaemic agent is effective for patients who have type 2 diabetes that cannot be treated by diet and exercise alone (Smeltzer & Bare, 2010). However during illness, infection, pregnancy, surgery or some other stressful events, patients with type 2 diabetes may require injection insulin to control blood glucose level.

**Prevalence of non adherence in adults with type 2 diabetes to prescribed medication, diet, self monitoring of blood glucose and for coming for check up:**

The prevalence of non adherence to medication found in this study was close to the findings in a study done in Uganda by Kalyango whereas John et al (2005) recorded a higher prevalence in their study.

Determining the degree of patient adherence to medication regimen can be gathered from the patient, physician, pharmacist, family members and friends. However, self reports are often inaccurate because patients may lie to avoid displeasing their healthcare provider or they may not only under report poor adherence but also over report good adherence (Kalyango et al, 2008). This may account for the low report of non adherence to medication in this study and in
the above studies where self reports were given by respondents through questionnaire.

Survival skills are essential for patients with diabetes and ability to monitor blood glucose level at home is part of this skill (Canadian Diabetes Association 2011). Self monitoring of blood glucose helps patients and providers to identify trends in glycaemic control so that changes can be made in meal plan, medication and exercise. In this study, majority of the respondents did not have any gluco meter for blood glucose check at home and few reported that they go to nearby laboratory facility or community health centre for monitoring but only when they feel sick. This can account for their not monitoring their blood glucose level as expected.

Majority of those on oral hypoglycaemic agent (OHA) in this study who are required to monitor their blood glucose level at least 2-3 times weekly (Smeltzer & Bare, 2010) were not doing so while most of those on injection insulin or insulin combined with OHA who are required to check their blood glucose level before every meal or at least once daily were non adherent. This finding is similar to that in John et al (2005) where only a small proportion of their respondents could do their testing at home. Also Delamater (2006) recorded that insulin independent patients and many on oral medication in his study never performed self monitoring of blood glucose or did so less than once per month.
Respondents in this study missed their hospital check up visits. This agrees with other studies (John et al, 2005; Delamater, 2006) who also recorded non adherence to keeping hospital appointments in patients with diabetes.

No matter how long patients have had diabetes, what to eat, when to eat and how much to eat are decisions they make daily. In this study, there was a prevalence of 29% non adherence to frequency of meals in a given day and to regularity of the meals. The respondents were eating less than 3 meals daily and the meals were eaten at irregular times although the 24 hours- dietary consumption recall showed that the respondents were selecting food from the six food groups. This can be attributed to the fact that their major occupation was trading and farming and respondents may have the tendency to leave for their jobs in the morning, eat at irregular time until they get home in the evenings. The greater number consuming bambara nuts (Okpa) for breakfast may be attributed to the fact that it is one of the cheapest, readily available source of protein in the locality followed by beans. It can also be due to the traditionally held belief that diabetics should eat more of protein than carbohydrates which some of the respondents are still clinging to. This also was seen in the number of respondents that had Beans for their lunch. Yam was the highest source of carbohydrate for lunch and supper followed by garri. Respondents rarely took snacks though greater number prefer garden egg to snacks. There was good consumption of vegetables across the 24 hours. This
may be because majority of the respondents were farmers and can afford the vegetables and must have accepted the instructions about the importance of vegetable in their diet by the dieticians.

In contrast, John et al (2005) reported findings of non compliance to diet especially taking very little fibre-rich diet and eating a lot of starch tubers. Rothma et al (2009) also reported non adherence to diet in adolescents with type 2 diabetes with respect to frequent episodes of over eating, drinking sugary drinks and eating fast foods.

**Demographic factors associated with non adherence to medication, diet, self monitoring of blood glucose and coming for check ups:**

Sex, level of education, occupation and duration with diabetes were not significantly associated with non adherence to medication in this study. This shows that these demographic factors do not predict non adherence to medication among the respondents in this study. This contrasts the finding in Kalyango (2008) where sex had significant association with non adherence to medication. This can be possible because in his study, females were predominant and the population was larger than the population in this study. Delamater (2006) in his study identified level of education as demographic factor associated with non adherence which were not identified in this study.
Age and marital status were significantly associated with non adherence to medication in this study. Logistic regression showed that respondents who were <50 years were more non adherent to medication than those who were >50 years. This may be possible because people that are less than 50 years may be more actively involved in work and other social activities and this may impact on their adherence behavior negatively. Ajibade (2010) and Griffith (2007) also identified age as being significant in their study. Type 2 diabetes occur mainly in adults above 40 years and adults are more likely to either forget taking their drugs or take it in unprescribed way, especially when they have more than one prescriptions to follow (Griffith, 2007).

Married respondents were more non adherent to medication than the singles in this study. This may possibly be due to the fact that married people are more likely to have distractions from family issues that may militate against adherence more than the singles. Also it can be as a result of married people being on the majority in this study. However this finding is in disagreement with the findings by Kalyango (2008) where marital status and age were not significantly associated with non adherence to medication though his study participants included those from 18 years and above and were single.

None of the demographic factors were found to be associated with non adherence to self monitoring of blood glucose and coming for clinic appointments in this study. This contrasts the finding in Delamater (2006)
where ethnic minority and socioeconomic state were associated with lower rates of SMBG among minority African–American and Mexican–American patients. These group may have difficulty meeting up with the financial cost of their management regimen explaining their non adherence behavior.

There was an association between age and non adherence to diet modification. Adults ≤50 years were more non adherent than those ≥50 years. This may be attributed to the fact that respondents within this age range may still be actively involved in their trading, farming and other jobs and tend to eat only when they have chance or when they return home. Adults generally tend to eat fewer meals in a given day due to reduction of rate of absorption with aging, reduced appetite, problem with dentition or non availability of family members to shop and cook for them. (Smeltzer & Bare 2010). However there was also non adherence to diet in Taiwanese and Turkish children with type 1 diabetes in Chang et al (2007) and Patino et al (2005) studies, though the pattern of their non adherence to diet was more of over eating due to excessive hunger and flare for sugary things.

Other demographic factors were not found to be associated significantly with diet non adherence though respondents who were traders reported that they usually eat before going to the market and when they come back in the evenings. John et al (2005) found occupation as a factor in their study. They reported that their respondents were mainly fisher men/women, who leave their
homes in the mornings and come back in the evenings. This affected the regularity and frequency of their meals. Busy schedule can militate against adherence.

**Psychosocial factors associated with non adherence:**

Patients with diabetes manage their illness on daily basis within the context of the other life goals, priorities, health issues, family demands and other personal concerns that make up their lives (Berman et al, 2010). In this study, psychosocial factors like inability to replace drugs due to cost, forgetfulness, fear of drug side effects, frustration due to long duration of treatment and lack of family assistance were not significantly associated with non adherence to medication as shown by logistic regression. However some of the respondents admitted that they experienced difficulty adhering to drugs due to these factors.

Other studies in contrast reported cost of medication and inability to afford some or none of the prescribed drugs as factors in non adherence in their respondents. (John et al, 2005; Kalyango, 2008 and Ajibade et al, 2010). This led to their respondents either terminating prescription prematurely or seek for cheaper medicine from the herbalists though these were not reported by the respondents in this study. Sanal et al (2013) also reported that in China with 30million adults living with diabetes, most rural areas had reduced access to medical treatment due to fee – for – service system and privatization.
Some studies in contrast to the findings in this study also identified psychological stress like anxiety, depression, diabetes – related emotional distress, disappointment about lack of family support as being associated with lower levels of treatment adherence leading to higher blood glucose levels, increased rates of diabetes complication and higher health care expenditure (Griffith 2007). Needle phobia, especially injection associated pain and fear of hypoglycaemia which were not significant in this study were identified by Stotland (2006) as being associated with poor adherence to therapy with subsequent inadequate glycaemic control. Most of these studies were done among insulin dependent adults, whereas majority of the respondents in this study were treated with oral hypoglycaemic agents (OHA) accounting for the differences in the findings.

Fasting was not significantly associated to non adherence to medication in this study. Diabetic patients were constantly counselled during health talks at the clinic to stop engaging in fasting due to the adverse effects especially hypoglycaemia but to engage in other religious obligations so far they are not detrimental to their health.

Psychosocial factors like fear of pricking self to check glucose level and cost of replacing strips were not significantly associated with non adherence to self monitoring of blood glucose in this study. Financial constraint and personality styles did not predict non adherence to SMBG in Stotland, (2006)
and Delamater, (2006). This contrasts the findings in the DAWN study by where more than three quarters of their respondents reported that their psychological problems especially depression negatively impacted on their self management including self monitoring of blood glucose. Stotland (2006) also noted that depression and phobic symptoms made their respondents to perform fewer blood glucose measurements per day. This difference may be so since majority of the respondents in this study did not even have glucometer for SMBG at home not to talk of fear of pricking self.

Cost of transportation showed significant association with non adherence to coming for clinic visits. This can be attributed to the location of permanent site of UNTH that is at the out skirt of the town. This makes patients within and outside the state to board buses more than once before getting to the hospital. This agrees with findings in John et al (2005) and where economic constraints and poverty were barriers to adherence to coming for check ups and other therapy in type 2 diabetes management in their studies.

Non availability of family member to accompany respondents was significantly associated with non adherence to coming for check ups. Since most of the respondents were above 60 years, they may need the assistance of a second person in giving and receiving of information during health talks, consultations with physician, dietician and pharmacists. Older adults may experience confusion with complex tasks, thus patients who may need to take
transport more than once before getting to the hospital may need a second younger person.

This is similar to the findings in John et al (2005), Ajibade, (2010) who reported that family conflict, reduced family support/involvement and reduced social support were significant barriers to adherence in adults with type 2 diabetes in their studies. However, far distance was not a significant factor in non adherence to coming for check ups despite the distance of the hospital from center of the town. When patients perceive illness as severe and can lead to complications or death, they are more likely to seek for health care despite the distance.

Cost of diet regimen, being tempted by favourite foods/drinks and having nobody to prepare the food at the proper time were not significantly associated with non adherence to diet modification in this study. Though respondents admitted that when they don’t have money to eat as prescribed, they eat anything available in the house and which often leads to eating inappropriately. On the contrary John et al, (2005) identified cost of diet, family conflict and need to conform to family values and expectations as strong factors in diet non adherence in their studies.

Kara et al (2007) also identified low family support as being in association with non adherence to diet in Turkish patients receiving
haemodialysis and concluded that patients with family support/involvement adhere better to therapy than those who have little or no family support.

**Health system/regimen – related factors associated with non adherence in adults with type 2 diabetes:**

Therapeutic relationship between patients and health care providers enhances easy acquisition of skill and knowledge so that patients can take an active role in managing their diabetes (Wiznitzer, 2011). Regimen complexity, adverse effects and confusion regarding the instructions about regimen can negatively impact on adherence (Morisky 2009). In this study, regimen – related factors like fear of pricking self to receive injection insulin or to monitor blood glucose, difficulty withdrawing correct dose of drug, fluctuating levels of blood glucose and difficulty reading and interpreting results of SMBG were not significantly associated with non adherence to medication and SMBG.

This may be understandable in this study since patients on insulin injection were on the minority and did not report any regimen – related distress and those on oral drugs did not report adverse effects. This disagrees with Stotland (2006) where needle phobia made the respondents in the study to intentionally omit their injection insulin and do fewer tests of blood glucose level. However the respondents in his study were both type 1 and 2 diabetics who were insulin dependent while the respondents in this study were only type
2 diabetics treated majorly with OHA. There was no provider/organisational factors associated with non adherence to medication and SMBG.

Difficulty estimating desired quantity of food as taught by dietician was not significantly associated with non adherence to diet therapy in this study. The researcher observed that the dieticians in charge of the diabetic clinic at the study hospital take reasonable time to teach and demonstrate diet modifications using locally available measures like spoons and cups and clarify issues where there is confusion. They also see the patients one-on-one as referred by physicians. This is in contrasts to the findings by John et al (2005) where poor understanding of the need to modify diet was among the reasons for poor compliance with dietary instruction in their study.

The discouraging attitude of health workers and late commencement of clinic activities were significantly associated with non adherence to coming for clinic visits. Therapeutic patient-provider relationship enhances adherence thus where it is deficient, it can account for non adherence. Also delay in commencing clinic activities prolongs waiting hours and can lead to frustration and distress. This agrees with the finding in Morisky (2009) where patients with type 2 diabetes who had better patient – provider relationship reported that they followed treatment recommendations and had good glucose control with less diabetes distress. He also identified support from healthcare professionals and
patient satisfaction with the medical visit as major factors in improving and maintaining high levels of adherence to medical recommendations.

Delamater (2006), in his study reported that diabetic patients who were satisfied with their relationship with the health care providers had better adherence to diabetes regimen while those who rated their patient – provider communication as poor showed lower adherence rates to oral medications and self monitoring of blood glucose.

Phone calls about upcoming appointments, phone texting, e-mail messaging, beginning clinic activities on time and reminder post cards are organisational factors that promote patients’ satisfaction with care and so improve adherence to management regimen (Griffith, 2007).

**Summary/ Conclusion**

This study was done to determine the prevalence of non adherence to management regimen among adults with type 2 diabetes and to identify demographic, psychosocial and health system/regimen factors that are associated with non adherence.

Cross sectional study design was used for the study and the out patient diabetic clinic of University of Nigeria Teaching Hospital Enugu was the setting for the study. The population of the study were the adults with type 2 diabetes
mellitus who attended the clinic within October to December 2010. The estimated sample size for the study using Yaro Yamene’ formular was 244.

The data gathered were cleaned and analysed using a Statistical Software Package for Social Sciences (SPSS) version 15. From the analysis, it was discovered that there was non adherence to management regimen in adults with type 2 diabetes with respect to their prescribed medication, diet, self monitoring of blood glucose and coming for check up visit.

The pattern of non adherence discovered ranges from the participants not taking up to 80% of the prescribed drugs especially the oral hypoglycaemic agents (OHA), eating less than thrice in a given day and at irregular times, not having glucometer for SMBG at home, not monitoring blood glucose level at least 2- 3 times weekly for those on OHA and at least daily for those on injection insulin. There was also non adherence to keeping appointments.

These findings were similar to findings in many studies (Kalyango, 2008; and Ajibade et al, 2010.) This implies that healthcare providers should screen patients for non adherence whenever management goals are not met before increasing the doses of drugs, sending for more investigations and or adding new drugs and recommending more lifestyle changes especially for chronic illnesses like diabetes.
Among the demographic factors, only age and marital status were significantly associated with non-adherence to medication in this study. Age also was found to be associated with non-adherence to diet.

Psychosocial factors that were found to be militating against adherence to coming for check-ups visits included cost of transportation and lack of family member to accompany them. Many studies found direct and indirect cost of regimen and family support/involvement to impact on adherence to regimen (John et al, 2005; Ajibade, 2010).

The discouraging attitude of health workers and late commencement of clinic activities were significantly associated with non-adherence to coming for check-up visits. Developing a therapeutic relationship with patients, being more interested in their concerns about their health and involving them in planning their care can go a long way in enhancing adherence to regimen (Griffith, 2007). On the basis of these findings, recommendations and suggestions for further study were made.

**Implication for Nursing Practice**

Chronic illness often requires complicated treatment regimen for lengthy periods making clients with chronic illnesses to be at increased risk for regimen-non adherence. Non-adherence is costly, wastes medical and human resources and may have serious consequences for the patients and family. Nurses should
understand that persons with diabetes are influenced by many factors (demographic, psychosocial, institutional etc) and especially individual beliefs and values (attitudes) about their health and illness. Variables that impact on diabetic patients’ adherence behavior as found in this study include age, cost, patient- provider relationship and late commencement of clinic activities.

The study also revealed that there was non adherence to different aspects of diabetic management regimen namely medication, diet, self monitoring of blood glucose and coming for clinic visits. Non adherence being a NANDA nursing diagnosis places the responsibility on nurses to assess for it in clients with diabetes while planning care. The focus of such care should include nursing outcomes like improved client quality of life, independent functioning, and ability to co-ordinate the treatment regimen to medication, diet and activity into a daily routine of work and recreation. They should organize educational plan based on these factors and individual perceptions that militate against adherence (Smeltzer et al, 2010).

Patient- provider relationship and late commencement of clinic activities should concern all the healthcare team involved in diabetic management and the institution as they make policies and plan for the care of diabetic patients. Nurses can advocate for the diabetic patients through the Nigerian Diabetic Association UNTH branch so that policies that will enforce early commencement of clinic activities will be put in place by the Hospital
Management to reduce waiting time. They can also lobby to see if the cost of diabetic treatment can be subsidized.

In order to enhance adherence, nurses need to ensure that the client with diabetes is able to perform the prescribed therapy, understands the necessary instructions and is a willing participant in establishing goals of therapy (Berman et al, 2008).

**Limitations of study**

- The study was hospital based and for the patients to be coming to Teaching hospital for their healthcare showed that they were already working towards being in control of their illness. Therefore population-based study with clients who could not access health facilities may give the true picture of non adherence and its associated factors.
- Self report of non adherence behaviour given by the participants through the questionnaire can give an under estimation or exaggeration of the problem as was reported in other similar studies.

**Recommendations**

- Health care providers (physicians, nurses, dieticians, pharmacists etc) should be made aware of the need to screen patients for non adherence when they report no improvement with their prescribed therapy.
Helping patients identify sources of their non-adherence and providing needed information through health education based on this knowledge can help patients handle their challenges better.

Health care providers should recognize that diabetic patients may adhere better in some aspects of their regimen while finding it difficult with some aspects of the regimen. There is the need to discover patients' areas of strength and weakness and collaborate with patients to create individualized self-management plans to enhance adherence.

Communication and relationship between patients and providers should be improved and clinics commenced on time in the institution of study.

Cost of drugs and transportation was one of the reported barriers to their adherence, Nigerian Diabetic Association UNTH branch should be made aware of this so that they can advocate for these diabetics (majority of whom are pensioners) through appropriate channels for support from the Government.

**Suggestion for further studies.**

Further studies should be carried out on non-adherence behaviour of patients with type 1 diabetes and those patients in the rural areas.

Also a research could be done to assess healthcare providers' awareness of the impact of non-adherence to therapy among their patients with diabetes and other chronic diseases.
REFERENCES


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INFORMED CONSENT FOR PARTICIPATION IN DIABETES NON ADHERENCE QUESTIONNAIRE

Dear participant,

I am a post graduate student of Department of Nursing Sciences, university of Nigeria. Enugu Campus. I am doing a study to find out how persons with diabetes follow the treatment instructions given to them by their doctors, diabetes nurse educator and dietician and to find out reasons that make the persons with diabetes not to follow these instructions.

You are please invited to be part of this study. The information we get form this study will help us find out better ways of helping you to follow your treatment instructions. You are going not to be forced to participate but your willingness is what I need. Your name will not be required and the study will not lead you to any danger.

Thank you for your co-operation.

Opara Hope C.

Department of Nursing Sciences

Faculty of Health Sciences and Technology

College of Medicine

University of Nigeria, Enugu campus.
Diabetes Non adherence Questionnaire

Instruction: complete this questionnaire by ticking √ inside box that answers the question best.

SECTION A: DEMOGRAPHIC DATA

Sex  male  Female
Age in years _______________
Level of education: Did not go to school at all
Primary  Secondary  Tertiary
Marital status:  Single  Married  Divorced  Widowed
Duration with Diabetes: less than 5 years  6-10 years  11 years and above

SECTION B

i. What type of medication are you taking for your diabetes?
   Injection insulin only
   Oral tablets only
   Injection and tablets combined together

ii. In the last week, did you miss taking any dose of your drugs?
   Yes  No

iii. If yes, can you remember how many days you missed taking your drugs?
   1 day  2 days  3 days  4 days  5 days & above

iv. Can you remember how many tablets you missed according to your drug type below?
   metformin
   Gilbenclamide
   Tolbutamide
   Glipizide
   Insulin soluble
   Insulin lente

v. Do you have any instrument for checking your sugar level at home?
   Yes  No

vi. If no, where else do you check your sugar level?
   1. Nearby laboratory
   2. Health centre
   3. Private hospital
   4. A family friend
   Until I come for check up

vii. How often do you check your blood glucose level at home or elsewhere?
   Once daily before each meal  once a week
   Only when I feel sick  twice a week  when I come for check up
   Once a month
Viii. In the last week, how often were you eating in a day?

- Once
- Twice
- Three times
- Four times or more

Ix. Were you eating your meals and snacks at about the same time each day?

- Yes
- No

X. In the last week, can you remember how you ate your food in a day?

- Breakfast
- Snacks
- Lunch
- Snacks
- Supper
- Bed-time Snacks

xi. In the past month, were you able to come for all check ups?

- Yes
- No

SECTION C

Below are some reasons why patients with diabetes may not follow very well instructions given to them for their health problem, indicate the extent to which these apply to you.

<table>
<thead>
<tr>
<th></th>
<th>Drugs (injection/or oral tablets)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Fear of pricking myself with needle</td>
</tr>
<tr>
<td></td>
<td>Difficulty withdrawing the correct dose due to reduced vision</td>
</tr>
<tr>
<td></td>
<td>Fear of hypoglycaemia</td>
</tr>
<tr>
<td></td>
<td>Inability to replace drugs due to cost/financial problem</td>
</tr>
<tr>
<td></td>
<td>Forgetfulness</td>
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<tr>
<td></td>
<td>Fear of drug side effect like weight gain</td>
</tr>
<tr>
<td></td>
<td>The drug seems not to be working</td>
</tr>
<tr>
<td></td>
<td>When fasting</td>
</tr>
<tr>
<td></td>
<td>Believes that the sickness is an attack and drug may not help</td>
</tr>
<tr>
<td></td>
<td>Frustration due to long duration of treatment</td>
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<tr>
<td></td>
<td>No family member available to remind/assist me</td>
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<tr>
<td></td>
<td>When my blood sugar is high or low</td>
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<tr>
<th></th>
<th>Self monitoring of blood glucose</th>
</tr>
</thead>
<tbody>
<tr>
<td>ii</td>
<td>Don’t have any machine for the check</td>
</tr>
<tr>
<td></td>
<td>Have the machine but cannot use it</td>
</tr>
<tr>
<td></td>
<td>Fear of pricking myself</td>
</tr>
<tr>
<td></td>
<td>Could not replace the strips due to cost</td>
</tr>
<tr>
<td></td>
<td>Difficulty in reading and interpreting the result of the check</td>
</tr>
<tr>
<td></td>
<td>Health workers attitude- they do not show interest in my own records</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Diet</th>
</tr>
</thead>
<tbody>
<tr>
<td>iii</td>
<td></td>
</tr>
<tr>
<td>Diet is costly for the family to maintain</td>
<td></td>
</tr>
<tr>
<td>Is causing conflict in my house</td>
<td></td>
</tr>
<tr>
<td>Tempted by favourite foods and drinks</td>
<td></td>
</tr>
<tr>
<td>Inappropriate food offer by friends/relations</td>
<td></td>
</tr>
<tr>
<td>Difficulty estimating the desired quantity</td>
<td></td>
</tr>
<tr>
<td>Nobody around to prepare food at regular times</td>
<td></td>
</tr>
</tbody>
</table>

| iv Keeping appointments |
| Distance is much |
| Could not due to cost of transportation |
| Attitude of healthcare workers has been discouraging |
| Appointments are not commenced on time at the clinic |
| No family member to accompany me |