SCHOOL OF PUBLIC HEALTH
COLLEGE OF HEALTH SCIENCES
UNIVERSITY OF GHANA

ADHERENCE TO ANTI-DIABETIC MEDICATION AMONG ADULTS RECEIVING CARE AT KORLE-BU POLYCLINIC

BY

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THIS DISSERTATION IS SUBMITTED TO THE UNIVERSITY OF GHANA, LEGON IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF THE MASTER OF PUBLIC HEALTH (MPH) DEGREE.

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DECLARATION

I Diana Adu-Mintaah hereby declare that except for references of other people's work which has been duly acknowledged, this dissertation entitled "Adherence to Anti Diabetic Medications among Adults Receiving Care at Korle Bu Polyclinic" submitted to the School of Public Health, University of Ghana is a record of an original work done by me under the guidance of my supervisor.

I further declare that the work has not been submitted and will not be submitted either in whole or part for the award any degree elsewhere.

NAME OF STUDENT : DIANA ADU-MINTAAH

SIGNATURE :……

DATE :

NAME OF SUPERVISOR : DR ERNEST KENU

SIGNATURE :……

DATE :

DEDICATION

Dedicated to my husband, Michael

and my parents.

All glory and honour be given to the Lord of Host.

ACKNOWLEDGEMENT

I am grateful to the almighty God for His faithfulness and love.

I wish to express my gratitude to Dr Ernest Kenu my academic supervisor for his expert, sincere and valuable guidance and encouragement. My sincere thanks go to all the lectures at the Epidemiology and Disease Control Department for their support.

I place on record my thanks to my loving husband Mr. Michael Eshun for his love, emotional support and encouragement. I am also grateful to my parents and siblings for their prayers, love and support.

To all the staff at Korle Bu polyclinic pharmacy, I am grateful to you for your support. I express my sincere thanks to all participants.

To all who have directly and indirectly lent a helping hand in this dissertation I express my gratitude.

ABSTRACT

Background

Diabetes is a chronic disease that requires long term management to prevent complications. It is a growing public health problem. Adherence to treatment has been recognized as a major problem in patients with chronic diseases despite the compelling evidence about effectiveness of medication. About 50% chronic care patients in the developed countries are non adherent and it is estimated to be higher in developing countries such as Ghana.

Diabetes mortality and morbidity have increased substantially at the Korle Bu polyclinic. This high level of mortality and morbidity was due to high glycaemic levels which can be caused by low or non adherence to therapy. This study determined the adherence level, factors that affect adherence to medication among adults receiving care at Korle-Bu polyclinic.

Method

A cross sectional study was conducted among adult diabetics receiving care at the Korle-Bu polyclinic from 25 to 65 years. A structured questionnaire and data extraction sheet for patient's folder were use to collect data. Adherence was assessed using the eight-item Morisky Medication Adherence Scale (MMAS-8). Data was analyzed using the STATA software version 12. Multiple regression model was used to identify factors associated with adherence.

Results

Overall 63% (183/300) participants have poor adherence. Ability to afford medication (OR=0.29; 95%CI=0.12-0.70) and forgetfulness (OR=34.42; 95%CI=10.31-114.86) were significantly associated with adherence.

Conclusion

At Korle-Bu polyclinic, patients who are able to afford their medications were less likely to have poor adherence. However patients who reported forgetfulness as a reason for missing doses and those who reported that diabetes can cause loss of sensation in hands and toes were more likely to have poor adherence. There is the need for diabetic medications to be subsidized and interventions like patient selected treatment support system to be introduced in the management of diabetes.

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LIST OF ABBREVIATIONS

IDA : International Diabetes Association

HIV : Human Immunodeficiency Virus

WHO : World Health Organization

OPD : Out Patient's Department

CI : Confidence Interval

OR : Odds Ratio

AOR : Adjusted Odds Ratio

FBS : Fasting Blood Sugar

MMAS-8 : Eight Item-Morisky Medication Adherence Scale

NHIS : National Health Insurance Scheme

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

Diabetes mellitus is a chronic disease which occurs when the body's beta cells do not produce enough of the insulin hormone or the insulin produced cannot be utilized by the body. It requires long term management. Adherence to medication is an important factor to good glycaemic control.

Diabetes mellitus is a growing public health problem. About 382 million people between 20 and 79 years were estimated to have diabetes globally in 2013 and this number is estimated to increase to 592 million by 2035. 20 million of these people were from sub Saharan African (Aguire et al., 2013).

According to international diabetes federation (IDA) Africa in 2013 there were 440000 estimated cases of diabetes in Ghana, this gives a prevalence of 3.35%. The prevalence of type 2 diabetes is 6% in Ghanaian urban adults. This is as a result of aging population, overweight, female gender, urban environment, high income and tertiary education (Amoah et al., 2002). On the other side 330,380 adults in Ghana are unaware of the fact that they are diabetic.

There is a notion that chronic diseases are diseases of the affluent, so in sub Saharan Africa much attention is not given to chronic disease as it is given to infectious diseases such as malaria tuberculosis and HIV. On the blind side the prevalence of these non communicable diseases tend to be increasing. According to the World Health Organization (WHO), 80% of the deaths caused

by chronic disease occur in the low and middle income countries (2005). There is therefore the need for more attention to be given to non communicable diseases.

Diabetes is managed both pharmacologically and non-pharmacologically. Poorly managed diabetes leads to complications. These complications are normally caused by hypoglycemia and hyperglycemia. If the complications are not managed well, it will lead to increase in mortality. In 2013, diabetes accounted for 8.4% of global all – cause mortality among people aged between 20 and 79 years and this is an 11% increment over that in 2011 (International Diabetes Federation, 2014). This implies that more effort has to be put in to prevent complications.

Adherence to long term therapy is defined as the extent to which a person's behaviour – taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider (WHO, 2003). Adherence to diabetic medication leads to a good glycaemic control. Good glycaemic control can prevent complications and improve the quality of life of the patient. Factors that affect adherence can be categorized into medical, institutional, individual and environmental factors(Rwegerera, 2014).

This study focuses on medication adherence of diabetic patients receiving care at Korle Bu polyclinic and identified the factors and their association with adherence.

1.2 STATEMENT OF PROBLEM

Medication adherence has been proved to be a difficult issue in patients with chronic diseases even though there is sufficient evidence about the efficacy of the medication (Fournier, et al., 2007). In the developed countries about half the population of chronic care patients does not adhere to their medication six or more months after initiating therapy (Haynes, 2001). This is estimated to be higher in developing countries (WHO, 2003). Poor adherence complicates the

challenges of improving health in developing countries, and results in waste and underutilization of already limited resources.

The main objective of diabetic therapy is to achieve and maintain glycaemic targets which will prevent acute and chronic complications. This can be achieved with diet, exercise and medications (American Diabetes Association, 2002). However low or non adherence to medication causes high glycaemic levels which causes complications. These complications increase the number of hospital admissions and mortality rate of diabetes.

Diabetes mortality and morbidity have increased substantially at the Korle-Bu polyclinic. According to the 2012 annual report of Korle-Bu teaching hospital, the polyclinic which is a primary healthcare center, recorded diabetes as the seventh cause of mortality and the fourth cause of admission. This high level of mortality and morbidity was due to high glycaemic levels caused by low or non adherence to therapy.

This has a negative impact on the health system, the patient, family system and nation as a whole. It drains the finances of the health system as it is more expensive to care for patients with complications. Pressure is put on the material and human resources. This overwhelms the system thus decreasing its efficiency. Most of these complications sometimes render the patients incapacitated thus reduce their income and therefore becomes a burden on the family and society as a whole. Man hours are lost when patients are admitted and this imparts on the economy. Therefore there is the need to improve adherence. This can be done by identifying factors that affect adherence at Korle-Bu polyclinic and putting interventions in place. This will reduce the mortality and morbidity associated with diabetes and improves the quality of life of patients.

1.3 **CONCEPTUAL FRAMEWORK**

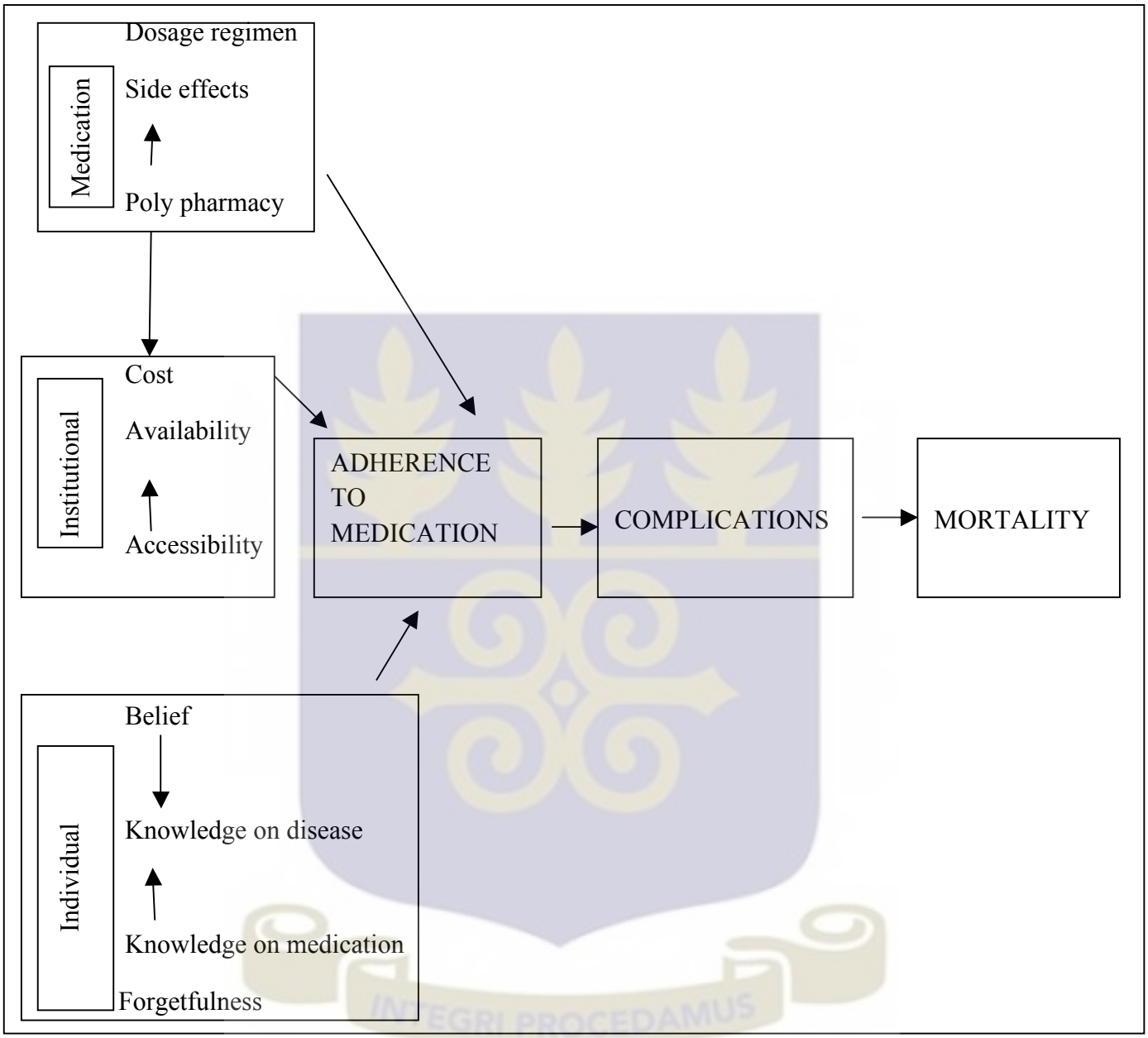

Figure 1: Conceptual Framework

Adherence is affected by the interplay of institutional, medication and individual factors. Poly pharmacy increases the risk of adverse reactions (side effects) and the cost of medication. Thus poly pharmacy can affect adherence independently or through cost and side effects. Dosage regiment affects adherence directly. An institution's management system determines the cost,

availability and accessibility of medications. If the medications are not available at the institution the cost effect increase and thus affects adherence. Knowledge of medication and patients' belief affect adherence directly and through knowledge of disease. Low adherence increases complication which if not treated will in-turn increases mortality.

1.4 JUSTIFICATION

There is an increase in the morbidity of diabetes and one of the key reasons is poor glycaemic control which can be due to poor adherence. Adherence studies are peculiar to every community and culture. This study identified factors that are peculiar to diabetic patients who receive care at the Korle Bu polyclinic. Factors that affect adherence are not well studied among patients at Korle Bu polyclinic. An interesting factor that will be investigated is the effect of the availability of the medication at the hospital pharmacy on adherence. There is little information on the effect of medicine availability at the hospital pharmacy on adherence.

Factors that will be identified will help determine areas where health education should focus. It will help in knowing what institutional policies need to be put in place to reverse low adherence.

If the recommendations of the study are implemented, adherence levels will increase. This will in effect decrease morbidity and mortality due to diabetes.

1.5 OBJECTIVES

1.5.1 GENERAL OBJECTIVE

To determine factors that affect anti-diabetic medication adherence among adults receiving care at Korle-Bu polyclinic

1.5.2 SPECIFIC OBJECTIVES

1. To determine medicinal factors that affect anti-diabetic medication adherence.
2. To determine institutional factors that affect anti-diabetic medication adherence.
3. To determine individual factors that affect anti-diabetic medication adherence.
4. To determine the association between the various factors and anti-diabetic adherence

CHAPTER TWO

LITERATURE REVIEW

2.1 DIABETES

Diabetes occurs when the body cannot produce enough of the insulin hormone or cannot use insulin effectively. It is characterized by high glycaemic levels. There are three types of diabetes- type 1, type 2 and gestational diabetes.

In type 1 diabetes, there is deficiency in insulin secretion completely and this is caused by destruction of the pancreatic beta cells (Kawasaki et al., 2014). The reason for the destruction is not fully understood. This can occur in people of any age but it usually occurs in children or young adults. It is managed through a combination of daily insulin therapy, close monitoring, a healthy diet, and regular physical exercise. The number of people who develop type 1 diabetes is increasing. The reasons for this are still unclear but may be due to changes in environmental risk factors, early events in the womb, diet early in life, or viral infections.

In type 2 diabetes the body can make insulin but not enough or the insulin produced does not work properly It usually occurs in adults, but is increasingly seen in children and adolescents (Reinehr, 2013). They are normally diagnosed when complications of diabetes have developed. It is normally managed through a healthy diet and increased physical activity or oral medication. However, if they are unable to regulate their blood glucose levels, they may be prescribed insulin.

In gestational diabetes, women who are non diabetics develop resistance to insulin resulting in subsequent high blood glucose during pregnancy. It normally occurs around 24th week of gestation.

2.2 BURDEN OF DIABETES

In 2013 the prevalence of diabetes in the world was estimated to be 8.3% of which 80% live in middle and low income countries. It is also estimated that by 2035 one out of every ten adults will be diabetic. A high proportion of patients with diabetes are between the ages of 40-59 years. However there is little difference with gender in the global numbers (Aguiree et al., 2013). Even though there is an increase in the number of diabetics in the rural area, the urban dwellers are more according to the current data (IDA, 2014)

The prevalence of diabetes in sub Saharan Africa in 2013 was 4.9% (Aguiree et al., 2013). The increasing prevalence of diabetes is having a negative influence on communicable diseases such as Tuberculosis. This is mainly due to the growing population and lifestyle changes (Young, et al., 2009) Prevalence of diabetes in Ghana is 3.3% according to the international diabetes federation in 2014. A study conducted in the Greater Accra region showed the age adjusted prevalence of diabetes as 6.4% (Amoah et al., 2002). As the prevalence increases, mortality also increases. In 2013 there were about 8,529 deaths due to diabetes in Ghana. Ghana spent an average of 123 USD per person per diabetes in 2013 (IDA, 2014).

2.3 ADHERENCE

Adherence was defined by the participants of WHO adherence meeting in 2001 as the extent to which a person's behaviour – taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider (WHO, 2014).

Adherence is a public health issue. A Meta analysis by loke et al., showed adherence to be poor among diabetics who have been on medication for more than half a year. It included those on both oral medications and insulin (Loke et al., 2012). The proportion of adherence to diabetic medication was normally ranging from 23% to 77% (Duràn-Varela et al., 2001; Swaby et al., 1991).

After diagnosis patients are eager to adhere but apathy sets in after some time. In a study conducted in Tanzania, the rate of adherence to medication in patients with type 2 diabetes was 60.2% at one week and 71.2% at three months (Rwegerera, 2014). This is similar to what Boccuzzi, et al. reported from their study in the United States – between 70% and 80% was the adherence rate of sampled insured type 2 diabetics (2001).

2.3.1 FACTORS AFFECTING ADHERENCE

Studies have demonstrated that regimen complexity, cost and side effects of medications, advanced age, female gender, long duration of diabetes, and co-morbid conditions such as hypertension, hyperlipidemia, coronary artery disease and depression affects adherence (Thayer et al., 2010; Bebar et al., 2013). Institutional factors such as the availability of medication at the hospital pharmacy, cost of medications, prescription patterns and accessibility also affects adherence. Again the personal beliefs, knowledge on disease and medication, forgetfulness and financial burden also reduce adherence level. (de Vries et al., 2014) These factors are interrelated.

2.3.1.1 KNOWELDGE OF MEDICATION AND DISEASE

Most interventions to combat adherence are directed towards education. Low level of education on disease and medication affect adherence. If a patient does not understand that, the disease is

being managed, level of adherence decreases when he/she feels better. An increase in a patient's knowledge will make it easy for the patient to adhere to treatment. If the patient knows the treatment objectives and goals it will motivate the patient. Lack of knowledge on medication can affect adherence (Albano et al., 2008). A patient might take an over dose or under dose if the patient does not understand the instructions given. Furthermore a patient who does not have knowledge of the side effects of the medication will not adhere if he/she starts experiencing it (Lindenmeyer et al., 2006).

A study conducted to show whether there is an association between medication adherence and knowledge showed that, there was better adherence and better glycaemic control associated with patient's knowledge about diabetes (Al-Qazaz et al., 2011)

Contrary to this, studies have suggested no relation between patients knowledge on disease and adherence (Gazmararian et al., 2006; Loke et al., 2012).

2.3.1.2 BELIEFS

Culture can be defined as a learned set of values, beliefs, norms, and patterns of behavior. The belief of an individual has much influence on the health care choices. It is the lens in which the patients see and understand their disease. A study indicated that diabetics from poor urban communities in Accra associated diabetes and its complications with diet, family history, lifestyle factors, psychological stress and supernatural factors (de-Graft Aikinset al., 2014).

Patients' beliefs about medicine and prescription data analyzed in a study gave a strong relationship between the belief and adherence (de Vries et al., 2014).

2.3.1.3 DOSE REGIMEN

The complexity normally increases with the chronic nature as the disease progresses in most patients. A study revealed patients with other co-morbidities can take as many as ten tablets a day (Gaede et al., 2003). The complexity of the dosage regimen directly affects adherence (Thayer et al., 2010).

2.3.1.4 COST

Managing diabetes is expensive. The cost of management is mainly from medications, reactive stripes, hospitalization procedures, biomedical analysis and image examinations (Borges et al., 2014). This financial burden is not felt by only the patient but the country at large. Ghana spent an average of US$ 123 per person per diabetes in 2013 (Aguiree et al., 2013). This is even higher in other countries. The average yearly cost per patient with diabetes in Brazil is estimated to be US$ 1,844 of which 42% is the proportion spent on medication (Borges et al., 2014). With this high cost of medication, most patients are not able to afford therefore leading to them being low or non adherent (Rwegerera, 2014). Again most of these patients are low income earners.

2.3.1.5 FORGETFULNESS

Forgetfulness can be defined as a permanent fail to remember. Depression has been associated with the progression of diabetes. As patience get depressed their ability to remember decreases and thus forgetfulness have been shown to impair the adherence of medication (Jannuzzi et al., 2014).

2.3.1.6 INSTITUTIONAL FACTORS:

The goal of every health care system is to provide:

1. Universal and equal access to reasonable health care

2. Control of health care costs at an affordable level

3. Effective use of resources (World Health Organization, 2014.)

If these goals are not met, adherence will be affected. Unavailability of prescribed medications affects adherence. If the medication is available and not accessible by the patient adherence will be compromised. Again if the cost is high, management tends to be a financial burden on patients and adherence is reduced.

2.3.1.7 AVAILABILITY OF MEDICATION

Availability of medication is measured by whether the medication was found at the day of survey or not (Babar et al., 2013; van Mourik et al, 2010). At national procurement centers and main hospitals where non availability of medications is not expected to be an issue, surprisingly it is (Babar et al., 2013). Constraints in resources in the supply chain management limits the availability of medicines (Magadzire et al., 2014). Availability of essential medicine is an issue in low income countries. For instance availability of asthma medication has been found to be poor in low income countries (Babar et al., 2013).

2.3.1.8 POLY-PHARMACY

Poly pharmacy can be defined as prescription, administration, or use of more medications than are clinically indicated, or when a medical regimen includes at least one unnecessary medication (Lee, 1998). This is normally due to prescribers doing symptomatic management or not knowing the actual cause of the condition the patient is presenting (Harder et al., 2009). It can also be caused be the patient being managed by more than one prescriber. To meet patients' expectation, prescribers will prescribe more medication than needed. This leads to an increase in adverse

reaction and low adherence(Austin, 2006). Poly pharmacy increase the risk of adverse drug reactions (Harder et al., 2009), which also increase total health cost.

2.3.2 EFFECTS OF NON ADHERENCE

Adherence has a high financial effect. Non adherence increases cost of healthcare. A study conducted from April 1998 to March 2000 showed that, the adjusted healthcare cost for patients whose adherence to diabetic medication was less or equal to 75% was US$ 37648, more than 75% was US$ 31547 and more than 95% was US$25 354. As the level of adherence increased, the health care cost decreased. This shows that cost of health care can be reduced when adherence is increased (White et al., 2004). Furthermore the study showed a relation between adherence and hospital admission. As the level of adherence increased, the probability of being admitted in a hospital or ER decrease

CHAPTER THREE

METHODOLOGY

3.1 STUDY TYPE

A cross sectional study was conducted at the Korle-Bu polyclinic among adult diabetics utilizing the facility from 11th May 2015 to 5th June 2015.

3.2 STUDY LOCATION

Korle-Bu polyclinic is one of the clinical and diagnostic departments of Korle-Bu teaching hospital. Korle-Bu teaching hospital is the premier teaching hospital in Ghana and the third largest hospital in Africa. It was established as a general hospital in 1923 and has grown since then. It lies about three kilometers West of the centre of Accra the capital of Ghana and is situated along the Guggisberg Avenue of the Ablekuma Constituency.

The hospital has a mission to provide quaternary health care facilities and services, training, research, outreach and advocacy for clients within and outside Ghana.

The polyclinic has a high Out Patient Department (OPD) attendance and usually has the highest departmental OPD attendance of the hospital. In 2012 the total OPD cases recorded were 72,371. It also serves as a training facility for family physicians not only in Ghana but West Africa as a whole. It is a 42-bed capacity facility that offers primary health care to the Korle-Bu community, its environs and Ghana as a whole and normally serves as the main primary entry point into the Korle Bu Teaching Hospital.

3.3 STUDY POPULATION

The study population includes all confirmed adult diabetics receiving care at Korle-Bu polyclinic. These patients should have been on anti-diabetic medication for not less than six months.

3.3.1 INCLUSION CRITERIA

- Diabetics aged 25 to 65 years
- Patients should have been on medication for not less than six months
- Patient should be willing to participate

3.3.2 EXCLUSION CRITERIA

- Patients who were very sick and were on admission.
- Patients who were confused, unwilling to participate or complete the study or unable to communicate verbally.
- Those who had not been on medication for six or more months were excluded in order to avoid immediate period following diagnosis to obtain adequate time for observing adherence.

3.4 VARIABLES

3.4.1 DEPENDENT VARIABLE

Adherence to anti-diabetic medication

3.4.2 INDEPENDENT VARIABLES

The independent variables that were investigated were grouped into:

- Medication factors

1. Dosage regimen

- Institutional factors
    1. Poly pharmacy
    2. Availability (Whether the medication is available in the hospital pharmacy at the time of study)
    3. Accessibility (Whether it is difficult to get prescribed medications)
    4. Cost of medication
- Patient factors
    1. Age
    2. Sex
    3. Knowledge level of medication and disease
    4. Financial burden
    5. Forgetfulness

3.5 SAMPLING

3.5.1 SAMPLE SIZE CALCULATION

Sample size was calculated using the single proportion formula:

$n = (z^2pq)/d^2$

Where n: estimated minimum sample size

Z: z value for chosen p value

p: estimated proportion with condition of interest

q: 1-p

d: margin of error on p

Assumptions

1. At 95% confidence interval Z= 1.96
2. p = 0.527 estimated level of adherence due to high cost of medication from a study at Muhimbili National Hospital, Dar es Salaam, Tanzania (Rwegerera, 2014b)
3. q = 1-0.527 = 0.473
4. d = 0.06

Therefore from the formula n = 266.

Making room for non response rate of 13%, the sample size used was 300.

3.5.2 SAMPLING PROCEDURE

From the sample size calculation, the total number of people needed for the study was 300. Systematic sampling was used and from the OPD records department for the Korle-Bu polyclinic the average number of diabetic patients who visit the polyclinic in a day is 197. Considering the fact that the data was going to be collected in four weeks, it implies that an average of 15 diabetics need to be sampled a day. A random number 3 was generated from 1 to 13 using an online random number generator (Random, 2014). The 3rd diabetic patient for a day was recruited then every 13th person after. If the person is not eligible or unwilling to participate the next person was used.

3.6 DATA COLLECTION TECHNIQUES/METHODS & TOOLS

Structured questionnaires and data extraction sheet were used. The questionnaires covered respondents' socio-demographic characteristics, knowledge about disease, knowledge about medication, level of adherence and reasons for non adherence. The questionnaires were

administered in the local language that is Twi, Ga or Ewe. This was done at the pharmacy whilst the patients wait for their medication. The interview was a face to face. The patients' folders were reviewed for current medications and the day's fasting blood sugar (FBS).

3.6.1 ADHERENCE ASSESSMENT

The level of adherence was assessed using the eight item-Morisky medication adherence scale-8 (MMAS-8). The questions include:

1. Do you sometimes forget to take your pills?
2. People sometimes miss taking their medications for reasons other than forgetting. Thinking over the past two weeks, were there any days when you did not take your medicine?
3. Have you ever cut back or stopped taking your medicine without telling your doctor because you felt worse when you took it?
4. When you travel or leave home, do you sometimes forget to bring along your medicine?
5. Did you take all your medicine yesterday?
6. When you feel like your symptoms are under control, do you sometimes stop taking your medicine?
7. Taking medicine every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan?
8. How often do you have difficulty remembering to take all your medicine?

A. Never/rarely

B. Once in a while

C. Sometimes

D. Usually

E. All the time

This is a self reporting adherence scale. A "no" response scores 0 and a "yes" response scores 1. The total score for each respondent was computed. A score of 2 and above characterized poor adherence and a score below 2 was characterized good adherence. For question 8, a score of 0 was given to option A and the others 1

Training

Research assistants who helped in administering the questionnaires were trained. The objectives of the study were explained to them and cautioned to ensure confidentiality throughout the study.

3.7 QUALITY CONTROL

The questionnaires were checked for completeness as they came in. Where the research assistants needed more training, it was done before the following day. The data collected was entered twice in Windows Excel. The research assistants were casually dressed to avoid intimidating the participants. Participants were given codes to avoid double inclusion.

3.8 DATA PROCESSING AND ANALYSIS

3.8.1 STATISTICAL METHODS

The data were analyzed using STATA version 12 software. The data were entered into Excel and coded. Frequencies and descriptive statistics were computed for the variables and socio-demographic characteristics. A contingency table was drawn. The association between variables and adherence was analyzed by cross-tabulation, and the significances were tested by the chi-square test.

The student t test was used to compare differences in the mean of age, FBS, number of pills taken in a day and number of medication supplied and adherence levels because these were continuous variables.

P values from the contingency table which were less than 0.05 were entered into the multiple logistic regression model. Age was controlled for because forgetfulness is affected by age. Multiple logistic regression analysis was performed to identify the predictive factors associated with anti-diabetic medication adherence.

The adjusted odds ratio (AOR) and 95% Confidence Interval (CI) were performed to determine factors associated with anti-diabetic medications adherence and a p-value of 0.05 or less was considered statistically significant.

3.9 ETHICS

Ethical clearance was sought from the Ghana Health Service (GHS) ethical review committee. The ethical approval-ID number is GHS-ERC: 52/02/15. Ethical approval letter is attached to Appendix 2. The head of the polyclinic was briefed on the objectives of the study and permission sought from him.

The objectives of the study and informed consent were read to each patient in the local dialect. Patients either signed or thumb printed a written consent form if they agreed to be part of the study. Patients who didn't want to be part of the study were given the opportunity to opt out. Patients were anonymous. Privacy was ensured during the interview; respondents were assured of confidentiality. Subject codes were used to hide respondents' identity. Personnel involved in data collection were cautioned during training to ensure confidentiality throughout the study.

The completed questionnaires were locked in a cabinet with the researcher to be the only one with access. The data on the computer have been kept in a folder with a password which will be accessible only to the researcher and the study team.

The informed consent administered to the respondents explained the confidentiality, voluntary participation, withdrawal and risk/benefits to them. (Refer to Appendix 1)

A copy of the written report will be sent to the polyclinic after the research.

I as the principal investigator declare that I have no conflict of interest in this study.

3.10 PRETEST OR PILOT STUDY

The questionnaires were piloted at Ussher forte polyclinic. 20 adult diabetics were sampled and used for the piloting. Questions which were identified to be unclear were modified.

During the pre testing the appropriateness of the time allocation and procedures were checked.

CHAPTER FOUR

RESULTS

4.1 DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS

A total of 300 diabetics aged 25 to 65 years were recruited. All the participants had been on diabetic medication for 6 months or more.

4.2 AGE AND SEX DISTRIBUTION

The mean age of the participants was 54.4years with a standard deviation (SD) of 9.7. Majority of the participants were above 50years. About 38.7% (116/300) of the sample were from 51 to 60 years and 32.0% (96/300) of the participants were older than 60 years. Female participants formed the majority. There were 64.7% (197/300) females and 34.3 % (103/300) males. The age and sex distribution is shown in Figure 1.

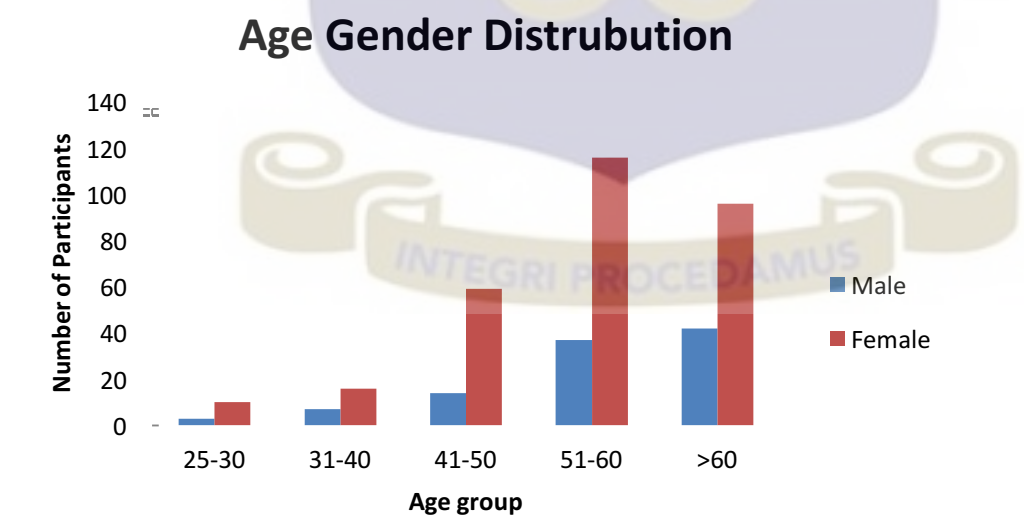

Figure 2: Age and sex distribution

4.3 SOCIOECONOMIC CHARACTERISTICS

Most of the participants were married. The married participants were 68.8% (203/300). The two main ethnic groups of the participants were Akan and Ga/Adangme. Each ethnic group constituted 35.7% (107/300) of the participants. For educational level, 37.4% (113/300) of the participants reported secondary education as their highest form of education. However 27.8% (83/300) reported that they have had no formal education. One third of the participants were either unemployed or pensioners. Majority of the participants, 95.7% (287/300) were accessing the health facility with a valid health insurance card. Table 1 shows the socioeconomic characteristics of the participants.

Table 1: Socioeconomic characteristics of participants

Variable	Number (%)
Ethnic group	
Akan	107(35.7)
Ewe	48(16.0)
Ga/Adangme	107(35.7)
Gonja	2(0.7)
Dagomba	3(1.0)
Others	33(11.0)
Religion	
Christian	263(88.0)
Muslim	29(9.70
Traditional	4(1.3)
Others	3(1.0)
Marital status	
Single	26(8.8)
Married	203(68.8)
Divorced	19(6.4)
Widowed	47(15.9)
Educational level	
No Formal Education	83(27.7)
Primary	47(15.7)
Secondary	113(37.7)
Tertiary	57(19.0)
Employment status	
Government	41(13.7)
Private	32(10.7)
Self employed	113(37.7)
Pensioner	61(20.3)
Unemployed	53(17.7)
Mode of payment	
Health insurance	287(95.7)
Cash	13(4.3)

4.4 CLINICAL CHARACTERISTICS

Type 2 diabetes was the commonest type of diabetes, 93.3% (283/300) participants had been diagnosed with type 2 diabetics. About 69.6% (204/300) of the participants had other chronic disease. The mean number of medications prescribed was 4.5(SD= 1.5) and a mean of 5.3 (5.0-5.5) medications was reported by participants to be taken in a day. The mean FBS reported was 8.4(7.8-8.4). About 68.4% (182/267) of the participants had FBS level of more than 6.6mmol. However 11% (33/300) of the participants didn't have their FBS level recorded in the folder.

Table 2: Clinical characteristics of participants

Variable	Number (%)
Type of diabetes	
Type 1	20(6.70)
Type 2	280(93.3)
Duration of condition	
0.5-1	39(13.0)
1.5-5	193(64.3)
6 to 10	69(20.3)
>10	7(2.3)
Number of medications prescribed	
<4	67(22.30
4 to 12	233(77.7)
FBS (mmol/L)	
<6.6	84(31.6)
≥6.6	182(68.4)
Co-morbidities	
No	91(30.3)
Yes	209(69.7)

4.5 INSTITUTIONAL FACTORS

More than 50% (170/300) of the respondents did not have all their diabetic medication available at the hospital pharmacy. About 37% (111/300) reported that all their diabetic medications were covered by the NHIS. Again about one third (106/300) reported that they were not able to buy all their medications. However, 57.3% (172/300) reported that they feel burdened buying their

medications indicating cost as an issue. Majority of the participants, 61.0% (183/300) reported that it was not difficult getting their prescribed medications.

With regards to the services rendered, a larger proportion 86.3% (259/300) of the participants reported that they were satisfied with it.

Table 3: Participants response to institutional factors

Variable	Number (%)
Availability of medicine	
No	170(56.7)
Yes	130(43.30
Drugs covered by NHIS	
No	189(63.0)
Yes	111(37.0)
Burdened by Cost	
No	128(42.7)
Yes	172(57.3)
Able to afford	
No	106(35.3)
Yes	194(64.7)
Difficult to get medications	
No	183(61.0)
Yes	117(39.0)
Satisfied with service	
No	41(13.7)
Yes	259(86.3)

4.6 PARTICIPANTS' BELIEF AND KNOWLEDGE OF DIABETES AND ITS TREATMENT

Participants' belief and knowledge of diabetes and its treatment is summarized in Figure 2. About 67.3% (202/300) reported they knew the names of their medication. However 49% (147/300) reported that they do not know any side effect of their diabetic medication.

Majority of the participants had knowledge on FBS level, foot care, signs of hyperglycaemia and complications of diabetes. However, 48.3% (145/300) who represent almost half of the sample reported that diabetes can be cured. About 13% (39/300) of the participants believed that diabetes is a spiritual disease and 10.3% (31/300) reported that they had ever stopped taken their diabetic medication because spiritual leaders had asked them to stop.

Few of the participants, 16 %(48/300) reported that their diabetes is not well controlled and 15% (45/300) did not believe the medication prescribed can help manage their diabetes.

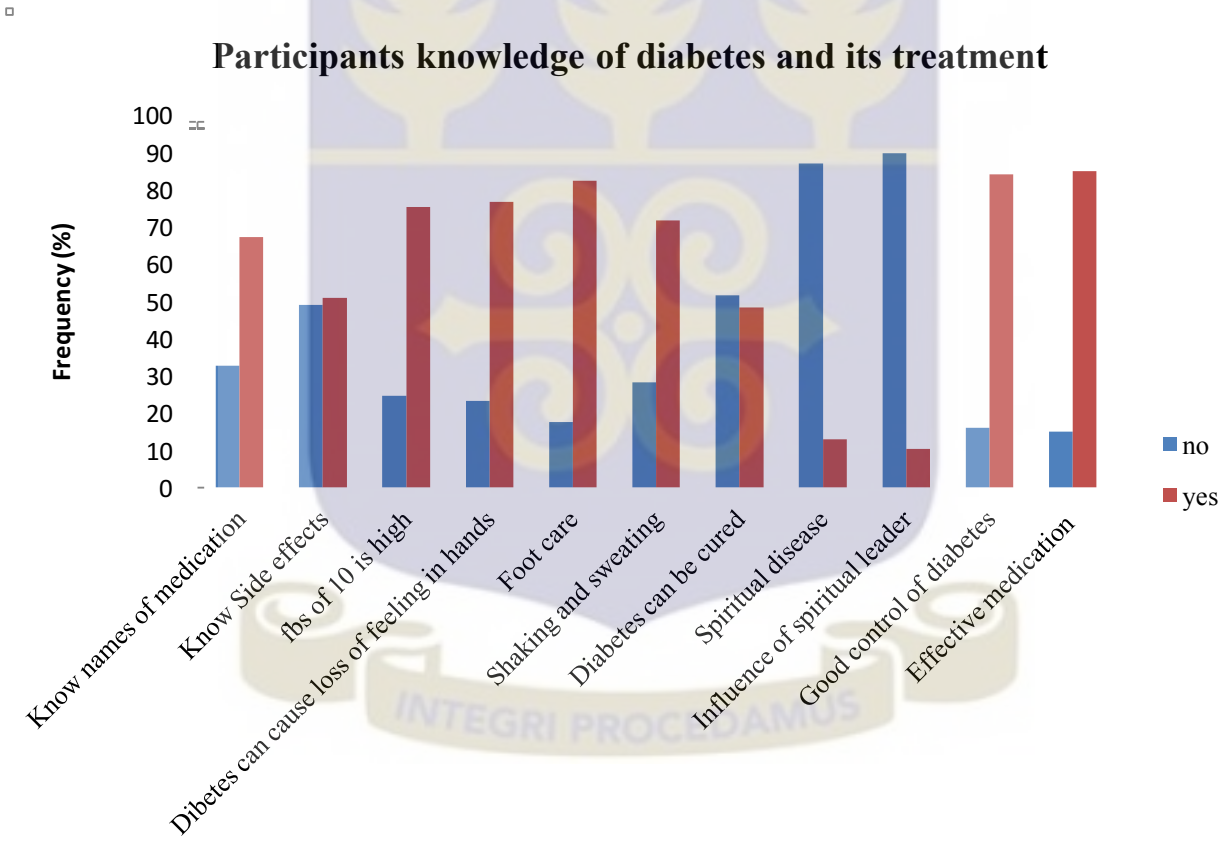

Figure 3: Distribution of participants' knowledge on diabetes and its treatment

4.6 DETERMINING THE LEVEL OF ADHERENCE

The level of adherence was assessed using the eight item-Morisky Medication Adherence Scale (MMAS-8). The MMAS-8 has an adherence score of 0-8. Participants who had a score of 2 and above were classified to have poor adherence. The mean score was 2.8 (SD 2.1). The minimum score was 0 and the maximum score 8. By the classification 39% (117/300) of the participants had good adherence whilst 63% (183/300) of the participants had poor adherence.

Table 4: Self reported MMAS-8 showing participants response

Reason	Number (%)
Forget	100(33.3)
Reasons other than Forgetting	84(28.0)
Feel worse after medication	59(19.7)
Travelling or when not at home	88(29.3)
Took all medications yesterday	257(85.7)
Controlled diabetes	63(21.0)
Inconvenience of taking medications	86(28.7)
Difficult to remember	109(36.3)

4.7 PARTICIPANTS SOCIO-DEMOGRAPHIC CHARACTERISTICS AND ADHERENCE

Adherence among 23-30 year age group tended to be higher however adherence level in the 41-50 year was the least even though the difference was not significant. Males reported a higher adherence rate compared to females and again this difference was not significant. Participants who were from the Ga/Adangme ethnic group reported good adherence rate whilst two thirds of participants who were from the Dagomba ethnic group reported good adherence, this difference was statistically significant (P value <0.001). This implies that there is an association between ethnic group and adherence.

For the highest educational level attained by the participants, the adherence level among the strata was almost the same. For employment status, pensioners reported the best adherence level whilst participants who were self employed reported the least. Participants who were not assessing the facility with NHIS card reported better adherence.

As the number of years of being on medication increases, adherence decrease. Participants who had been on medication for more than 10 years had lower adherence level. This difference was however not statistically significant. From the chi square (X^2) and fisher exact test, adherence was associated with ethnic group, employment status, mode of payment, type of diabetes and number of medications prescribed.

Table 5a: Socio-demographic characteristics and adherence

Characteristics	Adherence		p-value
	Good N=117(%)	Poor N 183(%)	
Age(years)			0.18
25-30	7(53.83)	6(46.15)	
31-40	7(43.75)	9(56.25)	
41-50	16(27.12)	43(72.88)	
51-60	44(37.93)	72(62.07)	
>60	43(44.79	53(55.21)	
Sex			0.648
Male	42(40.78)	61(59.22)	
Female	75(38.07)	122(61.93)	
Ethnic group			0.001*
Akan	32(29.91)	75(70.09)	
Ewe	14(29.17)	34(70.83)	
Ga/Adangme	59(55.14)	48(44.86)	
Gonja	0	2(100)	
Dagomba	2(66.67)	1(33.330	
Others	10(30.30)	23(69.70)	
Religion			0.417*
Christian	103(39.02)	161(60.98)	
Muslim	13(44.83)	16(55.17)	
Traditional	0	4(100)	
Others	1(33.33)	2(66.67)	
Marital status			0.395
Single	12(46.15)	14(53.85)	
Married	85(40.87)	123(59.13)	
Divorced	6(31.58)	13(68.42)	
Widowed	14(29.79)	33(70.21)	
Educational level			0.933
No formal education	31(37.35)	52(62.65)	
Primary	17(36.17)	30(63.83)	
Secondary	46(40.71)	67(59.29)	
Tertiary	23(40.35)	34(59.65)	

*P values obtained from Fishers exact test.

Table 5b: Socio-demographic characteristics and adherence

Characteristics	Adherence		p-value
	Good N=117(%)	Poor N 183(%)	
Employment status			0.001
Private	12(37.50)	20(62.50)	
Self employed	30(26.55)	83(73.45)	
Pensioner	36(59.02	25(40.98)	
Unemployed	20(37.74)	33(62.26)	
Mode of payment			0.019*
Cash	1(7.69)	12(92.31)	
Health insurance	116(40.42)	171(9.58)	
Type of diabetes			0.046
Type 1	12(60.00)	8(40.00)	
Type 2	105(37.50)	175(62.50)	
Duration of condition			0.096*
0.5-1	16(41.03)	23(58.97)	
1.5-5	83(43.01)	110(56.99)	
6 to 10	17(27.87)	110(56.99)	
>10	1(14.29)	6(85.71)	
			0.043
Number of medications prescribed			
<4	19(28.36)	48(71.64)	
4 to 12	08(42.06)	135(57.94)	
FBS (mmol/L)			0.943
<6.6	29(34.52)	55(65.48)	
≥6.6	64(34.94)	119(65.03)	
Co-morbidities			0.157
No	30(32.97)	61(67.03)	
Yes	87(41.63)	122(58.37)	

*P values obtained from Fishers exact test.

4.8 FACTORS AFFECTING ADHERENCE

Bivariate analysis showed that there was no significant difference between the participants with good adherence and poor adherence in age, gender, religion, marital status, highest level of

education, mode of payment, type of diabetes, duration of condition, number of medications prescribed, FBS and whether the participants know the names of their diabetic medication. However there was significant association between poor adherence and ethnicity, employment status, availability of medication at hospital pharmacy, cost, participants satisfaction of services rendered, knowledge of side effects of medication, disease knowledge, patients perception about their disease control and forgetfulness. Participants who reported that they were burdened by the cost of medications, reported forgetfulness as the reason for poor adherence and believed that diabetes is a spiritual disease were more likely to have poor adherence ([OR=2.25; 95%CI=1.40-3.61], [OR=23.30; 95%CI=9.74-55.7] and [OR=2.78; CI=1.23-6.28] respectively). Participants who had all their diabetic medications available at the hospital pharmacy were less likely to have poor adherence (OR=0.5; 95%CI=0.32-0.82). Again, participants who were prescribed four or more medications had about 0.54 times the odds of poor adherence compared to those who had less than four medications prescribed (OR=0.54; 95%CI=0.30-0.99).

Multivariate analysis showed that the ability to afford medication (cost), forgetfulness and participants' knowledge on complications were associated with poor adherence. Adjusting for age and other significant variables, participants who reported that they are able to afford medications prescribed, had a 71% reduction in the odds of poor adherence (OR=0.29; 95%CI=0.12-0.70). However, participants who reported that diabetes can cause loss of sensation in fingers, hands and toes were more likely to have poor adherence (OR=2.96; 95%CI=1.23-7.12) after adjusting for confounders. Participants who reported forgetfulness as the reason for missing doses had an odds of poor adherence 34.4 times those who do not forget (OR=34.42; 95%CI=10.31-114.86).

Table 6a: Factors affecting Adherence

	Crude OR (95%CI)	P value	Adjusted OR (95%CI)	P value
Age(years)	1.01(0.97-1.05)	**0**	1.01(0.97-1.05)	0.33
Sex				
Male	Reference			
female	1.12(0.69-1.82)	0.648		
Ethnic group				
Akan			Reference	
Ewe	1.04(0.49-2.19)	0.926	1.47(0.51-4.24)	0.475
Ga/Adangme	0.35(0.20-0.61)	<0.001	0.52(0.23-1.17)	0.116
Dagomba	0.21(0.02-2.43)	0.214	0.34(0.02-1.17)	0.486
Others	0.98(0.42-2.30)	0.965	0.40(0.11-1.44)	0.16
Religion				
Christian	Reference			
Muslim	0.79(0.36-1.70)	0.36		
Traditional				
Others	1.28(0.11-14.29)	0.11		
Marital status				
Single	Reference			
Married	1.24(0.55-2.81)	0.606		
Divorced	1.85(0.54-6.40)	0.327		
Widowed	2.02(0.75-5.45)	0.165		
Educational level				
No formal education	1.05(0.50-2.21)	0.894		
Primary	0.86(0.49-1.55)	0.634		
Secondary	0.88(0.44-1.76)	0.72		
Tertiary				
Employment status				
Government	Reference			
Private	1.44(0.56-3.60)	0.449	0.987(0.24-4.06)	0.986
Self employed	2.39(1.14-5.02)	0.021	2.19(0.63-7.56)	0.214
Pensioner	0.60(.027-1.33)	0.209	0.43(0.10-1.80)	0.251
Unemployed	1.43(0.62-3.26)	0.402	3.01(0.82-11.04)	0.096
Mode of payment				
Cash	Reference			
Health insurance	0.12(0.02-0.96)	0.045	0.15(0.02-1.51)	0.108

Table 6b: Factors affecting Adherence

	Crude OR (95%CI)	P value	Adjusted OR (95%CI)	P value
Type of diabetes				
Type 1	Reference			
Type 2	2.50(0.99-6.32)	0.053		
Duration of condition	Reference			
0.5-1	0.92(0.45-1.85)	0.82		
1.5-5	1.80(0.77-4.22)	0.174		
6 to 10	4.17(0.45-38.08)	0.205		
>10				
Number of medications prescribed				
<4	Reference			
4 to 12	0.54(0.30-0.99)	0.044	0.86(0.68-1.10)	0.254
FBS (mmol/L)				
<6.6	Reference			
≥6.6	0.98(0.57-1.68)	0.943		
Co-morbidities				
No	Reference			
Yes	0.68(0.41-1.155)	0.158		
Availability of medicines				
No		Reference		
Yes	0.51(0.32-0.82)	0.005	0.63(0.27-1.43)	0.269
Drugs covered by NHIS				
No		Reference		
Yes	0.56(0.35-0.90)	0.018	0.45(0.18-1.11)	0.082
Burdened by Cost				
No		Reference		
Yes	2.25(1.40-3.61)	0.001	0.77(0.12-1.75)	0.525
Able to afford				
No		Reference		
Yes	0.32(0.19-0.54)	<0.001	0.29(0.12-0.70)	0.006
Difficult to get medications				
No	Reference			
Yes	1.40(0.86-2.26)	0.176		
Satisfied with service				
No		Reference		
Yes	0.28(0.12-0.65)	0.003	0.81(0.24-2.68)	0.726

Table 6c: Factors affecting Adherence

	Crude OR (95%CI)	P value	Adjusted OR (95%CI)	P value
Know names of medication				
No	Reference			
Yes	0.62(0.38-0.104)	0.069	3.77(1.31-10.83)	0.014
Know Side effects				
No			Reference	
Yes	0.59(0.37-0.94)	0.028	0.56(0.23-1.36)	0.202
FBS of 10 is high				
No			Reference	
Yes	0.28(0.15-0.53)	<0.001	0.29(010-0.85)	0.024
Diabetes can cause loss of feeling in hands				
No			Reference	
Yes	2.45(1.42-4.23)	0.001	2.96(1.23-7.12)	0.015
Foot care				
No			Reference	
Yes	0.16(0.06-0.38)	<0.001	0.47(1.23-1.63)	0.221
Shaking and sweating				
No	Reference			
Yes	0.60(0.35-1.03)	0.062		
Diabetes can be cured				
No	Reference			
Yes	1.92(1.20-3.09)	0.006		
Spiritual disease				
No			Reference	
Yes	2.78(1.23-6.28)	0.014	1.10(0.28-4.22)	0.895
Influence of spiritual leader				
No	Reference			
Yes	2.37(0.99-5.70)	0.053		
Good control of diabetes				
No	Reference			
Yes	0.26(0.12-0.58)	0.001	1.76(0.52-5.97)	0.367
Effective medication				
No			Reference	
Yes	0.09(0.03-0.29)	<0.001	0.40(0.09-1.82)	0.235
Forgetfulness				
No			Reference	
Yes	23.30(9.74-55.70)	<0.001	34.42(10.31-114.86)	<0.001

CHAPTER FIVE

DISCUSSION

The objective of the study was to find the factors that are associated with adherence to anti diabetic medication among adult patients receiving care at Korle-Bu polyclinic.

The findings of the study showed that adherence level was suboptimal. About 63% (183/300) had poor adherence. Ethnicity, employment status, availability of medication at hospital pharmacy, cost, participants satisfaction of services rendered, knowledge on side effects of medication, disease knowledge, patients' perception about their disease control and forgetfulness were associated with adherence independently. However after controlling for confounding and finding association among these factors, poor adherence was associated with disease and medication knowledge, cost effect of medication on patient and forgetfulness.

The level of poor adherence from the study was 63%. Even though the level is suboptimal, the value is in accordance to the findings of other studies (Ahmad et al., 2013).

From the study age was not associated with adherence even though a better adherence level was observed in participants less than 30 years. Participants from 41 to 50 years had the poorest adherence level. This is consistent with the findings from a study done in Uganda (Rwegerera, 2014). People in this age group tend to be occupied with a lot of activities. Gender was not found in this study to be associated with adherence even though males had a better adherence level. Again this result is not different from other studies (Gimenes et al., 2009). This can be explained by the fact that men are less likely to be affected by emotional factors such as depression and emotional stress which can affect adherence. Participants who were from the Ga/Adangme ethnic group were less likely to have poor adherence in comparative to participants who were Akans.

This can be explained by the fact that the facility is on a Ga land and they tend to have believe in the services. Since patient's belief and satisfaction has an effect on adherence (Abebe et al., 2014). The type of diabetes was not associated with adherence.

Participants who were unemployed were more likely to have a poor adherence level comparing them to participants who were government workers. This is in accordance with other studies where low income earning was consistent to poor adherence (Gimenes et al., 2009). Participants need money for transportation and other expenditures. If the person is unemployed, he/she will only attend the facility when the care taker provides funds and this will affect adherence. Adherence level was associated with the participant attending to the facility with a valid NHIS card. These participants were less likely to have poor adherence. This is because they do not take all the financial burden of their medications. Educational level was not associated with adherence. This was in contrast to a study which found an association between education and adherence (Chew et al., 2015). This is because health education at the polyclinic is done in the local language and symbols are used to indicate dosage. Thus one needs not to be educated to understand.

Forgetfulness was an important factor associated with adherence. Diabetes has been found to be a risk factor of anxiety disorders (Hasan et al., 2015) which cause forgetfulness. Findings of this study collaborated with other studies which indicated an association between medication adherence and forgetfulness (Jackson et al., 2015; Jimmy et al., 2014). Combination of complex interventions such as manual telephone follow, reminders and supportive care have been effective in improving adherence in chronic care patients (Haynes et al., 2008). Considering the setting of the polyclinic some of these interventions can be used. For instance close relations who live with patients can be used as treatment supporters who will encourage and remind patients to

take their medications. Knowledge empowers a person concerning choice. Educating patients on medication and disease condition empower them on the choice they make. It also boosts their trust in the medication. Diabetes knowledge is associated with good adherence (Al-Qazaz et al., 2011). Even though majority of the participants reported to have good knowledge of diabetes and belief in the medication, the overall adherence level was suboptimal. This can be explained by the fact that the responses given could not be ascertained. Health education should therefore be reinforced on every visit. Most of these patients are above 50 years and they are prone to forgetting things easily. So the "ask, educate, and ask," approach can be used to make sure they have been well informed. Pictures can be used which can make it easily to remember. Reinforcing what patients have been educated on and encouragement can also be used. Spiritual leaders should be brought on board concerning health education. Few of the patients believed that diabetes is a spiritual disease and some had even stopped their medication because a spiritual leader asked them to. This is similar to a finding from a study conducted at urban slums in Accra (de-Graft Aikins et al., 2014). Spiritual leaders play an integral role in our communities. They can be educated and used as agents of change. They are normally the first point of call for most people when depressed.

For institutional factors, poly pharmacy had a positive impact on adherence from the findings. Participants who had more than four medications prescribed were less likely to have poor adherence. This can be explained by the perception that participants who had more medications perceived themselves as severely ill so they adhered. Better relationship between health professionals and clients improve satisfaction. Findings from a study in Nigeria found an association between poor patient provider communication, lack of trust in the provider and

adherence (Jackson et al., 2015). Patients who leave a health facility satisfied are motivated to adhere to any treatment given including medications.

Ability to afford medication (cost) was associated with adherence. The findings of the study is in accordance with what is known in literature (Rwegerera, 2014). Even though almost all the participants were accessing the health facility with a valid NHIS card, most of them reported that their medications were either not available or not covered by the health insurance. Therefore patients had to pay out of their pockets. Thus, the majority of the participants reported that they were burdened by the cost even though the medications were not difficult to get. In contrast to this, a study done in Oman whereby patients do not bear the financial burden of their disease condition due to free medical care including medications, cost was not associated with adherence (Jimmy et al., 2014). This implies making medical care free or reducing the cost borne by patients will improve adherence and reduce complications. Again the study reported a higher adherence level (Jimmy et al., 2014). This implies that reducing cost of medication will increase adherence.

The number of pills taken in a day was not associated with adherence. This is in contrast with other studies which indicated association between dosage regimen and adherence (Jackson et al., 2015).

This study had a few limitations. Firstly, the adherence level obtained could be different from the true adherence level since a self report scale is affected by the participants' ability to remember. Again there is the likelihood of participants to give socially acceptable answers. Furthermore a temporal association between adherence and the factors could not be determined due to the study design. As such one cannot generalize the outcome of this study.

CHAPTER SIX

6.1 CONCLUSION

Adherence was found to be suboptimal. The findings of the study showed that ability to afford medication and forgetfulness were significantly associated with poor adherence at Korle Bu Polyclinic.

There is the need to stress on the benefits of medication in diabetes management to prevent complications and reduce mortality. Furthermore health education needs to be intensified, medications subsidized and interventions like supportive care being introduced in the management of diabetes.

This study contributes to existing knowledge on diabetes in Ghana and adherence to medication.

6.2 RECOMMENDATIONS

Considering the poor adherence level obtained from the study, there is the need for all stakeholders to come together to improve on the level. If the following recommendations are carefully followed, the adherence level can be improved.

Korle-Bu polyclinic

- There should be proper forecasting in place to ensure the availability of essential medication.
- Diabetic clinic days can be introduced to get them together. This can help in the education.

- The public health unit should intensify patients' education on medications and disease condition. The "ask-educate and ask" approach can be used to make sure patients are getting the right information.

National

- Taxes on medication should be waved off; this will help in making the medications affordable.
- Treatment support system should be introduced in the management of diabetes. This can be done by getting family members to be involved in the management. They will support the patients and help them in sticking to their treatment plans.
- Spiritual leaders should be brought on board in the management of chronic diseases such as diabetes. They should be given the necessary training in equipping them as a source of motivation for the patients. This will help in improving adherence levels.

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APPENDICES

Appendix 1: Informed Consent for participation

Research Title: Adherence to anti-diabetic medications among adults receiving care at Korle-Bu polyclinic.

Introduction

My name is Diana Adu-Mintaah, a student from the School of Public Health, College of Health Sciences, University of Ghana, Legon. I am carrying out a study to investigate the factors that affect adherence to ant-diabetic medication among adults receiving care at Korle Bu polyclinic. This study seeks to identify the factors that do not make patients adhere to their diabetic medication and suggest interventions.

Procedures

The study will involve answering questions about you, disease condition and medications. Values of some of your routine test will be extracted from your folder and used. Participation in the study is absolutely voluntary and no coercion will be used to obtain responses from participants. It will be much appreciated if you could participate in this study. The study is purely academic and forms part of the requirements for the award of a Master degree in Public Health.

Risks and Benefits

This research poses no potential risk to either the study population or the society. There is no direct benefit to you for participation or monetary gain. However, the study is envisaged to be beneficial to both the study population and the society in many ways. The factors that will be

identified will help determine areas where health education should focus. It will help in knowing what institutional policies need to be in place to advert low adherence.

Voluntary Participation

Participation in this study is voluntary and you can choose not to answer any individual question or all the questions. You are free to withdraw from the study at any time. However, you are kindly requested to fully participate in the study since your responses will help us understand the factor that affect adherence to anti-diabetic medications.

Anonymity and Confidentiality

You are assured that all information provided will be kept confidential, privacy and would not be shared with anybody who is not part of the study team.

Dissemination of Results

A written report will be sent to the polyclinic.

Before taking Consent

Do you have any questions you wish to ask about the study? Yes ( ) No ( )

If yes please indicate the questions below:

……

……

……

In case you have any questions later please, do not hesitate to contact Diana Adu-Mintaah (Tel: 0244042281) or the administrative secretary, Ghana Health Service ethics review committee Hannah Frimpong (Tel: 0302679323)

Voluntary Consent

I have read the information provided above, or the information above has been read to me and I understand. I have been given the opportunity to ask questions regarding this study; questions have been answered to my satisfaction. I now voluntarily agree, and also voluntarily agree for my relative to participate in this study knowing that I have the right to opt out and also withdraw my relative from this study at any time without affecting future health care services.

…….	…….	……
Name of participant	Signature/Thumbprint	Date
…….	…….	……
Name of witness	Signature	Date
…….	…….	……
Name of researcher	Signature	Date

Interviewers Statement

I, the undersigned, have explained this consent to the subject in English language/Ga/Twi, and that she/he understands the purpose of the study, procedures to be followed, as well as the risks and benefits of the study.

The participant has fully agreed to participate in the study.

Signature of Interviewer ……..

Date:……

Appendix 2: Questionnaire

SUBJECT NO……. DATE……

Personal profile

Name

1. Age at last birthday
2. Community of residence
3. Sex: 1. Male [ ] Female [ ]
4. Ethnic group:
    1. Akan [ ] 4. Gonja [ ]
    2. Ewe [ ] 5. Dagomba [ ]
    3. Ga/Adangme [ ] 6. Others specify……..
5. Marital status:
    1. Single [ ] 3. Divorced [ ]
    2. Married [ ] 4. Widowed [ ]
6. Religion:
    1. Christian [ ] 3. Traditional [ ]
    2. Muslim [ ] 4. Others specify …….
7. Educational level
    1. None [ ] 3. Secondary [ ]
    2. Primary [ ] 4. Tertiary [ ]
8. Employment:

1. Public servant [ ]
2. Informal sector [ ]
3. Self employed [ ]
4. Pensioner [ ]
5. Unemployed [ ]

9. Level of income …….

10. Mode of payment

1. health insurance [ ]
2. Cash [ ]

11. Any co morbidities

1. Yes [ ]
2. No[ ]

12. What are the co morbidities

1. Hypertension [ ]
2. Dyslipidaemia [ ]

13. Type of diabetes

1. Type 1 [ ]
2. Type 2 [ ]

14. How long have you been taking diabetic medication …….

15. Number of medication prescribed ……..

16. Number of medication taken in a day

17. Class of diabetic medication prescribed

1. Insulin [ ]
2. Metformin[ ]
3. Dipeptidylpeptidase-4 reductase [ ]
3. Sulphonylureas[ ]
4. Thiazolidines [ ]

4. Others specify [ ]

18. Were all diabetic medication available at the hospital pharmacy

1. Yes [ ]
2. No [ ]

19. Were all the medication covered by health insurance

1. Yes [ ]
2. No [ ]

20. Do you feel burdened buying your medication

1. Yes [ ]
2. No [ ]

21. Are you able to buy all your medication?

1. Yes [ ]
2. No[ ]

22. Is it difficult to get your prescribed anti diabetic medication

1. Yes
2. No

Medication Knowledge

23. Do you know the names of your diabetic medication?

1. Yes[ ]
2. No [ ]

24. Do you know of any side effects

1. Yes [ ]

2. No [ ]

Disease knowledge

25. Diabetes can be cured.

1. Yes [ ]
2. No [ ]
3. Don't know [ ]

26. A fasting blood sugar level of 210 is too high.

1. Yes [ ]
2. No [ ]
3. Don't know [ ]

27. Diabetes can cause loss of feeling in my hands, fingers and feet.

1. Yes [ ]
2. No [ ]
3. Don't know [ ]

28. Diabetics should take extra care when cutting their toenails.

1. Yes [ ]
2. No [ ]
3. Don't know [ ]

29. Shaking and sweating are signs of high blood sugar.

1. Yes [ ]
2. No [ ]
3. Don't know [ ]

Patient's belief

30. Diabetes is a spiritual disease

    1. Yes [ ]
    2. No [ ]
    3. Don't know [ ]

31. Have you ever stopped taking your diabetic medication because a spiritual leader asked you to stop?

    1. Yes [ ]
    2. No [ ]

32. Is your diabetes well controlled

    1. Yes [ ]
    2. No [ ]
    3. Don't know [ ]

33. Do you believe that the medication prescribed can help manage your diabetes

    1. Yes
    2. No
    3. Don't know

34. Were you satisfied with the services rendered

    1. Yes [ ]
    2. No [ ]

Glycaemic control

35. FBS value……

36. Hb1Ac value …….

Adherence scale

37. Do you sometimes forget to take your pills?

    0. No [ ]

    1. Yes [ ]

38. People sometimes miss taking their medications for reasons other than forgetting. Thinking over the past two weeks, were there any days when you did not take your medicine?

    0. No [ ]

    1. Yes [ ]

39. Have you ever cut back or stopped taking your medicine without telling your doctor because you felt worse when you took it?

    0. No [ ]

    1. Yes [ ]

40. When you travel or leave home, do you sometimes forget to bring along your medicine?

    0. No [ ]

    1. yes [ ]

41. Did you take all your medicine yesterday?

    0. No [ ]

    1. Yes [ ]

42. When you feel like your symptoms are under control, do you sometimes stop taking your medicine?

    0. No[ ]

    1. Yes [ ]

43. Taking medicine every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your treatment plan?

    0. No [ ]

    1. yes[ ]

44. How often do you have difficulty remembering to take all your medicine?

___A. Never/rarely

___B. Once in a while

___C. Sometimes

___D. Usually

___E. All the time

Adherence score…….