

**PATIENTS KNOWLEDGE OF THEIR ANTI-DIABETIC
MEDICATION AND SOURCES OF MEDICATION
INFORMATION AT THE UNIVERSITY TEACHING
HOSPITAL IN LUSAKA, ZAMBIA**

By

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**A dissertation submitted to the University of Zambia in partial
fulfilment of the requirements of the degree of Master of
Clinical Pharmacy**

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DECLARATION

I, Mufaweli Kapawa-Mwale hereby declare that the work on which this dissertation is based is original, except where acknowledgements indicate otherwise.

This dissertation is submitted for the award of the degree of Master of Clinical Pharmacy degree or examination at this or any other university. Neither the whole work nor any part of it has been submitted before for any degree or examination at this or any other university.

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CERTIFICATE OF APPROVAL

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DEDICATION

I dedicate this research to my children Lubala and Koiso Mwale, my niece Briteny Mitonga and my husband Fidelis Kangaonde Mwale.

To my parents Rtd Brig. General N. Kapawa and Mrs J. Kapawa.

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LETTERS OF CLEARANCE FROM UTH MANAGEMENT, ASSISTANT DEAN POST-GRADUATE AND ETHICAL APPROVAL FROM RESEARCH ETHICS COMMITTEE.

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ACRONYMS

UNZA	University of Zambia
UTH	University Teaching Hospital
WHO	World Health Organization.
UK	United Kingdom
DAZ	Diabetes Association of Zambia
DM	Diabetes Mellitus
OBRA	Omnibus Budget Reconciliation Act
SPSS	Statistical Package for Social Sciences
UNZA-BREC	University of Zambia Biomedical Research Ethics Committee

Operational definitions

Diabetes mellitus - A group of metabolic disorders of fat, carbohydrates and protein metabolism that results from defects in insulin secretion, insulin action (sensitivity) or both. It is characterized by hyperglycaemia.

Compliance - A patient's adherence to a recommended course of treatment.

Hyperglycaemia - Condition characterized by excessively high levels of glucose in the blood, and occurs when the body does not have enough insulin or cannot use the insulin it does have to turn glucose into energy.

Hypoglycaemia - The condition called hypoglycaemia is literally translated as low blood sugar. Hypoglycaemia occurs when blood sugar (or blood glucose) concentrations fall below a level necessary to properly support the body's need for energy and stability throughout its cells.

Patient counselling- Patient counselling is defined as providing medication information orally or in written form to the patients or their representatives on directions of use, advice on side effects, precautions, storage, diet and life style modifications.

Glycated haemoglobin - is a form of haemoglobin that is measured primarily to identify the average plasma glucose concentration over prolonged periods of time. It is formed in a non-enzymatic glycation pathway by haemoglobin's exposure to plasma glucose.

Gestational diabetes - is a condition in which women without previously diagnosed diabetes exhibit high blood glucose levels during pregnancy (especially during their third trimester).

Mental illness- refers to a wide range of mental health conditions — disorders that affect a person's mood, thinking and behavior.

ABSTRACT

Objectives

A patient's knowledge of their medication is not only vital in the prevention of drug related problems, but is also a major factor that influences treatment success. This study aimed at evaluating patients' knowledge of their anti-diabetic medication in relation to drug name, duration of therapy, dose, side effects, administration, storage, purpose of medication and to identify the sources of patients anti-diabetic medication information. The study further determined whether there was an association between the patients' age, gender, educational level and sources of information with patients' knowledge of their anti-diabetic medication at the University Teaching Hospital (UTH).

Materials and methods

A cross-sectional study involving the interview of 377 diabetic patients was conducted, in the in patients and out patients departments of Medicine, Obstetrics/Gynaecology and Surgery at the University Teaching Hospital. All patients on anti-diabetic medication who met the inclusion criteria of the study made up the study population. Data analysis was done using SPSS 16 and association of anti-diabetic medication knowledge with age, educational level, gender, sources of medication information was done by using Pearson chi square test.

Results

Out of the 377 patients 52.2%, 20.7% and 27.1% had good, average and poor individual knowledge of their anti-diabetic medication respectively. Of the 377 patients 80.6% and 63.4% knew the name(s) and dose of their diabetes medication respectively. More than half (81.7%) of the study patients knew the purpose of their anti diabetic medication. About half 51.5% were not aware of the duration of therapy for diabetes. Of the 377 patients 75.9%, 28.9% and 8.5% did not know the side effects, administration and storage of their medication respectively. A significant association between level of education and patients' knowledge was observed ($p < 0.001$). There was no association between patients' knowledge of their anti-diabetic medication with sources of medication information, age and gender.

Conclusion

This study found that 52.2% of the patients had good individual knowledge of their medication with the rest having average (20.7%) or poor (27.1%) knowledge, the study highlighted that most patients exhibited knowledge deficit regarding the duration of treatment and side effects of their anti-diabetic medicines. Majority of the patients (69.2%) obtained their anti-diabetic medication information from medical doctors, 4.8% did not receive any information at all about their medication. We did not find any association of patients' knowledge of their anti-diabetic medication with the sources of information, age and gender. However, a significant association between patients' knowledge of their anti-diabetic medication with educational level was observed.

CHAPTER 1

1.0 INTRODUCTION AND BACKGROUND

The worldwide prevalence of diabetes mellitus (DM) has risen dramatically over the past two decades. It has been projected that the number of individuals with DM will continue to increase in the near future (WHO, 2013). Published information on the global burden of diabetes, 1995-2025 suggests that, the number of adults with diabetes in the world is estimated to rise from 135 million in 1995 to 300 million in the year 2025 (King et al, 1995). According to a World Health Organisation (WHO) report 347 million people worldwide have diabetes (WHO, 2013). The WHO projects that diabetes will be the seventh leading cause of death in 2030 (WHO, 2013).

Country and regional data on diabetes in the WHO African region estimated that by 2000 approximately 7,020,000 people were said to be suffering from diabetes and this is expected to rise to 18,234,000 by 2030 (WHO, 2013).

According to a WHO report on country and regional data on diabetes, Zambia had 70000 cases of diabetes in 2000 and this is expected to rise to 186000 by 2030 (WHO, 2008).

Diabetes mellitus is a group of metabolic disorders of fat, carbohydrates and protein metabolism that results from defects in insulin secretion, insulin action (sensitivity) or both. It is characterized by hyperglycaemia. The chronic hyperglycaemia of diabetes is associated with long term damage, dysfunction and failure of different organs especially, the eyes, kidneys, nerves, heart and blood vessels (Dipiro et al, 2008).

Diabetes mellitus can be classified into type 1, which accounts for only 5–10% of those with diabetes and type 2 which accounts for about ~90–95% of those with diabetes (Diabetes care, 2004).

Generally, the long term injurious effects of hyperglycaemia are separated into macro vascular complications which include coronary artery disease, peripheral artery disease, stroke and micro vascular complications which include diabetic nephropathy, neuropathy and retinopathy (Kumar & Clark, 2009).

The primary goals of DM management are to reduce the risk of micro and macro vascular disease complications, ameliorate symptoms, reduce mortality, and improve quality of life.

The United Kingdom Prospective Diabetes Study (UKPDS) on intensive blood-glucose control with sulphonylureas or insulin compared with conventional treatment and risk of complications in patients with type 2 DM have confirmed that the complications of diabetes can be reduced by proper control of blood glucose (UKPDS33, 1998).

Frank et al (1986) defined patient medication knowledge as awareness of the drug name, purpose, administration schedule and side effects. Patient's knowledge of medication use is not only of vital importance in the prevention of drug related problems, but a major factor that influences treatment success and hence if provided, it offers an opportunity for one to attain a full health potential (Ssemaluulu & Adome, 2006). Diabetes education is the cornerstone of diabetes management because diabetes requires day to day knowledge of nutrition, exercise, monitoring and medication (Bonsignore, 2013). Nader et al. (2008) undertook a questionnaire based survey of 671 patients to determine the patients' sources of drug information in Iran. The study revealed that 188 patients (28%) reported they did not receive any information from their pharmacists or physicians.

Jose et al (2007) found out that among emergency admissions in a tertiary health care institute in India, 33% were due to non-compliance of which DM was among the common diseases that led to emergency admissions, of which lack of knowledge of prescribed medication was the commonest cause of non-compliance. Faira et al (2007) stated that health providers rarely assess patient knowledge as part of their clinical routine.

The Omnibus Budget Reconciliation Act of 1990 (OBRA '90) was instituted in the United States of America and mandates the offer to counsel patients about their prescriptions. The following items should be addressed: 1. Name of drug 2. Intended use and expected action 3. Route, dosage form, dosage, and administration schedule 4. Common side effects that may be encountered, including their avoidance and the action required if they occur 5. Techniques for self-monitoring of drug therapy 6. Proper storage 7. Potential drug-drug or drug-food interactions or other therapeutic contraindications 8. Prescription refill information 9. Action to be taken in the event of a missed dose (www.thomas.loc.gov.com).

This study set out to evaluate the level of patients' knowledge of their anti-diabetic medication with respect to drug name, dose, side effects, administration, purpose of therapy, duration of therapy and storage and to identify sources of anti-diabetic medication information. The study further determined existence of an association between the

patients' age, gender, educational level and sources of information with patients' knowledge of their anti-diabetic medication at the University Teaching Hospital (UTH). In as much as evaluation of the level of patients' knowledge of their diabetes medication is important, insight on where they obtain this information is extremely important.

1.1 STATEMENT OF THE PROBLEM

Currently, there is no program in place to assess patients' knowledge of their anti-diabetic medication at the University Teaching Hospital. Through the patient assessment process, the pharmacist can identify, resolve and prevent drug-related problems that adversely affect the care of the diabetic patient. There is also no diabetes educational program in place at UTH. Diabetes education involves education on the basic requirements of diabetes treatment: nutrition, medication, self-monitoring, and self-management. Despite all the advances in diabetes treatment, education remains the cornerstone of diabetes management (Bayles & Martin, 1998)

It is important to get feedback from patients on what they understand about their therapy in promoting rational drug use. Everyone with diabetes needs to be provided with information on medicines as they need to effectively manage their condition, because 95% of diabetes management is self care (Diabetes information jigsaw survey, 2006).

Jing et al (2008) in a review of 102 articles in a study on factors affecting compliance: a review from patients' perspective, established that lack of patient knowledge on the disease and medication leads to non-compliance and that patient's knowledge about their disease and treatment is not always adequate. Some patients lack understanding of the role their therapies play in the treatment, while others lack knowledge about the disease and consequences of poor compliance or lack understanding of the value of clinic visits. Some patients thought the need for medication was intermittent, so they stopped taking the drug to see whether medication was still needed.

In an un-published study on adherence to diabetes medication at UTH, Ilunga (2010) found that 23.3% of the 90 sampled patients did not adhere to their treatment regimen with 1 in every 4 respondents having had suboptimal adherence.

An un-published study done by Banda (2012), on common complications associated with diabetes mellitus in the diabetic clinic at UTH, showed that 19.2% of diabetic patients had

hypoglycemia, and 9.2% diabetic ketoacidosis. Peripheral neuropathy accounted for 40%, diabetic foot complications 13.8% and 2.5% coronary artery disease.

1.2 RESEARCH QUESTION

What is the level of patients' knowledge of anti-diabetic medication amongst diabetic patients attending the Obstetrics/Gynaecology, Internal Medicine, Surgery departments of the University Teaching Hospital?

1.3 JUSTIFICATION OF THE STUDY

An evaluation of patients' knowledge of medicines and its use would help screen for problems in drug therapy and improve therapeutic outcomes (Ssemaluulu & Adome, 2006). It is undisputed that the patients' motivation and willingness to take part in therapy are crucial foundations for good self-therapy and the resulting optimal blood glucose regulation (Diabetes Care, 2002).

The overall aim of this study was to assess patients' knowledge with respect to drug therapies used for the control of DM and identify patients' sources of anti-diabetic medication information. The study further determined associations between this knowledge with sources of anti-diabetic medication information, age, gender and educational status. Faria et al (2007) holds that this knowledge may be directly correlated with patients' understanding of the importance and need of medication. Understanding the knowledge of the medications prescribed may lead to proper medication use, and therefore optimising DM control.

Recommendations as a result of this study's findings will be made to the Ministry of Health (MoH) and the Diabetes Association of Zambia (DAZ) so as to improve the management of diabetic patients.

1.4 GENERAL OBJECTIVE

To determine patients' level of knowledge of their anti-diabetic medication and identify the patients' sources of anti-diabetic medication information among diabetic patients attending the University Teaching Hospital.

1.5 SPECIFIC OBJECTIVES

1. To assess anti-diabetic medication knowledge through an interviewer administered questionnaire amongst diabetic patients in Obstetrics/Gynaecology, Internal Medicine and Surgery departments at the University Teaching Hospital.
2. To identify the sources of anti-diabetic medication information amongst diabetic patients in Obstetrics/Gynaecology, Internal Medicine and Surgery departments at the University Teaching Hospital.
3. To determine whether there is an association between patients' level of knowledge and the sources of medicines information age, gender and educational status.

CHAPTER 2

2.0 LITERATURE REVIEW

Review of literature evaluated and analysed studies that were conducted globally, regionally on patients' knowledge of their anti-diabetic medication. The scientific literature was reviewed to increase the understanding of the health problem related to patients' knowledge of their anti-diabetic medication. The review focused on the following specific objectives:

- a) To assess anti-diabetic medication knowledge through an interviewer administered questionnaire amongst diabetic patients in Obstetrics/Gynaecology, Internal Medicine and Surgery departments at the University Teaching Hospital.
- b) To identify the patients' sources of anti-diabetic medication information amongst diabetic patients in Obstetrics/Gynaecology, Internal Medicine and Surgery departments at the University Teaching Hospital.

The first section of this chapter provides an overview of anti-diabetic medication and the epidemiology of diabetes. The second section reviews literature on patients' knowledge of their anti-diabetic medication. The third section looks at patients' sources of anti-diabetic medication information and lastly the fourth section provides a summary of the literature review.

2.1 Epidemiology of diabetes mellitus and an overview of anti-diabetic medication

A report on the global burden of diabetes by international diabetes federation, 2012 states that 366 million people were reported to have diabetes in 2011 and by 2030 this will have risen to 552 million (Unwin et al, 2012).

Anti-diabetic medications are not designed to cure diabetes, but help diabetic patients to keep their condition under control and lower the risk of diabetes complications. The following are the different classes of anti-diabetic drugs currently available; 1) Insulin 2) Biguanides 3) Alpha glucosidase inhibitors 4) Sulphonylureas 5) Thiazolidinediones 6) Meglitinides

2.2 Patients' knowledge of their anti-diabetic medication

Patients may decide whether and when to take the medicines, how to take the medicines, whether to continue if side effects occur or symptoms disappear, and what to do with the medicines that remain. Failed therapies often occur as a result of many factors including medication related problems such as: lack of patient understanding of the therapy and side-effects, (Ssemaluulu & Adome, 2006).

Brown et al (2000) in a study done in the UK found that out of 261 patients only 15% knew the correct mechanism of action of their medication and 62% took tablets correctly in relation to food. Moreover only 10% of those taking a sulphonylurea knew it may cause hypoglycaemia and 20% of those taking metformin were aware of its gastrointestinal side-effects. Twenty percent forgot to take their tablets at least once a week and 5% omitted tablets because of hypoglycaemia. It was concluded that patients' knowledge of oral hypoglycaemic agents was poor.

Vivian and Leung (2003) established that during treatment some patients in the study group adjusted the dosage of their medications according to the severity of their hyperglycaemic symptoms. Some patients did not even know the purpose of the drugs. It was concluded that enhancing patients' medication knowledge could improve compliance to anti-diabetic medication.

A study was done to assess the five factors more commonly related to knowledge and use of medications. It was established that taking the wrong dose of medications at the wrong time was the most prevalent factor related to knowledge and the use of medication (Miller, 1997). It is clear from the findings of this study that patients who had sub-optimal knowledge of their medication took the wrong dose of medication at the wrong time.

A study involving 55 patients conducted in Sao Paulo state in Brazil on patients knowledge regarding medication therapy to treat diabetes: a challenge for health care services, established the following: regarding dose, 39.1% of the participants mentioned the dose of the medications correctly, 30.4% reported it partially correct and 26.1% incorrectly. As for time of medication intake, 47.8% referred taking the medication at the right time; 28.3% at partially correct times and only 19.6% at incorrect times. As for the number of pills taken, 45.7% reported correctly, 10.9% partially correct and 17.4% incorrectly. As for the number of times they took medications, 54.3% answered correctly;

23.9% partially correct and 4.3% incorrectly. 56.5% of participants presented with knowledge deficit on the medication to control diabetes mellitus. Diabetic patients are often sub optimally aware about their disease and its treatment, (Faira et al, 2007).

Another study was done in Greece at the General Hospital of Korinthos titled 'Diabetic patients are often sub optimally aware about their disease and its treatment', the following were the findings, 56.8% of the whole population was taking their medication in a correct way, 57 patients (48.3%) were aware of the brand names of their anti-diabetic medication, 105 (88,2%) did not know their way of action, while 72 patients (60,5%) did not know the possible side effects (Kyriazis et al, 2013).

A study conducted in Nigeria by Okoro and Ngong (2012) on the evaluation of patients anti-diabetic medication counselling provided by pharmacists in a tertiary health care setting revealed that 43.1% did not know the name of the anti-diabetic medications they were taking, 51.4% did not know the duration of therapy and 69.4% did not know the side effects. In the study 80.6% missed taking their medications and 75.9% took their medication as soon as they remembered and took the dose when it was almost time for the next dose. The sample size in the study was 72. This study showed a low level of counselling of patients on their anti-diabetic medication by pharmacists in the study area (Okoro & Ngong, 2012).

Results of a study on patients' knowledge of medication use as an equity issue in health care in Uganda showed that patients had an inadequate knowledge of medication use with 59.02% of the 519 sampled patients 'not knowing what their conditions were, and 81.79% not knowing the right dosing schedule (Ssemaluulu & Adome, 2006).

Ramesh et al (2011) conducted a study in India, on diabetic knowledge of rural community and drug utilization pattern in a tertiary care hospital. From the 300 sampled patients in the study 21% did not know the storage conditions of insulin.

McPherson et al (2007) concluded that patients with a greater understanding and knowledge of their anti-diabetic medication demonstrated better glycaemic control. The sample size of the study was 44. There was strong association between knowledge and blood glucose control. Glycosylated haemoglobin was one half lower with each one unit increase in knowledge score among men and among women glycosylated haemoglobin was 1.6 units lower for each one unit increase in knowledge.

2.3 Patients' sources of anti-diabetic medication information

Equity in health does not stop at the availability of essential drugs but includes the provision of adequate information to patients for the proper use of those drugs in order to achieve a full health potential. Equity in health care provision not only relates to the equity in access to health care, but also to the provision of medication-use related information, enabling patients to make informed decisions irrespective of their social status, financial standing or educational background. Provision of equitable health care enhances patients' well-being, quick recovery and reduces mortality rates of any disease condition (Ssemaluulu & Adome, 2006). Self-management educational programs that emphasise individualised diabetes care should be provided to the patients to address the major components of diabetes management such as dietary therapy, exercise and drug treatment.

The Diabetes information jigsaw survey (2006) found that 1 in 5 people with diabetes in the United Kingdom thought it was not very important to take their prescription and that only 17% of people with diabetes received information about their diabetes treatment every time they are given a prescription and 8% received no information at all from their healthcare professionals. The survey also established that 60% of people did not understand as much as they would like about their anti-diabetic medications.

Okoro and Ngong (2012) in a study done to evaluate patients anti-diabetic counselling provided by pharmacists in a tertiary health care setting in Nigeria established that out of a sample size of 72, 23(31.9%) of the participants did not receive medication information. Out of 49(68.1%) that received counselling 10(13.9%), 24(33.3%) and 15(20.8%) were counselled by physicians, pharmacists and sales personnel respectively.

Brown et al, 2000 in a study to assess knowledge about oral hypoglycaemic agents amongst patients with diabetes and non-specialist healthcare professionals found out that out of 261 patients only 35% of patients recalled receiving advice about their medication with only 1% receiving written advice.

Brown et al (2000) and the Diabetes information jigsaw survey 2006, established that some patients do not receive information about their medication. It was found that 83% of respondents in the diabetes information jigsaw survey did not receive any information at all about their medication as compared to 65% in the study by Brown et al (2000). Lack of medication information by patients may lead to non-compliance. Non-compliance will lead

to uncontrolled blood glucose. In the two studies it can be seen that patients may not receive medication information.

2.4 Summary of Literature Review

The reviewed literature suggests that patients' knowledge of their anti-diabetic medication may be sub-optimal and this may lead to irrational drug use which can increase the risk of micro-vascular (diabetic nephropathy, neuropathy and retinopathy) and macro-vascular (coronary artery disease, peripheral artery disease and stroke) complications of DM. Most patients in the studies reviewed demonstrated knowledge deficit in regard to side effects, dose, purpose, duration of action of the medication.

Studies done by McPherson et al (2007) and Vivian and Leung (2003), observed that when patients' knowledge of their anti diabetic medication is inadequate compliance to treatment regimen may be impaired.

It can also be observed in the reviewed literature that some patients do not receive information from their health care providers concerning their medication. This can be observed in the study stated in the literature done by Okoro and Ngong (2012) where 31.9% did not receive medication information. As seen in the Diabetes Jigsaw Survey done in the United Kingdom 60% of the patients do not understand as much as they would like about their medication.

It is clear from the reviewed literature none of the studies determined whether there was association between diabetic patients' knowledge of their anti-diabetic medication and different categories of sources of information. This study evaluated the level of patients' knowledge of their anti-diabetic medication in terms of drug name, dose, duration of therapy, purpose, side effects, administration, and storage. The study also determined associations between patients' knowledge and sources of anti-diabetic information and patients' demographics (age, gender, educational level) respectively.

CHAPTER 3

3.0 METHODOLOGY

The purpose of this chapter is to define the methodology which was used in the study and explain the research design that was utilized within the methodology. This chapter will include the following: study design, study setting, data source, study population, inclusion/exclusion criteria, sample size/sampling method, variables, data collection/data collection tools and data consolidation/analysis/interpretation. The research question to be answered was: What is the level of knowledge of anti-diabetic medication amongst diabetic patients attending the Obstetrics/Gynaecology, Internal Medicine, Surgery departments of the University Teaching Hospital?

3.1 STUDY DESIGN

The study was a cross-sectional study.

3.2 STUDY SETTING

The study was conducted at the outpatient's clinic and in-patient wards of the departments of Internal Medicine, Obstetrics/Gynaecology and Surgery at UTH. The University Teaching Hospital is a tertiary referral hospital which provides high quality hospital services for the population of Zambia.

3.3 STUDY POPULATION

All patients on anti- diabetes medication attending the out-patient clinic and in-patients in the departments of Internal Medicine, Obstetrics/Gynaecology, Surgery at the UTH made up the study population.

3.4 INCLUSION CRITERIA

- 1- Patient with type 1 or type 2 diabetes mellitus.
- 2- Age \geq 18 years and \leq 75 years
- 3 – Patients who were on anti-diabetic medication for more than 6 months

3.5 EXCLUSION CRITERIA

1- Patients who had gestational diabetes.

2-Patients who had severe medical illness including physical or mental handicaps.

3.6 SAMPLE SIZE DETERMINATION

The following formula was used to calculate the sample size;

$$n = \frac{Z^2 P(100-P)}{d^2}$$

Where; Z = 1.96, factor from normal distribution

P = Expected period prevalence which is 56.5% (Faira et al, 2007:patients' who presented with deficit knowledge of their anti-diabetic medication)

d = Absolute sampling error

n = Sample size

Therefore, $n = \frac{(1.96)^2 \times 56.5(100-56.5)}{5^2}$

$$5^2$$

$$= 377$$

3.7 SAMPLING METHOD

A systematic sampling technique was used to sample diabetic patients attending the outpatient clinic and in patients departments of Internal Medicine, Obstetrics/Gynaecology, and Surgery throughout the period of the study. An estimated 8346 diabetic patients in the year 2012 were seen at the inpatient wards and outpatient department at UTH. This means that an estimated 2086 patients were seen in a period of three months. To achieve the desired sample size of 377 every 5th patient with diabetes who met the inclusion criteria was selected each day from Monday to Friday of the whole study period of six months.

3.8 VARIABLES

TABLE 1 VARIABLES OF THE STUDY

Specific objective	Variable	Scale of measurement	Statistical method
1.To assess patients' knowledge of the name, purpose, side effects, duration, storage and administration of diabetes medication	dependent variable- patients' knowledge of anti-diabetes medication	Categorical	Frequency, histogram, pie chart, bar chart.
2.Source of diabetes medication information	Independent variable	Categorical	Frequency, pie chart, bar chart, histogram
3.association of diabetes medication knowledge with age, educational level, Gender, sources of medication information	Independent variable- Age:18-28, 29-39, 40-50, 51-61, 61-75 Educational level: uneducated, primary, secondary, tertiary. gender: male or female	Categorical	Frequency, pie chart, bar chart, histogram

3.9 DATA COLLECTION TOOLS AND TECHNIQUES

Before the commencement of data collection, participants were informed about the objective of the study. The participants were informed that participation in the study was voluntary. Informed consent from the participants was obtained before collection of data. Confidentiality was assured by using codes rather than names. An interviewer administered questionnaire (Appendix 10.2) was used for data collection. Two research assistants were engaged in the collection of data. A questionnaire was formulated from a combination of two standard questionnaires used in similar studies: the medication knowledge assessment tool designed by American society on aging and the American society of consultant pharmacists and the Diabetes knowledge test by Fitzgerald from Michigan diabetes research and training centre. It was divided into two parts. Part A was

aimed at obtaining the demographic profile of the participants including name, age, gender, address, education, marital status and employment.

Part B was designed at obtaining information on the diabetes medication knowledge and a score of 1 will be given to each correct answer. A scale of 0-7 was used, a higher score 5-7 equated to a good knowledge and a lower score 0-3 equated to poor knowledge, a score of 4 equated to average knowledge.

For the purpose of this study, medication knowledge consisted of seven specific items of information:

- ability to name (brand or generic name) all medicines being used by the participant
- purpose of medication
- the dose to take
- when the medicine should be taken with regards to meals (in addition site of administration with regards to insulin)
- potential side effects
- how to store the medicine
- duration of treatment

Indicators for knowledge of side effects, administration and storage were as follows:

1. At least one side effect or common side effect of the drug should be named, sulphonylureas

- hypoglycaemia, weight gain, Gastrointestinal (GiT) effects.
- Metformin- (GiT) effects, insulin- allergic reactions, hypoglycaemia, blurred vision.
- Acarbose- flatulence, diarrhoea.
- Meglitinides- hypoglycaemia, weight gain.
- Thiazolidinediones- water retention.

2. Storage:

- Unopened vials insulin- stored at 2 – 8 ° C, vials in use may be kept at room temp (max 25°C) for one month (Novo Nordisk, 2011).
- Oral anti-diabetic medicine: keep in dry place, aware from light and at room temperature (below 25°C)

3. Administration:

- Insulin- 30 min before meals, subcutaneously in the abdominal muscle or the deltoid muscle or thigh.
- Metformin- with meals,
- Glibenclamide- 15 to 30 minutes before meals
- Gliclazide- take with meals
- Glipizide- 30 mins before meals
- Glimepride- with food
- Meglitinides- 0- 30 minutes before meals
- Acarbose- just before meals
- Thiazolidinediones- with or without meals.

Individual knowledge of anti-diabetic medication was scored as follows:

Table 2: Knowledge of anti-diabetic medication scoring table

Name of medication	1
Purpose of medication	1
Side effects	1
Duration of therapy	1
Storage of medication	1
Administration of medication	1
Dose	1

Additionally, the medical prescription and patients files were verified to compare data provided by the participant with the written data by the health practitioner, which enabled the investigator to identify if the patient really had knowledge on the items investigated

The study duration was six months and data collection was done in a period of three months.

3.10 DATA ANALYSIS

The data collected from the participants was pre coded to ensure easy entry and analysis of data using SPSS version 16. Data was collected from participant via face to face interview by the researcher and two assistants.

Data analysis was based on the specific objectives:

1. To assess anti-diabetic medication knowledge through an interviewer administered questionnaire amongst diabetic patients in Obstetrics/Gynaecology, Internal Medicine and Surgery departments at the University Teaching Hospital.
2. To identify the sources of anti-diabetic medication information amongst diabetic patients in Obstetrics/Gynaecology, Internal Medicine and Surgery departments at the University Teaching Hospital.
3. To determine whether there is association between patients' knowledge of their anti-diabetic medication and the sources of medication information.

The data was presented as follows:

- Patients' knowledge of anti-diabetic medication (categorical variable)- frequency, percentages, bar charts.
- Sources of medication information (categorical variable)- frequency, percentage.
- Age (categorical variable) - frequency, percentages.
- Gender (categorical variable) - frequency, percentage.
- Education level (categorical) - frequency, percentage.

The association between patients' knowledge of their anti-diabetic medication and sources of medication information, age, sex and educational level were executed using Pearson Chi-square tests. A $p < 0.05$ value was considered statistically significant.

3.11 ETHICAL CONSIDERATION

Permission and approval for the research was sought from the University of Zambia Biomedical Research Ethics Committee (UNZA - BREC).The study participants were informed verbally and in writing about the purpose of the proposed study.

Informed consent was obtained from the participants and permission was obtained from the University Teaching Hospital Management to carry out the study. The data collected did not include any material which would infringe on the confidentiality and dignity of the participants. Confidentiality was assured as no names were captured on the data collection tool only initials and codes were used.

CHAPTER 4

4.0 RESULTS

A total of 377 patients who met the inclusion criteria were interviewed in the out-patient clinic and in-patients departments of Internal Medicine, Obstetrics/Gynaecology and Surgery at the UTH. Results from all the 377 patients were included in the data analysis. The age group of the participants ranged from 18-75 years with most patients (27.3%) between the ages of 51-61 years. Sex distribution consisted of 59.2% (223) female and 40.8% (154) male. In this study 40.8% of the participants had attained secondary school education.

4.1 Individual knowledge of anti-diabetic medication score

Slightly over half (52.2%) of the 377 participants (Table 3) have good individual knowledge of their anti-diabetic medication with the rest having average and poor knowledge.

Table 3-patients' individual knowledge of anti-diabetic medication score

Knowledge of diabetes medication	frequency	percent
Good knowledge	197	52.2
Average knowledge	78	20.7
Poor knowledge	102	27.1

4.2 Results for patients knowledge of name(s) of their anti-diabetic medication

Patients who knew the name(s) of their anti-diabetic medicines were found to be 80.6% (Figure 1) of the 377 sampled diabetic patients in our study.

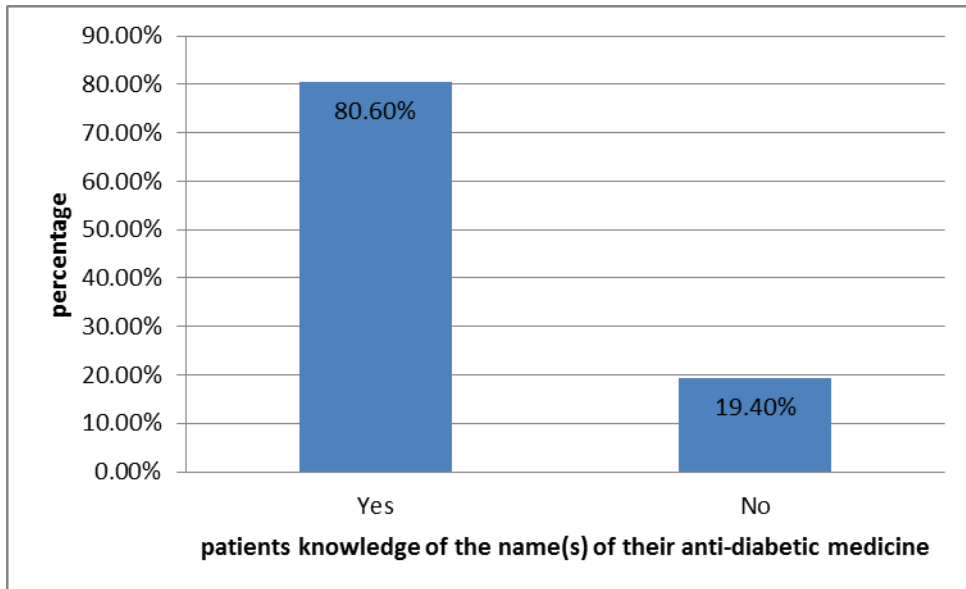


Figure 1 shows patients' knowledge of name(s) of their anti-diabetic medication

4.3. Results for patients knowledge of purpose of their anti-diabetic medication

More than half, 81.7% of the 377 participants in the current study knew the purpose of their anti-diabetic medication (figure 2).

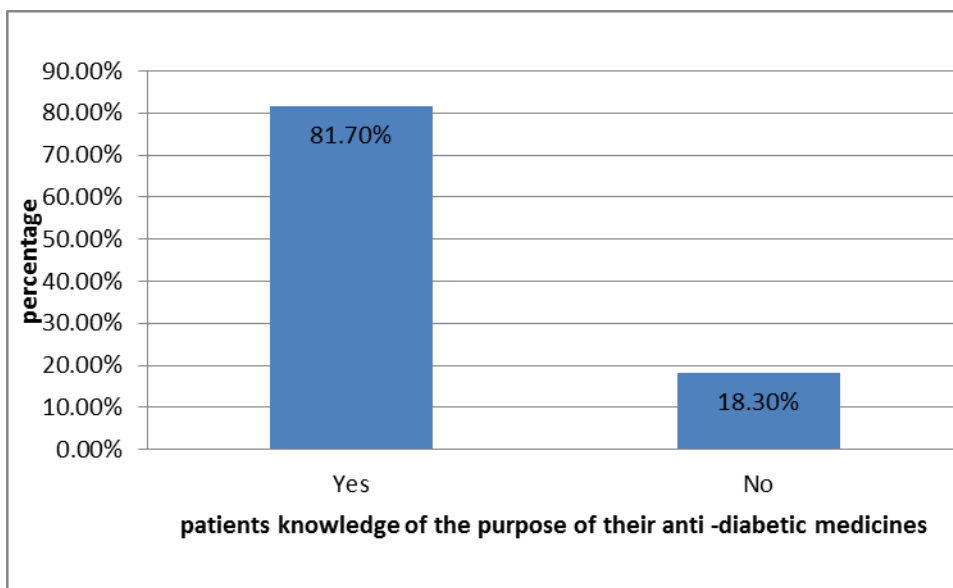
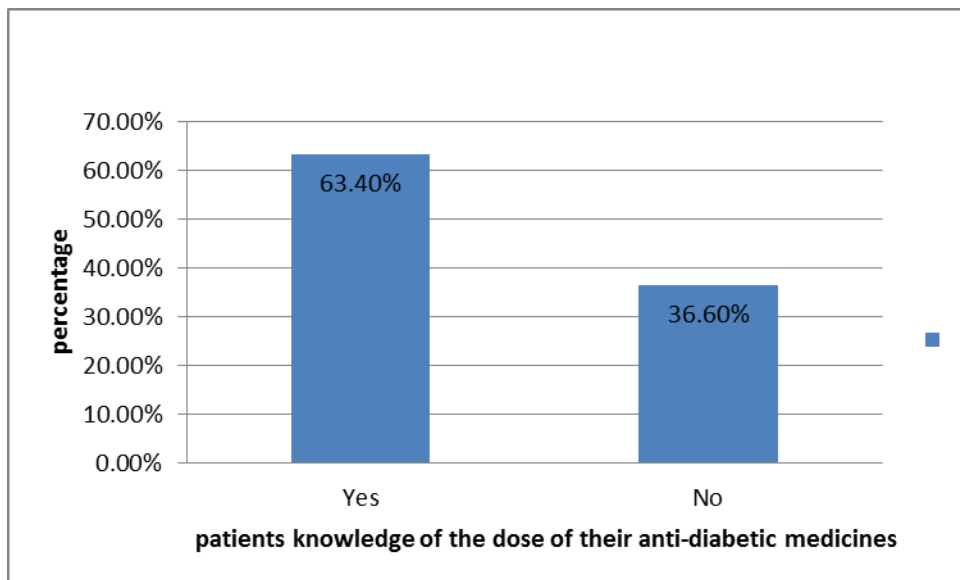


Figure 2-patients' knowledge of purpose of anti-diabetic medication

4.4. Results for patients knowledge of dose of their anti-diabetes medication

When asked if they knew the dose of their anti diabetic medication 63.4% (239 participants) were able to give the actual dose of the medicine(s) they were taking (Figure



3). Figure 3-patients' knowledge of dose of anti-diabetic medication

4.5 Results for Patients' knowledge of duration of therapy of diabetes

The results of this study show that more than half, 51.5% of the 377 participants were not aware of the duration of therapy for diabetes (Table 4).

Table 4- patients' knowledge of duration of therapy for diabetes.

Knowledge of the duration of therapy for diabetes	frequency	percent
Yes	183	48.5%
No	194	51.5%

4.6 Results patients' knowledge of at least one side effect or common side effect of their anti-diabetic medication.

In the current study more than half (75.9%) of the 377 sampled participants could not give at least one side effect or common side effect of their anti-diabetic medication (Table 5).

Table 5-patients' knowledge of at least one side effect or common side effects of anti-diabetic medication.

Able to name at least one side effect or common effect of their anti-diabetic medicine	frequency	percent
Yes	91	24.1%
No	286	75.9%

4.7 Results for patients' knowledge of storage of their anti-diabetic medication.

Of the 377 patients in the current study 91.5% (345 diabetic patients) knew the storage conditions of their anti- diabetic medicines while 8.5% (32 diabetic patients) did not know the storage conditions of their medicines.

4.8 Results for patients knowledge of administration of their anti-diabetic medication

In this study it was observed that from the 377 sampled diabetic patients 71.1% (268) administered their medication correctly, while those who did not administer their medication correctly were 28.9% (109) this is with regards to food (and site and mode of administration with regards to insulin).

4.9 Results for sources of patients anti-diabetic medication information

Eighteen (4.8%) of the 377 sampled participants did not receive any information about their anti-diabetic medication. Of the 95.2% that received medication information 261(69.2%) was provided by medical doctors, 64(17%) hospital pharmacists, 30(8%) nurses, 3(0.8%) retail pharmacists and 1(0.3%) internet(Table 6).

Table 6-sources of anti-diabetic medication information.

Source of anti-diabetic medication information	Frequency	Percent
Hospital pharmacists	64	17
Retail Pharmacists	3	0.8
Medical Doctors	261	69.2
Nurses	30	8
Internet	1	4.8
Never been provided with information	18	4.8

4.10 Results for association of patients' knowledge of their anti-diabetic medication with age, gender, educational status and sources of medication information.

There was no significant association between sources of medication information, age and gender with patients' knowledge of their anti-diabetic medication. Results for chi square test for association of patients knowledge of their medication with sources of anti diabetes medication information was $p= 0.93$, association of age and patients knowledge of their anti- diabetic drugs was $p=0.259$ and association of patients knowledge of their anti-diabetic medication with gender $p=0.327$.

However, a significant association between level of education and patients' knowledge was observed, ($p<0.001$).

4.11 Results for type of drug therapy used for DM

The results for the type of drug therapy used for DM control was as follows: 46.5%(175) were using insulin, 22.3% (84) used a combination of metformin and glibenclamide, 15.6% (59) used metformin, 12.7% (48) glibenclamide, 1.6%(6) metformin and insulin , 0.8% (3) were on glibenclamide and insulin, 0.3% (1) glipizide and 0.3%(1) gliclazide.

4.12 Results for the period the patient has been on anti-diabetic medication in months

When asked the period in months the patients had been on anti- diabetic medication the following were the results: 63.7% (240) had been on therapy for more than 24 months, 26.3% (99) for 6-12 months and 10.1% (38) for 13-24 months.

CHAPTER 5

5.0 DISCUSSION

This study showed that slightly half 52.2% (197) of diabetic patients had good individual knowledge of their anti-diabetic medication. It was also observed that 20.75% (78) and 27.1% (102) of the participants had average and poor individual knowledge respectively (Table 3). This knowledge comprised of knowledge of drug name, purpose of medication, dose, drug administration, side effects, duration of therapy and storage of anti-diabetic medication. It also showed that majority of the 377 sampled diabetic patients 69.2% (261) received their anti-diabetic medication information from medical doctors, while 17% (64) received their medication information from pharmacists (Table 6), this being in disagreement with a study by Okoro & Ngong (2012) done in Nigeria where, 33.3% (24) patients obtained their medication information from pharmacists and only 13.9% received their medication information from medical doctors. Of the 377 sampled diabetic patients in the current study 4.8% (18) patients reported not to have received any information about their medication, while a study done in the United Kingdom (Brown et al, 2000) established that 261 (35%) of the participants did not receive anti diabetes medication information.

Patients' knowledge of anti-diabetic medication in this study comprised of seven components that is being able to provide the drug name, duration of therapy, at least one side effect or common side effect, drug administration, purpose of medication, storage of medication and dose of prescribed medication. Patients' knowledge of the seven components was assessed individually, concerning knowledge of name of medication it was noted that 80.6% (304) knew the name(s) of the anti-diabetic medication they were taking (Figure 1). This is inconsistent with the findings of Kyriazis et al (2013) in a study done in Greece where 48.3% (57 patients) were aware of the brand names of their anti-diabetic medication. However, it should be noted that the measure of knowledge of anti-diabetic medication in the current study was the ability to either give the generic or trade name of the anti-diabetic medication, while in the study done in Greece by Kyriazis et al (2013) patients were assessed on their knowledge of the trade names of their anti-diabetic medication only.

Majority of the participants 81.7% (308) knew the purpose they are taking the anti-diabetic medication (Figure 2). This is consistent with the findings of Okoro and Ngong in a study done in Nigeria which revealed that 52(72.2%) knew the purpose of their anti-diabetic medication.

More than half of the participants (63.4%) in the current knew the dose of their anti-diabetic medication (Figure 3). In a study done in Sao Paulo, Brazil (Faira et al, 2007) 39.1% of the participants mentioned the dose of the medications correctly, 30.4% reported it partially correct and 26.1% incorrectly.

When asked about the side effects of their anti-diabetic medication, a large number of the participants 286 (75.9%) could not name at least one side effect or common side effect of their anti-diabetic medication (Table 5). This is consistent with the studies done by Okoro and Ngong (2012) and Kyriazis et al (2013), where an average of 64.7% respondents were unaware of the side effects of the medication they were taking, that is 69.4% in the study carried out by Okoro and Ngong (2012) and 60.5% in the study by Kyriazis et al (2013). Patients may sometimes choose to take their medication or not depending on the side effects that they experience.

Slightly above half 51.5% (194) did not know the duration of diabetes therapy (Table 4), this being in agreement with the findings in the study by Okoro and Ngong (2012), where more than half of the participants did not know the duration of treatment. Of the 194 in the current study who did not know the duration of therapy 1.3% (5) stated that the duration of treatment was not more than 6 months.

We found that 8.5% (32) of the 377 sampled diabetic patients did not store their anti-diabetic medication correctly, while in a study done in India (Ramesh et al, 2011), from the 300 sampled patients in the study 21% did not know the storage conditions of insulin. In the current study knowledge of storage of anti-diabetic medication was assessed for both insulin (injectable) and oral anti-diabetic medication drugs, while in the study by Ramesh et al (2011) knowledge of storage of medication was assessed with regards to insulin only. It was noted that 3.2% (12) of the participants on insulin reported to be storing their insulin in a freezer well below 0°C

It was observed that 268 (71.1%) of the patients knew the correct administration of their anti-diabetic medication. This is in agreement with the study done in the United Kingdom (Brown et al, 2000) where 161(62%) of the patients were aware of the administration of their anti-diabetic medication with relation to food. In the current study administration of anti-diabetic medication comprised of knowledge of administration with regards to food for all the anti-diabetic medication and in addition knowledge of site of administration with regards to insulin, while the 62% of the patients that were aware of the administration of their medicines in the study done by Brown et al (2000) were assessed on administration of oral anti-diabetic medicines which does not include insulin.

When the individual patients' knowledge of their anti-diabetic medication comprising of these seven components was assessed in relation with sources of medication information no significant association between sources of medication information and patients' knowledge of their anti diabetes medication was observed, this was established by using Pearson chi square ($p=0.93$). It also demonstrated a lack of significant association of age ($p=0.259$) and gender ($p=0.327$) to the patients knowledge of their anti-diabetic medication as indicated by Pearson Chi square test of association. However, a significant association between level of education and patients' knowledge was observed ($p<0.001$). Knowledge deficit emphasizes the need for diabetes education program which is essential in improving patients' knowledge of their anti-diabetic medication which is one of a key component of diabetes management and improvement of quality of life.

5.1 STUDY LIMITATIONS

The study had the following limitations:

- The study was limited to one site which may not give a true reflection based on study setting and demographics for participants.
- The study did not evaluate the exact medication information provided to the participants by the identified sources of anti diabetes medication in the study.
- The knowledge of mode of action of the anti diabetes medication prescribed which is related to this phenomenon was not included in this study.

CHAPTER 6

6.0 CONCLUSION

This study found 52.2% of the participants having good knowledge of their anti-diabetic medication with the rest having average or poor knowledge, patients presented knowledge deficit particularly regarding the duration of diabetes therapy and side effects of their anti-diabetic medication. Patients' knowledge of the dose, administration, name and purpose of their anti-diabetic medication is still not acceptable in this era of pharmaceutical care. Majority of the patients (69.2%) obtained their anti diabetes information from medical doctors, 4.8% did not receive any information at all about their medication. The current study did not find any association of patients' knowledge of their anti-diabetic medication with the sources of information, age and gender. However, a significant association between patients' knowledge of their anti-diabetic medication with educational level was observed ($p < 0.001$).

6.1 Recommendations

- Pharmacist and other members of the health care team should focus on improving patients' knowledge of their anti-diabetic medication through patient counseling of their anti-diabetic medication and diabetes educational programs.
- Patients educational program for diabetic patients to be established at UTH
- Considerable mass media campaigns aimed at patient education on anti-diabetic medication, through radio programs and newspaper articles.
- Health workers should be trained to increase their communication skills to ensure that patients (who are mostly of low education level) are given appropriate instructions regarding medication use and have actually understood the instructions given.
- Health workers should assess patient knowledge of their anti diabetes medication as part of their clinical routine with the aim to identify, resolve and prevent drug-related problems that adversely affect the care of the diabetic patient

CHAPTER 7

7.0 WORK PLAN

	ACTIVITY	MAR	APRIL	MAY	SEPT - NOV	DEC - JAN
1	Proposal writing					
2	Proposal submission	X				
3	Presentation to Pharmacy Department Presentation to Post Graduate Forum Submission to UNZA BREC		X	X X		
4	Resource mobilization			X		
5	Data collection				X	
6	Data Analysis					X
7	Report Writing					X
8	Report Submission					X

CHAPTER 8

8.0 BUDGET

ITEM	DESCRIPTION	QTY	UNIT PRICE (K)	TOTAL(K)
1	HP Laserjet Printer	1	2,000.00	2,000.00
2	Reams of paper	5	50.00	250.00
3	Typing Proposal	2	75.00	150.00
4	Typing Report	2	100.00	200.00
5	Proposals binding	4	40.00	160.00
6	Reports binding	4	50.00	200.00
7	Ball Pens	5	4.00	20.00
8	Binding Reports	4	50.00	200.00
9	Data Spreadsheet printing	6x 350	12.00	4,200.00
10	Data collection Assistants	2 X3	500.00	3,000.00
11	USB, CD's			600.00
12	Internet Use	6	200.00	1,200.00
13	Transport			5,500.00
14	Miscellaneous			2,000.00
	Grand Total			19,680.00

CHAPTER 9

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CHAPTER 10

APPENDICES

Appendix 10.1

CONSENT FORM

PARTICIPANT INFORMATION SHEET (To be kept by the participant)

Research Title: PATIENTS' KNOWLEDGE OF DIABETES MEDICATION AND THEIR SOURCES OF INFORMATION AT THE UNIVERSITY TEACHING HOSPITAL

Dear Participant,

We have invited you to participate in a study designed to assess patients' medication knowledge of their diabetes medication and relate this knowledge to age, gender and educational level and to identify the sources of medication information of patients at UTH. Studies have shown that an evaluation of patients' knowledge of medicine and its use may help screen for problems in therapy and improve therapeutic outcomes. Thus, understanding the knowledge of the use of medications prescribed may lead to its proper use, optimizing DM control.

If you are willing to participate in this study, upon signing of the consent form we will then go ahead and obtain the required information by using an interviewer administered questionnaire.

Confidentiality

Any information obtained will remain absolutely confidential. Your details will be entered on a paper form but only in coded form and your name will not be included. Only your enrolment number will be recorded.

The Study is voluntary.

You do not have to participate in the study if you do not want to, and if you refuse to participate in the study, your care will not be affected in any way. This study has been approved by the Biomedical Research Ethics Committee of the University of Zambia and their contact details and researchers contact details are given below:

Contact details of researcher: Mufaweli Kapawa Mwale

(Master of Clinical Pharmacy Student)

Pharmacy Department, University Teaching Hospital,

P/Bag RW 1X, Ridgeway, Lusaka.

Contact details of Biomedical Research Ethics Committee: The Chairperson, Biomedical Research Ethics Committee, Ridgeway Campus,

P.O. Box 50110, Lusaka.

CONSENT FORM (To be kept by the researcher)

I confirm that I have understood the information I have been given about the study. I agree to participate in the study. I confirm that I am joining the study out of my free will and that I can withdraw at any time without affecting the quality of care available to me.

I understand what will be required of me.

Name:

Signed:

Date:

I confirm that I have explained the information fully and answered questions.

Name of researcher:

Signed:

Date:

Appendix 10.2: Questionnaire

Questionnaire

Fill in the blank spaces and tick the appropriate option.

Part A

- 1 Participants ID:
- 2 Address:
- 3 Age in years: 18-28 (1), 29-39 (2), 40-50 (3), 51-61(4), 62-75(5)
- 4 Sex: Female (1) Male (2)
- 5 Marital status: Married (1) Single (2) Divorced (3) Widowed (4)
- 6 Employment status: Employed (1) Unemployed (2)
 Businessman/woman (3)
- 7 Level of education: Never been to school (1) Primary (2)
 Secondary (3) Tertiary (4)

Part B

- 8 How long have you been on anti-diabetes medication? 6-12 months (1) 13-24 months (2) more than 24 months (3)
- 9 Do you know the names of your drugs? Yes(1) No (2) if yes, name them.
Sulphonyureas
 Glibenclamide, Gliclazide, Glipizide, Glimepride
Biguanides
 Metformin
 Insulin
Alpha glucosidase inhibitor
 Acarbose
Thiazolidinediones
 Pioglitazone, Rosiglitazone
Meglitinides
 Mitiglinide, Repaglinide, Nateglinide
- 10 Were you informed as to where you can get your medication from? yes (1)
 no (2)
- 11 Where do you get your medication from?
 Hospital Pharmacy (1) , Retail Pharmacy (2) local clinic (3)
- 12 Do you know why you are taking the drug/drugs? Yes (1) No (2) if yes explain.

To prevent hyperglycaemia/ control the blood glucose

To prevent complications associated with diabetes

Other.....

13 Has any medical practitioner spoken to you as to why you are taking the anti diabetes medication? yes (1), no (2)

14 Do you know the dose of the medication? Yes (1) , (No.(2) If yes, state dose.

15 How many times in a day do you take your medication?[O.D (1), b.d(2), t.i.d (3), q.i.d (4)

16 How long are you supposed to take the medication?[less than 6 months (1) 6- 12 (2) months , 1-2 years (3), lifetime(4) I do not know(5)

17 Can you name at least one side effect or common side effects of the medications? (if yes explain) Yes (1) No (2)

Sulphonylureas

hypoglycaemia, weight gain, Git effects , hypersensitivity reactions , other.....

Biguanides- metformin

Git effects, decreased appetite, cough, muscle pain, lactic acidosis

Alpha glucosidase inhibitor –acarbose

flatulence, diarrhoea, other.....

Meglitinides

hyperglycaemia, weight gain other.....

thiazolidinediones

water retension, heart failure, weight gain , muscle pain, other.....

insulin

hypogylcaemia, blurred vision, hypersensitivity reactions, other.....

18 Do you know how to administer the medication? (if yes explain) Yes (1) No (2)

insulin soluble- 15- 30 min before meals subcutaneously in the stomach, thigh, deltoid muscle.

insulin protaphane -15- 30 min before meals subcutaneously in the stomach, thigh, deltoid muscle or administered at bedtime

metformin- with or immediately after meals,

- sulphonylureas glibenclamide- 15 to 30 minutes before meals, Gliclazide- take with meals, glipizide- 30 mins before meals, glimepride- with food
- meglitinides- with or shortly before meals (0- 30 minutes),
- acarbose- just before meals
- thiazolidinediones - with or without meals.

- 19 Where do you store your medicines? fridge (2-8⁰C) (1) freezer (2) room temp, away from sunlight (3) other.....
- 20 What do you do when you miss a dose? Take as soon as i remember (1), wait for the next dose (2), I don't miss doses (3)
- 21 Who provides you with drug information? hospital pharmacists (1) , retail pharmacist (2) , doctor (3), nurse (4), internet (5) , medical leaflets and magazines (6), I have not been provided with any information (7)