KNOWLEDGE, ATTITUDES AND PRACTICES AMONGST DIABETES MELLITUS PATIENTS ABOUT EXERCISE AT A PRIMARY HEALTH CENTER IN GABORONE BOTSWANA

RESEARCH

by

SHIRLEY BOSHALE KEAKILE

MINI-DISSERTATION

Submitted in partial fulfilment of the requirements for the degree of

MASTER OF PUBLIC HEALTH

In the Faculty of Health Sciences

in the

School of Health Sciences

at the

UNIVERSITY OF LIMPOPO

SUPERVISOR: Prof L Skaal

2015

DECLARATION

A Dedication

To my husband Barobi and the children Pontsho, Tshepo, Kago, Tumelo, and One who supported me throughout my study.

ACKNOWLEDGEMENTS

I want to thank the following persons for their respective contributions to the dissertation:

- A special thanks to my supervisor, Professor Linda Skaal, for her immense guidance, encouragement and support and to the entire staff compliment of the Department of Public Health, School of Health Sciences at the University of Limpopo.
- My husband, Barobi Keakile, for his unconditional love, support and encouragement.
- My five children, Pontsho, Tshepo, Kago, Tumelo and One for their support and understanding.
- My colleagues (health care providers) in Block 6 clinic for their willingness to participate in the study.
- Health managers at Princess Marina hospital for taking time from their busy schedules and for the permission to conduct the study at Block 6 clinic.
- The Ministry of Health in particular the Health Research Unit for giving me the permission to conduct the study.

ABSTRACT

BACKGROUND: Diabetes mellitus (DM) is a chronic lifestyle disease without a cure, and medical emphasis is on management to avoid short and long term diabetes related problems/complications. It is very important for patients to be knowledgeable on the role of diet, physical exercise and self-monitoring. The main objective of this study was to determine the knowledge, attitudes and practices of the diabetes mellitus patients about the benefit of physical activity.

METHODOLOGY: The was a cross sectional descriptive study that assessed the knowledge, attitudes and practices amongst diabetes mellitus patients on physical activity at Block 6 clinic in Gaborone, Botswana. The researcher administered questionnaires with individual patients to investigate how well they understood their condition, their attitude towards exercise and the extent to which they have adopted exercise as part of their diabetes control. A total of 140 diabetic patients participated in the study.

RESULTS: The results of the study revealed that participants had good knowledge of symptoms of diabetes (97.9%), complications that can result when diabetes is not well controlled (76.4%) and urine analysis test (65%). The results also showed that majority of the participants had fair knowledge (62.1%) and only (20.0%) had good knowledge; (89.4%) had positive attitude, and only 10.6% had negative attitude towards physical exercise. The results show that 59.6% had low level of physical activity, 31.3% did not exercise, whilst only 9.1% reported that they exercised adequately.

CONCLUSION

The study reveals a variation between diabetes related health knowledge, attitude, and practice in among those who are affected by diabetes. The knowledge and practice levels were relatively low. Nevertheless majority of the study participants had positive attitude towards Physical Activity.

Keywords: Diabetes, knowledge, attitude, Practice, Physical

Table of Contents

LIST OF TABLES AND FIGURES

DEFINITIONS OF KEY CONCEPTS

Diabetes is a chronic disease that occurs when the pancreas does not produce enough insulin, or when the body cannot effectively use the insulin it produces (WHO, 2008).

Type 2 diabetes mellitus: - where there the body develops resistance to insulin even though enough is produced (world Health Organization [WHO], 2008).

Exercise: - planned activities performed repeatedly to develop or maintain fitness (Sigal,et al. 2006).

Practices are the actual actions performed by the diabetes patients in the form of exercises for the control and management of diabetes mellitus (Sigal et al., 2006). In this study practices means to undertake at least 30 minutes of regular, moderate-intense activity on most days to help prevent type 2 diabetes and its complications, according to (world health Organization [WHO], 2008)

LIST OF ABBRIVAITIONS

DM	Diabetes Mellitus
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome
IGT	Impaired Glucose Tolerance
MoH	Ministry of Health
NCD	Non Communicable Diseases
PA	Pysical Activity
PHC	Primary Health Care
SA	South AfricaT2DM type 2 Diabetes Mellitus
T2DM	Type 2 Diabetes Mellitus
USA	United States of America
WHO	World Health Organization

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Diabetes mellitus(DM) is a chronic lifestyle disease without a cure, and medical emphasis is on management to avoid short and long term diabetes related problems/complications (Chalem, 2008). It is very important for patients to be knowledgeable on the role of diet, physical exercise and self-monitoring. For example engaging in regular aerobic physical activity such as brisk walking at least 30 minutes per day, most days of the week, minimum of 150 minutes/week (Sigal et al., 2007). According to Rippe(2013), physical exercise can decrease insulin resistance and therefore aid in both preventing type 2 diabetes mellitus and managing the disease, other epidemiological studies suggest that physical activity can reduce the risk of non-insulin dependent diabetes by up to 50% while weight reduction is accompanied by a considerable lowering of the risk factors of diabetes (Hoogwerf, 2010).

According to the WHO, there are 347 million people with diabetes worldwide and more than 80% are in low and middle income countries (World Health Organization [WHO] 2004). It has been predicted that deaths from Diabetes Mellitus (DM) will double between 2005 and 2030; and this has prompted the WHO to declare that something needs to be done to avert the impending catastrophe (WHO, 2009).

The greatest increase in prevalence and incidence is expected in developing world such as Asia and Africa as it follows the trend of urbanization/civilization and lifestyle changes. According to the American Diabetes Association, diabetes prevalence increases with age, people who are 60 years and above are at risk of suffering from diabetes, this is due to degeneration and a reduction in physical activity of about 8-20% (Clin, 2011).

Non-communicable Diseases (NCDs) continue to be a big problem for Botswana (MoHB WHO 2007). It is estimated that 2% of the population in Botswana suffer from NCDs, the most prevalent being hypertension, diabetes and cancers (MoHB WHO 2007, Chronic Disease Risk Factor). According to the same survey, Botswana as a developing country is experiencing a steady increase in NCDs and diabetes increased by two folds between1980 and 1998.The survey further identified the problem of limited physical activity as well as overweight as some of the risk factors for NCDs; diabetes showed an increasing trend along all ages in the

population. In Botswana, DM is the 6th most common cause of overall mortality. This finding corresponds with the WHO's projection that by 2030 it will be the 7th killer in the world (Lopez & Mathers, 2006).

1.2 RESEARCH PROBLEM

Botswana as part of the global village has not been spared of the NCDs which for some time were ignored as people were rallying behind the HIV/AIDS pandemic and resources were channelled in that direction. There has been a steady increase in the number of diabetes patients attending Block 6 Clinic. The t majority of patients are from middle age to the elderly. middle age and the elderly category of people are mostly the working group while some are retired ;. Many may afford to own cars and thus may lead sedentary lives and therefore be pre-disposed to NCDs.

According to the results of the STEPS Survey conducted in Botswana in 2007 ([MoHB WHO] 2007 Botswana STEPS Chronic disease risk factor surveillance report). The prevalence of non-communicable diseases including diabetes mellitus type 2 was on the increase. The same survey showed a high prevalence of diabetes associated risk factors such as sedentary lifestyle and an unhealthy diet (35% with low levels of physical activity). The STEPS survey classified the respondents as having a high risk of developing any type of NCDs while only 1.2% was classified as having none of the risk factors (MoHB WHO 2007). Weight reduction and exercise have been found to improve tissue sensitivity to insulin (Agurs-CollinsTD, Kumanyika SK, Ten Have & Adams-Campbell LL, 1997) and are hence an integral component of diabetes management alongside drugs and diet (Brind Amour, 2012). Despite this tripartite strategy being internationally recognized, diabetes management programs do not always place sufficient emphasis on the diet and exercise aspects.

In response to the identified burden of diabetes type 2 and associated risk factors as per the STEPS survey, the Ministry of Health took a decision to convert Block 6 clinic from a general out-patient facility to a specialist centre for diabetes care staffed with medical doctors, nurses and dieticians. In establishing Block 6 clinic, which is the only facility of this kind in the Gaborone, general principles of diabetes management are followed to guide its operations. It is unclear as to the extent to which general diabetes management guidelines were contextualized to the Botswana context.

As the number of patients attending Block 6 clinic continues to grow, it is important to determine the extent to which the program has addressed lifestyle modification by studying

the level of knowledge on diabetes and physical activity as well as determining their attitudes and practices as it pertains to physical activity. The proposed study intends to address the information gap and provide information to enhance the educational aspect in the management of patients at Block 6 clinic. The study will also provide information which can be used by the Ministry of Health to develop diabetes management programs that can be rolled out to the entire country.

The problem that arises is the extent to which general diabetes management guidelines have addressed lifestyle modifications in clients attending block 6 clinic, this has not been evaluated or reported since the establishment of the of the special diabetes centre.

5.1 DISCUSSIONS

Introduction

This section discusses the main findings of the study and also addresses objectives and research questions of the study. The study findings are discussed in relation to the study results and the available literature on knowledge, attitudes and practices amongst diabetes mellitus patients. This study determined the knowledge, attitudes and practices of the diabetes mellitus patients about the benefit of physical activity. The results were analysed, the dependent variables were cross-tabulated with demographic characteristics to see how they influence them and establish the level of significance.

Objective 1: To determine socio-demographic profile of respondents

The results of this study revealed that just over two thirds of respondents were females compared to males. Studies show that diabetes is more common amongst females than males, because most females tend to lead a more sedentary lifestyle and have been reported to be obese, which is why they develop diabetes mellitus. A study conducted by Azimi-Nezhad, et al., (2008), showed that there was a higher prevalence of diabetes mellitus amongst females than males. Furthermore, they suggests that the high rate of physical inactivity and bad eating habits amongst females makes them to be more at risk of developing NCDs such as diabetes mellitus.

The results further revealed that the majority of respondents were over 40 years of age. International Diabetes Federation (2013) did a study among older populations and found that as people grow older, their level of physical activity declines. Studies show that prevalence of diabetes mellitus increases and peaks at the age of 45 years. It is therefore expected that, at that age, level of physical activity declines.

This study also found that over half of respondents were uneducated (up to primary school level or with no education). This implies that these patients would be limited in their ability to seek information related to their disease and may lack knowledge on benefits of exercise as a component of managing their disease. A study by Malathy,et al., (2011) reported that patients suffering from diabetes lacked knowledge on how to manage their disease whilst those who are educated were ignorant in that they were lazy to seek information regarding how exercises improve their condition. This is supported by (Okonta, 2014) who also reported that low levels of education led to poor knowledge on benefits of exercises on lowering blood glucose level. Mshunqane (2004) did a study on efficacy of exercise among diabetic patients and found that exercise significantly lowers blood glucose.

The results further revealed that close to half (46%) of respondents were unemployed, meaning that they had more time to visit the clinic and seek information regarding other options of managing their disease besides medication. Also close to two thirds of respondents were married, therefore are likely to get support from their spouses when they decide to exercise, especially if it is meant to control their disease.

Objective 2–To determine knowledge of diabetic patients with regard to their condition

The results of this study revealed that the majority of respondents had fair knowledge about diabetes mellitus. Moodley and Rambiritch, (2007) also found that two thirds of respondents had good knowledge about diabetes mellitus. In contrast, Mohamed et.al, (2015) found that only a third of 33.3% of respondents had satisfactory knowledge on diabetes in their study. From the current results, the level of knowledge among patients can be attributed to the educational program given every week for those who are diagnosed with diabetes in most clinics in Botswana, as mandated by national government. In addition to these educational talks, patients are given pamphlets to read on diabetes, however, for those who cannot read or write, these pamphlets may not improve knowledge.

The results of this study also show that there was no significant association between knowledge on diabetes and gender, ($p=0.241$) however, slightly more female had fair knowledge on diabetes compared to males. Females were relatively more knowledgeable than their male counterparts. This result is consistent with Eknithiset (2010) who found that there was generally a good diabetic knowledge amongst the female in their study. In contrast, Gulabani, (2008) found that the role of gender on knowledge regarding diabetes mellitus was evident with women scoring significantly lower than men even after regulating other

confounders. Upadhyay, et al., (2008) also found that males had more knowledge than females in their study. The differences in these study findings lies mainly on the fact that sample sizes used in these studies differs significantly and also the races used in both studies differed. Studies further suggest that males have a poor health information-seeking behaviour. This findings is consistent with the current study where a quarter of males had poor knowledge compared to only 14% of females with poor knowledge.

The results also revealed that most of the respondents with higher education had fair – good knowledge compared to those with lower levels of education, however, there was no significant association between levels of education and knowledge. Similarly, Khurshid & Othman (2014) also found that respondents who had good level of education had satisfactory knowledge on diabetes mellitus .Zeyana et al., (2013) also found that education was an independent predictor of knowledge on diabetes. Persell et al., (2004) further suggest that educated patients are usually curious to know more about their diseases than uneducated people. They are also expected to seek information and read about their condition; however, some educated patients are simply ignorant about their condition and rely heavily on medication.

As for age of respondents the results showed that those who were aged over 40yrs had fair knowledge and more of those >50yrs had poor knowledge about their condition. These results are consistent with results from Jasper (2014) who found that knowledge among participants aged 51-60 was higher than others. This finding is not consistent with Odili, Isiboge and Eregie, (2011) who found younger age to be associated with better knowledge on diabetes. The results of the current study further showed that more than half of respondents who were employed had fair knowledge on diabetes. The results show that almost one third of those who were unemployed had poor knowledge about diabetes mellitus and employment status was significantly associated to knowledge ($p<0.05$). This result is consistent with (Kurshid, 2013) who found that the rate of knowledge was significantly associated with participants' occupation.

Objective 3–To determine attitudes of diabetic patients towards Physical Activity

The results of the study showed that the majority of respondents had positive attitude towards physical exercise. These results are similar to findings of Kheir, Greer, Yousif, Al Geed and Al Okkah, (2011) who found that the majority of patients had positive attitudes towards exercise. In contrast, Al-Adsani, et al., (2009) found that respondents scored poorly in attitude and only 35% had positive attitude towards exercise in their study. The results also showed that

gender, education, age and occupation were not associated with attitudes towards physical exercise. The result of the association between attitude and education is consistent with Eknithiset (2010) who found that attitude was associated with the level of education. Marital status was also associated with attitudes towards physical exercise. These findings imply that patients with positive attitude towards exercise will engage in exercises, however, this doesn't seem to be the case in this study. These findings further show that patients who are not yet physically active, but had positive attitude would need a bit of encouragement to start exercising, whilst those with negative attitude would need a significant amount of time and strategies to change their attitude so that they can see the benefits of exercise in controlling their blood glucose levels. Gender, age, education and occupation of the study participants had no effect on attitude. However, the attitude of the patients towards diabetes was positive and most of study participants believed that they were responsible for their care and this implies that they were ready to change if motivated or properly educated.

Objective 4–To determineLevel of Physical Activity/ Practice, of diabetic patients

The results of this study also showed that just over half of respondents had low level of physical activity. The result is consistent with Gautam, (2015) who found that 17.6% of respondents reported low or no physical activity. This finding is also in line with Murata, Shah, Adam, Wendel, Bokhari , Solvas, Hoffman , Duckworth,(2003) who found that majority of patients with diabetes or at highest risk for developing type 2 diabetes do not engage in regular physical activity, with a rare significantly below national norms. Physical exercise has been shown to be an important strategy for people with diabetes to control their sugar levels (American Diabetes Association, 2006). On one hand, results by Mohamed (2015) found that a third of diabetic patients adhered to their physical exercise regime in their study.

The results of this study also showed that gender was not associated with level of physical activity. In addition, the results show that more than half of respondents who were males had low physical activity compared to females. These findings are consistent, Leitzmann, Rimm, Hu (2003) who found that males were more likely to do physical activity compared to females. Also, two-third of those with primary education had low physical activity, while half of those with no education had no physical activity in the current study. Level of education has been found to influence one's level of physical activity, where educated people have been reported to be more physically active compared to uneducated people.

The results of this study also showed that age of respondent was not associated with physical activity. A study by Lim & Taylor (2005) found that about half of older adults report adequate levels of physical activity. On overall the results from this study showed that respondents were relatively fair on attitude towards physical exercise, yet, good attitude and good knowledge did not really yield increased level of participation of physical activity in the current study. In summary, analysis on the association showed that there was no significant difference between genders, no association between education or age and knowledge of the study participants. These findings are consistent with Hawal, et al., (2012) who found that there was no significant difference according to gender and no association between level of physical activity; age and duration of diabetes. The results also showed that occupation of the study participants was associated with knowledge.

The results of this study showed that there was a significant association between knowledge and physical activity. These results are consistent with findings by Srinual (1993) in which there was a significant association between knowledge and level of physical activity. The results show that almost most of respondents with poor knowledge had poor practice whilst respondents with good knowledge had good physical activity/ practice.

The results of the study further revealed that there was no significant association between attitudes and level of physical activity. The results showed that a higher percentage of respondents with fair attitude had low level of physical activity. A few respondents who had good attitudes also had low levels of physical activity. The result on attitude towards physical exercise is also not in line with Okonta, Ikombele and Ogunbanjo (2014) who found that majority of respondents reported that they did not exercise regularly.

The results from the logistic regression analysis showed that males were more likely to have poor knowledge compared to females. The results also show that males were more likely to have positive attitudes toward diabetes compared to females. Respondents with no education were more likely to have poor practices compared to those with higher education.

5.2 CONCLUSION

On overall, the results show that female respondents have slightly higher knowledge on diabetes. Respondents who have secondary education, aged 41- 50 years employed and not married had fair knowledge on diabetes. The relationship between knowledge on diabetes and occupation of respondents is significant. The results of this study showed that the level of

knowledge is relatively high among the items used to measure knowledge. The study concludes that although the knowledge, attitude and practice levels among respondents are relatively high, there is a need to educate individuals with diabetes in order to improve awareness. Therefore there is a need for structured programmes to improve knowledge, attitude and practices of diabetic patients. This could be achieved by increasing quality and scope of health education at Ministerial level. Education and counselling about all the aspects of diabetes is needed. Interventions should be put in place to sensitize individuals and this could lead to better preventative and management techniques in diabetes. Thus, there is need for arranging large scale awareness programs for community at large and also to identify and use media to spread the message which can change the attitude and practice of the public in the future.

1.3 AIM OF THE STUDY

1.3.1 Aim of the study

The aim of this study was to determine knowledge, attitudes and practices amongst diabetes mellitus patients towards physical activity at Block 6 clinic in Gaborone Botswana.

1.3.2 Objectives of the study

The objectives of the study were to determine

- The knowledge of diabetic patients about their own condition.,
- Attitudes of these patients towards physical activity.
- If diabetes mellitus patients are doing any exercises (practice)

1.3.3 Research Question

What are the knowledge, attitude and practice of diabetic patients with regard to benefits of physical activity at a Primary Health Centre in Gaborone, Botswana?

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

According to the WHO, in 2011, there were 171 million (2.8%) suffering from diabetes and is estimated that the number will have doubled by 2030. Diabetes is most common in developed countries and this is due to urbanization with improved transportation and therefore less physical exercise while people eat refined foods while in developing countries it is common in urban areas(Mendez & Popkin, 2004).

Various studies have been done to better understand the benefits of exercise as therapy in chronic conditions, DM type 2 being one such disease. Such studies have yielded a rich pool of data which helps to discuss the far reaching benefits and harm of exercise as it relates to particular patients. Together these studies have looked at the different type of exercise with most focusing on endurance exercise and resistance exercise. Such studies have helped various diabetes associations, most notably being the World Health Organisation and the American Diabetes Association to have sufficient evidence as they continue in their efforts to strongly advocate for the full recognition of exercise as therapy and its full incorporation into treatment guidelines.

Diabetes Mellitus is a serious lifestyle disease whose complications can cause heart attack or stroke, blindness, kidney failure, or loss of feet or legs due to gangrene resulting in amputation of the affected part. However, DM can be controlled by engaging in physical exercise and weight reduction (Sigal et al., 2007). The Ministry of Health, in Botswana having realised that DM was a big problem eventually designated two clinics, one in the north(Francistown) and one in Gaborone (Block 6 Clinic) where the study was conducted.

In recent years, the medical personnel and the society have experienced the problem of obesity and Type 2 Diabetes Mellitus(T2DM) and the epidemic has gone to unique challenges to the health care providers (Regensteiner, Reusch, Stewart and Veves, 2009). According to WHO (2008) Non Communicable Diseases including diabetes mellitus will double in 2030 and will reach 366 million and this is due to their association with obesity. Diabetes has become a world-wide epidemic and its incidences as well as prevalence are continuously on the increase (Sigal et al, 2007)

Regular physical activity (PA) is critical in the prevention and management of T2DM. Engaging in regular exercise improves blood glucose control and can prevent or delay T2DM and its complications (Qui et al., 2012) along with positively affecting lipids, blood pressure, cardiovascular events, mortality, and quality of life. However, most people with T 2DM are not active and show poor adherence. The paper reviewed the possible barriers to PA and strategies to improve the adherence. Based on the currently available literature, it is concluded that self-efficacy and social support from family, friends, and health care providers play an important role in adoption and maintenance of regular PA; also highlighting some new, modern and innovative interventions that facilitate exercise participation and improving adherence.

The major causes of chronic diseases are known, essentially: tobacco use, unhealthy diets, physical inactivity and harmful use of alcohol; If these risk factors were eliminated, at least 80% of all heart disease, stroke and T2DM would be prevented, and over 40% of cancer would also be prevented (WHO, 2013). "Obesity is found in approximately 55% of patients diagnosed with T2 DM" (Zoloedov et al., 2009:55). Other factors include aging (about 20% of elderly patients in North America have diabetes (American Diabetes Association, 2008)

Studies have been conducted which looked at the impact of exercise on glusose tolerance and/or insulin sensitivity. In a study by Praet (2006) which was considering the influence of acute exercise on hyperglycaemia in insulin-treated type 2 diabetes, they found an improvement in insulin resistance.

Other studies have been done which showed similar results for various types of exercise. These finding were found to hold for the various age groups. A study conducted in India in the Saurashtra region found that 12.3% 12.1% and 16%had highly satisfactory knowledge, Attitude and Practice respectively; the article went on to say known modifiable risk factors can be reduced and controlled by the patients themselves (Shar, Kamdar, and Shar, 2009)

In another study conducted in Napal found that diabetes education was 10% while 37% were completely illiterate and that education of the vulnerable community can become cost effective public health strategy. In this study the patients felt that they were responsible for their own self care which implied that were ready to change if educated properly (Gautam et al.,2015)

In yet another study done in South Africa a KAP at the Mmamelodi Hospital in Pretoria regarding life modifications reported low levels education as no respondents had good knowledge while 92.6% had poor knowledge of the benefits of 97.7% had bad practice in relation to life style modifications (Ikombele, 2015).

2.2 Common approaches in treatment of diabetes

The principal treatment of type 1 diabetes, even from its earliest stages, is replacement of insulin combined with careful monitoring of blood glucose levels using blood testing monitors (Silverstein et al., 2005). Without insulin, diabetic keto-acidosis often develops and this is a very serious complication which may result in a coma or death (Silverstein, 2005).

Type 2 diabetes is usually first treated by increasing physical activity, decreasing carbohydrate intake, and losing weight (Anderson et al., 2008). Weight loss can be easily achieved by regular exercise. These can restore insulin sensitivity even when the weight loss is modest, for example around 5 kg especially when it is abdominal fat (Bernard, 2007). In some instances the improvement in glycaemic control have been noted in the absence of weight loss owing to an increase in lean muscle mass that is proportional to the decrease in adiposity. It is sometimes possible to achieve long-term, satisfactory glucose control with these measures alone (Devamalar, 2010), though some argue that this cannot reverse the progress of the disease (Agurs-Collins et al., 1997).

In a study to determine behaviour of PA amongst adults over the age of 18 with type 2 diabetes, Barrett et al (2007) found that “men participate in more LTPA (Leisure Time Physical Activity) than women do, and those from the highest income group participate in more LTPA than low- or middle-income groups”. The same study looked at different types of physical activities and reported that walking was the most popular amongst their study participants. As this study was self-reporting, the authors rightly concluded that more objective tools were needed to be able to draw definitive conclusions as it pertained to physical activity and demographic changes. The same authors put across that it is important that policy review take place to create an enabling environment for “walking and other physical activity behaviour (Barrett et al., 2007) .

2.3 Exercise and Diabetes

The place of exercise in the control of diabetes has been established for many decades (Joslin, 1959). According to WHO,(2004), simple lifestyle measures have been shown to be effective in preventing or delaying the onset of type 2 diabetes has therefore made recommendation for people to undertake at least 30 minutes of regular, moderate-intense activity on most days to help prevent type 2 diabetes and its complications and to achieve and maintain healthy body weight. In line with the WHO statement, the American Diabetes Association has itself made a consensus statement saying that for decades, exercise has been considered and remains a cornerstone of diabetes management along with diet and medication (Sigal, et al, 2006). Two randomized trials each found that lifestyle interventions

including 150minutes/week of physical activity and diet induced weight loss of 5-7% reduced the risk of progression from impaired glucose tolerance (IGT) to Type 2 diabetes by 58% (Sigal et al, 2007).

Boulé, Haddad, Kenny, Wells, Sigal, (2001) undertook a systematic review and meta-analysis on the effects of structured exercise interventions in clinical trials of >8weeks duration on HbA1c and body mass in people with type 2diabetes and they found that post intervention HbA1c was significantly lower in exercise than the control group. This improvement of glycaemic control was found in other studies of varying duration and with study subjects of varied demographic makeup (Baldi, 2003).

Over the years various researchers have undertaken work to better understand the attributes of exercise, e.g. types, durations and frequency that yield substantial benefits to individuals. In addition to this, there is a pool of research which looks at exercise capabilities of individuals as this may be limited by the presence of various independent ailments as well as diabetes complication such as retinopathy, nephropathy and neuropathy (American Diabetes Association, 2007).

While there are clear benefits of exercising for type 2 diabetics, there are some potential adverse effects that should be considered and these include problems of foot care and abnormal cardiovascular responses (Constantini, et al., 2005). These side effects may be related to underlying medical conditions.

2.4 Diabetes education

The knowledge and understanding of diabetes mellitus and its treatment by patients is of great importance in enabling individuals to better manage their conditions and by so doing to prevent complications of the disease and to have overall better health outcomes (Knight, Gonzalez, Feldman, Zunder, Goldenberg, Williams, Loewith, Stokoe, Balla, 2006). This argument has been supported by other researchers who have argued that the most effective way to mitigate and minimize the occurrence of diabetes complication and to optimize it management is through patient education.

With the vast research that has been done in this area of diabetes knowledge, there are studies which have shown that there is no significant correlation between acquisition of knowledge of one's disease and their adoption of positive behaviour (Knight et al, 2006).

The proceeding notwithstanding the global prevailing position continues to put a premium on providing proper patient education as this has been consistently reported to improve knowledge and understanding of diabetes. Furthermore, the education given to patients has been shown to assist the person with diabetes to implement a positive lifestyle and take control of, and responsibility, for their own diabetes self-care and in addition to this are more likely to have better metabolic outcomes (Copeland, Pugh,. Hicks,. Noel, (2014).

A study by Geyer, (2006) while following up all-cause mortality and mortality due to myocardial infarction alone in the Swedish and German population, found that whilst the strongest predictor of all-cause mortality was income when diabetes was considered alone, its strongest predictor of mortality was education. The researchers thus concluded that variable such as education, income and occupation whilst related cannot be used interchangeably as they "measure different phenomena and tap into different causal mechanisms" (Geyer, 2006).

2.5 Knowledge, Attitudes and Practices surveys

Knowledge, Attitudes and Practices (KAP) surveys are need as assessment studies which seek to determine the knowledge, attitudes and practices of a population/community (Launiala, 2009). This study seeks to explore the knowledge levels, attitudes and practices of diabetic patients attending at Block 6 clinic in Gaborone-Botswana

Although it has been recognized that various WHO documents and related resource facilitate the process of addressing the prevention and control of NCDs in middle and low income countries, new documents such as the WHO Framework and WHO package of essential NCDs (WHO-PEN ,2010) provide a "know-how" guide, and they will serve as an adjuvant tool for use by Member States to implement the Action Plan for the global strategy for the Prevention And Control of NCDs that has been endorsed by The World Health Assembly in May 2008 (MoHB WHO, 2007).

In summary, this chapter explored literature related to knowledge, attitudes and practices of diabetic patients in relation to physical activity or exercise as part of their treatment protocol.

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Study Design

The study was a quantitative; cross sectional descriptive study that assessed the knowledge, attitudes and practices amongst diabetes mellitus patients on physical activity at Block 6 clinic in Gaborone, Botswana.

The Researcher administered questionnaires with individual patients to investigate how well they understood T2DM, their attitude towards exercise and the extent to which they have adopted exercise as part of their diabetes control. A face-to-face questionnaire was administered in English or Setswana by a skilled researcher in a private location within Block 6 clinic.

3.2 Study Site

The study was conducted in Gaborone, Botswana.. Greater Gaborone District Health Management Team provides healthcare services to the city population through 16 health clinics. This study was conducted at Block 6 Clinic which is the only clinic designated to provide diabetes mellitus treatment under Gaborone City Council. All diabetes patients are referred to Block 6 Clinic where special services are provided to the patients.

3.3 Study Population

Burns and Groove (2005) define population as all elements (individuals, objects, or substances) that meet the sample criteria for inclusion in the study. In this study the population was all T2DM patients from Gaborone attending at Block 6 clinic.

Gaborone city council has a population of 231 592 (according to 2011 Botswana population and housing Census).

There are about 3000 diabetes mellitus patients registered at this centre. They are seen every three months or monthly depending on their blood sugar control status. Patients whose blood sugar is poorly controlled are seen on a monthly basis while those whose blood sugar levels show good control are seen every three months.

3.4 Sampling

3.4.1 Sampling Method:

The selection of study participants was based on purposive sampling. Eligible participants were those patients who have been diagnosed with diabetes type 2 and have had at least one medical consultation in Block 6 Clinic.

3.4.2 Sample size Calculation:

The sample size calculation was based on the Sample size Table from Krejcie & Morgan (1970). The table is based on a confidence level of 95% with a margin of error of 5%. The population of 3000 was used to calculate and additional 10% was added on in order to cover for the respondents that are not going to participate in the research or withdraw from the study. The study sample size was 140 patients who were diagnosed with type 2 diabetes Mellitus.

3.4.3 Sampling Procedure

The purpose of the study was explained to diabetes patients attending Block 6 clinic. Those patients who had understood the objectives of the study and provided consent for enrolment by way of a signed consent form were enrolled into the study using a pretested data collection questionnaire. The enrolment was on a continuous basis until the desired sample size of 140 patients from a population of 3000 was reached. The enrolment commenced soon after permission to carry out the research was given by both Medunsa Research and Ethics Committee (MREC), the Ministry of Health and Princess Marina hospital.

3.5 Exclusion criteria

The exclusion criteria were as follow:

- Mentally challenged patients
- Patients with speech difficulty
- Patients with significant or total hearing loss
- Patients under the age of 18 years at the time of enrolling in the study
- Newly Diagnosed Diabetes patients (less than 4 weeks)

3.6 Data collection

Questionnaire was used to collect data from the diabetic patients at Block 6 Clinic. The researcher administered the questionnaire herself and ticked the responses on the questionnaire for the patients.

The questionnaire comprised of both closed and open ended questions

Section A comprised of demographic and socio-economic information

Section B comprised of knowledge of diabetic patients on the disease

Section C comprised of attitude of diabetic patients towards PA

Section D comprised of the level of PA of diabetic patients.

The questionnaire was developed along the line of the available international guides on diabetes education best practice. Questions were based on what is seen as pertinent knowledge, attitudes and practices that patients with type 2 diabetes must have for them to meaningfully control their disease. The expected knowledge, attitude and practice were also based on the nature of the approach taken in diabetes education in Botswana.

A face-to-face questionnaire was administered in English or Setswana by a skilled researcher in a private location within Block 6 clinic. The duration of data collection was continuous until such a time that the sample size was reached.

3.7 Pre Test

The questionnaire was pretested at Princess Marina hospital which runs a specialist clinic for all chronic conditions including Diabetes Mellitus. The pre-test was done among 10 diabetes patients to assist in restructuring and validating the questionnaire, logical flow of question and its palatability. After the pre-test, no correction or adjustment to the questionnaire was made as there was no need for any change or adjustment.

3.8 Data Processing and Analysis

Data was recorded on the pre-coded questionnaires and entered into a computer using SPSS software. The researcher did the data checking and cleaning. Data was analysed using SPSS version 21.0 programs. During the analysis, frequency distributions for variables were determined and logistic regression tests were performed on selected variables.

Knowledge and attitudes, scores were created by assigning a value of one for correct responses to question items for the respective parameters. (Correlations, standard deviations and chi-square) Odds Ratio was applied to determine statistically significant association between independent variables and outcomes, repeatedly. Knowledge and attitude questions were coded using 3 point Likert scale. Knowledge was classified into 4 categories being: Poor; fair, good and excellent knowledge. Attitude was classified into negative and positive attitude.

3.8 Measures of Reliability, Validity

The interviews were conducted in a language the participants were most comfortable with. Validity was ensured by basing the questionnaire on current scientific knowledge regarding the research theme, obtained through literature review and presented the questionnaire to some experts in the field to validate that it was accurate and representative (Burns & Grove, 2009)

Reliability occurs when an instrument measures the same thing more than once and results in the same outcome. It was measured by pre-testing the questionnaire (De Vos, Strydom, Fouché, & Delport, 2006). The reliability test was calculated for knowledge and attitude questions using Cronbach's alpha where α close to 1 implied that the questions are more reliable.

3.9 Bias

Bias is defined as any tendency which prevents unprejudiced consideration of a question. In research, bias occurs when "systematic error [is] introduced into sampling or testing by selecting or encouraging one outcome or answer over others" Bias can occur at any phase of research, including study design or data collection, as well as in the process of data analysis and publication.

To minimize bias, all diabetes mellitus clients meeting the inclusion criteria were given an equal chance of being included in the study, data collection tools were validated so that only relevant data was collected.

3.10 Ethical Considerations

3.10.1 Ethical Clearance and Permission

In general, this study did not inflict any harm upon diabetic patients, the community and the health workers involved in the study. Great care was taken to obtain consent from all authorities and the study strictly adhered to ethical considerations. An ethical clearance was obtained from the Medunsa Research and Ethics Committee and permission was requested from the research committee in the Ministry of health Botswana. Permission was also obtained from Princess Marina Hospital Research Committee.

3.10.2 Signing of informed consent

The respondents were given the detailed information about the study. This included the type of study and the reasons why the study was conducted. Information pertaining all risks and benefits were made available to the participants before the commencement of the study. The information was made available in the language the respondents well understood. Only those patients, who signed the informed consent form, by so doing showing that they voluntarily enrolled into the study, were interviewed as per the approved questionnaire.

3.10.3 Principles of justice

The Researcher treated the respondents fairly by selecting them for reason directly related to the study problem. The Researcher also respected the rights of the participants and determined the extent to which their private information was shared with others (Brink, 2009, Burns & Groove, 2009)

Every effort was made to ensure the confidentiality of patients enrolled in this study. All questionnaires used in the study had a predetermined identifier. At the time of enrolling in the study, participants were issued with a predetermined identifier. Personal names were captured on consent forms which were separate from the questionnaire and showed the study number of the participant. The consent forms were kept in a secure place separate from the questionnaires so as to make it difficult to link the questionnaire with the personal identifiers.

Patients were asked to sign a consent form before participating in this study. The consent form was offered in English and Setswana and was explained in great detail. Particular emphasis was placed on the voluntary and confidential nature of the study. Patients were informed that they could withdraw from the study at any time without penalty or negative consequences. During data capturing and thereafter analysis, only the predetermined identifiers were used.

3.11 Significance of Proposed Research

The findings will help to develop an evidence based effective exercise; an educational package for diabetic patients; inform policy on preventative interventions and strategies for managing Diabetes Mellitus and other lifestyle disease in Botswana.

CHAPTER 4

RESULTS

4.1: INTRODUCTION

This chapter discusses and analyse data gathered from Block 6 clinic in Gaborone, Botswana. The analysis was done based on the responses from respondents, using various forms. The data was collected through questionnaires. The results essentially answer the research questions and are presented as frequency and percentages in form of tables. Level of significance and association of demographic data and diabetic knowledge, attitude and practices were calculated. All the analysis was performed using IBM SPSS statistical package version22.0.

4.2:SOCIO-DEMOGRAPHIC PROFILE OF RESPONDENTS

Table 4.1 Socio-demographic profile of Respondents

Variables n=140		Frequency	Percentage
Gender	Males	43	30.7
	Females	97	69.3
Age group	20- 30 years	2	1.4
	31 – 40 years	11	7.9
	41 – 50 years	30	21.4
	>50years	97	69.3
Education	None	24	17.1
	Primary school	48	34.3
	Secondary school	41	29.3
	Tertiary school	27	19.3
Marital status	Not married	50	35.7
	Married	90	64.3
Occupation	Employed	76	54.3
	Not employed	64	45.7

Table 4.1 shows that out of the one hundred and forty (140) participants, 43 (30.7%) were males and 97 (69.3%) were females. Over two thirds (69.3%) were aged > 50 years, 21.4% were 41 – 50 years, over half (51.4%) of participants had lower education (no school/primary school); and only 19.3% had tertiary education.The majority of respondents were married (64.3%) and 35.7% were not married. In terms of occupation, 54.3 % were employed, whilst 45.7% were unemployed.

4.3: KNOWLEDGE OF THE PARTICIPANTS ON DIABETES

Table 4.1: Self-reported Knowledge of Respondents on Diabetes

Aspects	Correct response n(%)	incorrect response n (%)
KNOWLEDGE OF DIABETES		
The major symptoms of diabetes are urination, increased thirst and hunger	137(97.9)	3 (2.1)
What is the normal fasting blood sugar level	73(52.1)	67(47.9)
Which of the following is not a complication that can result when diabetes is not well controlled?	107(76.4)	33(23.6)
Which of the following is not an important factor in controlling diabetes?	107(76.4)	33(23.6)
What is the recommended minimum amount of exercise that a person with diabetes should get in a week?	48(34.3)	92(65.7)
When a person who is on insulin does running exercise, where should they not inject themselves?	27(19.3)	113(80.7)
Regular urine analysis test help with knowing the amount of protein in ones urine.	91(65.0)	49(35.0)
During exercise what happens to the amount of insulin required by the body?	91(65.0)	49(35.0)
What must you do if you discover that your blood sugar reading is high just before your planned exercise time?	54(38.6)	86(61.4)
How frequently should a person with diabetes have their eyes checked?	91(65.0)	49(35.0)

The questionnaire comprised of ten questions measuring knowledge on diabetes as displayed in Table 4.2.Participants were more likely to have knowledge of major symptoms of diabetes (97.9%), normal fasting blood sugar (52.1%), complications that can result when diabetes is not well controlled (76.4%),urine analysis test (65%), what happens to the insulin required by the body during exercise (65%),how frequently should diabetic persons have their eyes checked and also understand urine analysis (65%).

Table 4.3 Summary of knowledge, attitude and practice towards diabetes

VARIABLES		FREQUENCY (n)	PERCENTAGE (%)
KNOWLEDGE about the condition	POOR	25	17.9
	FAIR	87	62.1
	GOOD	28	20.0
Attitudes towards exercise			
	Negative	13	10.6
	positive	110	89.4
Level of PA	No PA	31	31.3
	Low level PA	59	59.6
	Adequate level PA	9	9.1

Table 4.3 above shows majority of the participants have fair knowledge (62.1%) and only (20.0%) had good knowledge; (89.4%) had positive attitude, and only 10.6% had fair attitude towards physical exercise. The results show that 59.6% had low level of PA, 31.3% did not exercise, whilst only 9.1% reported that they exercise adequately.

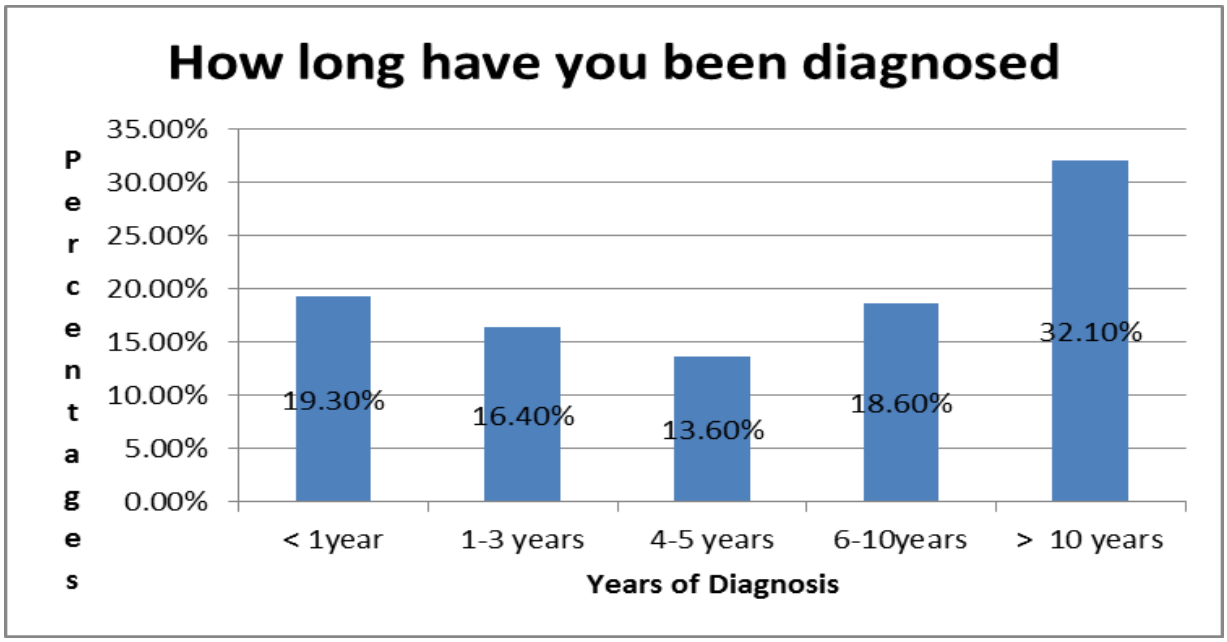

Figure 4.1: How long have you been diagnosed with diabetes

Figure 4.1 show that close to one third (32.1%) of respondents have been diagnosed with diabetes for more than 10 years, while (19.3%) have been diagnosed with diabetes less than 1 year.

Figure 4. 2 Parent siblings or child with diabetes

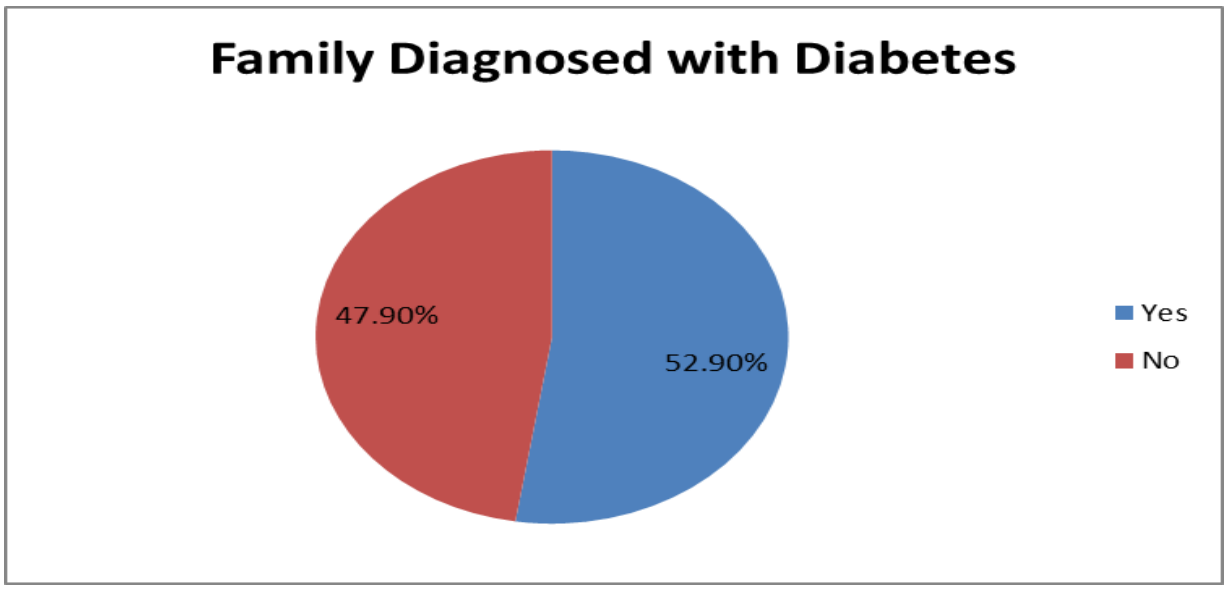

Figure 4.2 shows that half (52%) of respondents had a parent, sibling or child who has diabetes and less than half (47.9%) did not.

Table 4.4 Attitudes of respondents towards exercise

ATTITUDES TOWARDS EXERCISE	Positive responses n(%)	Negative responses n(%)
Do you think you can lead a normal life if you take appropriate measures for diabetes?	136 (97.8)	3(2.2)
Are you willing to do regular exercise to prevent further complication due to diabetes?	137(97.9)	3(2.1)
Do you think people with diabetes who are on insulin should measure blood sugar before, during, and after exercise to determine their body's typical response to exercise?	95 (67.9)	45(32.1)
Are you willing to do specially prescribed exercises as given by your health worker?	132(97.8)	3(2.2)
Will you wear footwear as recommended by your health worker when you go to exercise?	136(97.8)	3(2.2)
Do you think that seeing a health care worker for your diabetes at least once every 6 months is beneficial?	54(38.6)	86(61.4)
Do you feel that you can control your diabetes so that it does not interfere with the things you want to do?	118(85.5)	20(14.5)
Do you feel that you can follow your recommended diet even when you have to share food with other people who do not have diabetes?	118(86.1)	19(13.9)
Do you feel that you can judge when the changes in your illness mean you should visit the doctor?	136(97.1)	4(2.9)
Do you feel that you can eat all your meals as per the time intervals recommended by your health worker?	106(77.4)	31(22.6)

Table 4.4 shows that majority of respondents have positive attitudes towards exercise. The results show that a higher percentage (97.8%) think they can lead a normal life if they take appropriate measures for diabetes and (97.9%) are willing to do regular exercise to prevent further complications due to diabetes. The results also show that (85.5%) of respondents feel that they can control their diabetes so that it does not interfere with things they want to do.

Table 4.5 Level of physical activity of the respondents

Physical Activity Parameters	YES n(%)	NO n(%)
Do you exercise?	120(85.7)	20(14.3)
During the past week, did you spend at least 30 minutes, 3 days per week doing stretching or muscle strengthening exercise such as lifting weights?	62(44.3)	78(55.7)
During the past week, did you spend at least 30 minutes, 3 days per week doing any of the following exercises; walking, running, riding bicycle, swimming, climbing stairs, or any other aerobic exercises?	108(77.1)	32(22.9)
In the past month, have you exercised for at least 30 minutes/ 3 days per week?	50(36.2)	88(63.8)
Do you have a machine to measure your blood sugar (glucose) level?	36(25.7)	104(74.3)
In the past month, how often have you checked your blood sugar level before you exercise?	14(10.1)	125(89.9)
In the past month, how often have you checked your blood sugar level after you exercise?	10(7.1)	130(92.9)
In the past week, how often have you eaten breakfast when you got up?	124(88.6)	16(11.4)
In the past week did you take your diabetes medication as prescribed by your health worker?	126(90)	14(10)
When you exercise do you wear the type of shoes recommended by your health provider?	58(41.4)	82(58.6)

Table 4.5 shows that majority (85.7%) of respondents reported that they do exercise. The results show that less than half (44.3%) did spend at least 30 minutes, 3 days per week doing stretching or muscle strengthening exercise such as lifting weights. More than one-third (36.2%) said that in the past month, they have exercised for at least 30 minutes/3 day per week. The results of also show that a higher percentage (88.6%) of respondents have eaten breakfast when they got up in the past week, while (90%) of respondents did take their diabetes medication as prescribed by their health worker. The results further show that (7.1%) of respondents have checked their blood sugar level after exercise in the past month. On overall, the results show that majority of respondents do exercise while in relation to checking the blood level, the percentage are a bit low.

Table 4.6: Knowledge of respondents by selected demographic characteristics

Gender	**Knowledge n(%)**			**Total**	**P-value**
	Poor	Fair	Good		
Male	11(25.6)	23(53.5)	9(20.9)	43(100)	0.241
Female	14(14.4)	64(66.0)	19(19.6)	97(100)	
Education					0.135
None	8(33.3)	15(62.5)	1(4.2)	24(100)	
Primary	10(20.8)	28(58.3)	10(20.8)	48(100)	
Secondary	4(9.8)	27(65.9)	10(24.4)	41(100)	
Tertiary	3(11.1)	17(63.0)	7(25.9)	27(100)	
Age group					0.64
20 -30 years	0 (0.0)	2(100)	0(0.0)	2(100)	
31 -40 years	2(18.2)	7(63.6)	2(18.2)	11(100)	
41 -50 years	0(0.0)	20(66.7)	10(33.3)	30(100)	
>50 years	23(23.7)	58(59.8)	16(16.5)	97(100)	
Occupation					
Employed	7(9.0)	53(67.9)	18(23.1)	78(100)	0.008*
Not employed	18(29.0)	34(54.8)	10(16.1)	62(100)	
Marital status					
Not married	4(8.0)	35(70.0)	11(22.0)	50(100)	.076
Married	21(23.3)	52(57.8)	17(18.9)	90(100)	

** indicate significance*

Table 4.6 shows that gender was not significantly associated with knowledge (P value= 0.241). The results from tables 4.6 also show that education of respondent is not associated with knowledge (P value = 0.135). With regard to the association between age and knowledge is not statistically significant (P value = 0.64). The results show that occupation is significantly associated with knowledge (P value = 0.008) and marital status was not significantly associated with knowledge (P value = 0.76).

Table 4.7: Attitude by selected demographic characteristics

Gender	Attitude n(%)			P-value
	Negative	Positive	Total	
Male	6(15.8)	32(84.2)	38(100)	0.208
Female	7(8.2)	78(91.8)	85(100)	
Education				0.405
None	3(13.0)	20(87.0)	23(100)	
Primary	6(14.0)	37(86.0)	43(100)	
Secondary	1(2.9)	33(97.1)	34(100)	
Tertiary	3(13.0)	20(87.0)	23(100)	
Age group				0.145
20 -30 years	1(50.0)	1(50.0)	2(100)	
31 -40 years	0(0.0)	10(100)	10(100)	
41 -50 years	4(16.0)	21(84.0)	25(100)	
>50 years	8(9.3)	78(90.7)	86(100)	
Occupation				
Employed	5(7.5)	62(92.5)	67(100)	0.220
Not employed	8(14.3)	48(85.7)	56(100)	
Marital status				
Not married	2(4.3)	45(95.7)	47(100)	0.073
Married	11(14.5)	65(85.5)	76(100)	

Table 4.7 show that gender is not significantly associated with attitudes of respondents (P value =0.208). The results also show that education is not associated with attitudes of respondents (P value = 0.405). Age of respondent is not associated with attitudes of respondents towards diabetes (P value = 0.1450). Occupation is not associated with attitudes of towards diabetes (P value = 0.220). The results from the table show that marital status is not significantly associated with attitudes towards diabetes (P value = 0,073).

Table 4.8: Practice by selected demographic characteristics

Gender	**Practice n(%)**			**P-value**
	Poor	Fair	Good	
Male	9(31.0)	18(62.1)	2(6.9)	0.878
Female	22(31.4)	41(58.6)	7(10.0)	
Education				0.112
None	10(52.6)	9(47.4)	0(0.0)	
Primary	11(31.4)	22(62.9)	2(5.7)	
Secondary	7(26.9)	16(61.5)	3(11.5)	
Tertiary	0(0.0)	3(13.0)	20(87.0)	
Age group				
20 -30 years	0(0.0)	2(100)	0(0.0)	0.760
31 -40 years	1(14.3)	5(71.4)	1(14.3)	
41 -50 years	5(25.0)	13(65.0)	2(10.0)	
>50 years	25(35.7)	39(55.7)	6(8.6)	
Occupation				
Employed	15(23.8)	31(58.5)	7(13.2)	0.289
Not employed	16(34.8)	28(60.9)	2(4.3)	
Marital status				
Not married	7(22.6)	22(71.0)	2(6.5)	0.298
Married	24(35.3)	37(54.4)	7(10.3)	

Table 4.8 shows that gender is not associated with practice (P value = 0.878). The results from the table also shows that education is not associated with practice (P value = 0.112). The results also show that age is not associated with practice (P value = 0.760). Occupation is not associated with practice (P value = 0.289). Marital status is not associated with practice (P value = 0.298).

Table 4.9: Odds ratio that an individual will have knowledge on diabetes by selected demographic characteristics

	OR	95% Confidence Interval	
Gender	3.232	.802	13.032
Education	2.794	.378	20.655
Marital status	.402	.091	1.772
Age group	2.431	.195	30.252
Employment status	.411	.100	1.692

Table 4.9 shows that males were (3.232) times more likely to have poor knowledge compared to females. Respondents with no education were (19,505) times more likely to have poor knowledge compared to those with tertiary education.

Table 4.10: Odds ratio for attitude of individual towards physical exercise by selected demographic characteristics

	OR	95% Confidence Interval	
Gender	4.663	1.109	19.615
Education	1.203	.144	10.065
Marital status	.072	.006	.865*
Age group	8.880	1.396	56.510

Table 4.10 shows that marital status were more likely to have positive attitudes toward diabetes (OR= .072; CI= .006 - .0865). Those with no education were more likely to have fair attitudes compared to those with higher education.

Table 4.11: Odds ratio for physical activity by selected demographic characteristics

	OR	95% Confidence Interval	
	Knowledge of Respondent		Total
Gender	3.705	.426	32.246
Education	9.196	.799	10.860
Marital status	1.855	.246	14.008
Age group	2.358	2.358	2.358

Table 4.11 shows that male were (3.705) times more likely to have poor practices compared to females. Respondents with no education were more likely to have poor practices compared to those with higher education.

Table 4.12 Relationship of knowledge and physical activity

		Knowledge of Respondent			Total
		Poor	Fair	Good	
Practice	Poor	12	19	0	31
		38.7%	61.3%	0.0%	100.0%
	Fair	8	33	18	59
		13.6%	55.9%	30.5%	100.0%
	Good	0	5	4	9
		0.0%	55.6%	44.4%	100.0%
Total		20	57	22	99
		20.2%	57.6%	22.2%	100.0%

P value =.000

The relationship between physical activity and knowledge was associated using the chi-square Test which demonstrated statistically significant (p value=.000). The results show that (38.7%) of respondents with poor knowledge has poor practice. On the other results also show that respondents with good knowledge (44.4%) have good physical practice.

Table 4.13 Relationship between attitudes and physical activity

		Attitudes		Total
		negative	Positive	
Practice	no activity	5	21	26
		19.2%	80.8%	100.0%
	low level	5	49	54
		9.3%	90.7%	100.0%
	Adequate	0	6	6
		0.0%	100.0%	100.0%
Total	Count	10	76	86
	Practice	11.6%	88.4%	100.0%

P value=.280

The relationship between attitudes and physical activity was not associated using the Chi-Square Test which demonstrated statistically insignificant (p value = .280). The results show that a higher percentage of respondents with fair attitude had fair physical activity. Respondents who have good attitudes (80.8%) had poor physical activity.

CHAPTER 5

DISCUSSIONS, CONCLUSION, RECOMMENDATIONS AND LIMITATIONS

5.1 DISCUSSIONS

Introduction

This section discusses the main findings of the study and also addresses objectives and research questions of the study. The study findings are discussed in relation to the study results and the available literature on knowledge, attitudes and practices amongst diabetes mellitus patients. This study determined the knowledge, attitudes and practices of the diabetes mellitus patients about the benefit of physical activity. The results were analysed, the dependent variables were cross-tabulated with demographic characteristics to see how they influence them and establish the level of significance.

Objective 1: To determine socio-demographic profile of respondents

The results of this study revealed that just over two thirds of respondents were females compared to males. Studies show that diabetes is more common amongst females than males, because most females tend to lead a more sedentary lifestyle and have been reported to be obese, which is why they develop diabetes mellitus. A study conducted by Azimi-Nezhad, et al., (2008), showed that there was a higher prevalence of diabetes mellitus amongst females than males. Furthermore, they suggests that the high rate of physical inactivity and bad eating habits amongst females makes them to be more at risk of developing NCDs such as diabetes mellitus.

The results further revealed that the majority of respondents were over 40 years of age. International Diabetes Federation (2013) did a study among older populations and found that as people grow older, their level of physical activity declines. Studies show that prevalence of diabetes mellitus increases and peaks at the age of 45 years. It is therefore expected that, at that age, level of physical activity declines.

This study also found that over half of respondents were uneducated (up to primary school level or with no education). This implies that these patients would be limited in their ability to seek information related to their disease and may lack knowledge on benefits of exercise as a component of managing their disease. A study by Malathy,et al., (2011) reported that patients suffering from diabetes lacked knowledge on how to manage their disease whilst those who are educated were ignorant in that they were lazy to seek information regarding how exercises

improve their condition. This is supported by (Okonta, 2014) who also reported that low levels of education led to poor knowledge on benefits of exercises on lowering blood glucose level. Mshunqane (2004) did a study on efficacy of exercise among diabetic patients and found that exercise significantly lowers blood glucose.

The results further revealed that close to half (46%) of respondents were unemployed, meaning that they had more time to visit the clinic and seek information regarding other options of managing their disease besides medication. Also close to two thirds of respondents were married, therefore are likely to get support from their spouses when they decide to exercise, especially if it is meant to control their disease.

Objective 2–To determine knowledge of diabetic patients with regard to their condition

The results of this study revealed that the majority of respondents had fair knowledge about diabetes mellitus. Moodley and Rambiritch, (2007) also found that two thirds of respondents had good knowledge about diabetes mellitus. In contrast, Mohamed et.al, (2015) found that only a third of 33.3% of respondents had satisfactory knowledge on diabetes in their study. From the current results, the level of knowledge among patients can be attributed to the educational program given every week for those who are diagnosed with diabetes in most clinics in Botswana, as mandated by national government. In addition to these educational talks, patients are given pamphlets to read on diabetes, however, for those who cannot read or write, these pamphlets may not improve knowledge.

The results of this study also show that there was no significant association between knowledge on diabetes and gender, ($p=0.241$) however, slightly more female had fair knowledge on diabetes compared to males. Females were relatively more knowledgeable than their male counterparts. This result is consistent with Eknithiset (2010) who found that there was generally a good diabetic knowledge amongst the female in their study. In contrast, Gulabani, (2008) found that the role of gender on knowledge regarding diabetes mellitus was evident with women scoring significantly lower than men even after regulating other confounders. Upadhyay, et al., (2008) also found that males had more knowledge than females in their study. The differences in these study findings lies mainly on the fact that sample sizes used in these studies differs significantly and also the races used in both studies differed. Studies further suggest that males have a poor health information-seeking behaviour. This findings is consistent with the current study where a quarter of males had poor knowledge compared to only 14% of females with poor knowledge.

The results also revealed that most of the respondents with higher education had fair – good knowledge compared to those with lower levels of education, however, there was no significant association between levels of education and knowledge. Similarly, Khurshid & Othman (2014) also found that respondents who had good level of education had satisfactory knowledge on diabetes mellitus .Zeyana et al., (2013) also found that education was an independent predictor of knowledge on diabetes. Persell et al., (2004) further suggest that educated patients are usually curious to know more about their diseases than uneducated people. They are also expected to seek information and read about their condition; however, some educated patients are simply ignorant about their condition and rely heavily on medication.

As for age of respondents the results showed that those who were aged over 40yrs had fair knowledge and more of those >50yrs had poor knowledge about their condition. These results are consistent with results from Jasper (2014) who found that knowledge among participants aged 51-60 was higher than others. This finding is not consistent with Odili, Isiboge and Eregie, (2011) who found younger age to be associated with better knowledge on diabetes. The results of the current study further showed that more than half of respondents who were employed had fair knowledge on diabetes. The results show that almost one third of those who were unemployed had poor knowledge about diabetes mellitus and employment status was significantly associated to knowledge ($p<0.05$). This result is consistent with (Kurshid, 2013) who found that the rate of knowledge was significantly associated with participants' occupation.

Objective 3–To determine attitudes of diabetic patients towards Physical Activity

The results of the study showed that the majority of respondents had positive attitude towards physical exercise. These results are similar to findings of Kheir, Greer, Yousif, Al Geed and Al Okkah, (2011) who found that the majority of patients had positive attitudes towards exercise. In contrast, Al-Adsani, et al., (2009) found that respondents scored poorly in attitude and only 35% had positive attitude towards exercise in their study. The results also showed that gender, education, age and occupation were not associated with attitudes towards physical exercise. The result of the association between attitude and education is consistent with Eknithiset (2010) who found that attitude was associated with the level of education. Marital status was also associated with attitudes towards physical exercise. These findings imply that patients with positive attitude towards exercise will engage in exercises, however, this doesn't seem to be the case in this study. These findings further show that patients who are not yet physically active, but had positive attitude would need a bit of encouragement to start

exercising, whilst those with negative attitude would need a significant amount of time and strategies to change their attitude so that they can see the benefits of exercise in controlling their blood glucose levels. Gender, age, education and occupation of the study participants had no effect on attitude. However, the attitude of the patients towards diabetes was positive and most of study participants believed that they were responsible for their care and this implies that they were ready to change if motivated or properly educated.

Objective 4–To determineLevel of Physical Activity/ Practice, of diabetic patients

The results of this study also showed that just over half of respondents had low level of physical activity. The result is consistent with Gautam, (2015) who found that 17.6% of respondents reported low or no physical activity. This finding is also in line with Murata, Shah, Adam, Wendel, Bokhari , Solvas, Hoffman , Duckworth,(2003) who found that majority of patients with diabetes or at highest risk for developing type 2 diabetes do not engage in regular physical activity, with a rare significantly below national norms. Physical exercise has been shown to be an important strategy for people with diabetes to control their sugar levels (American Diabetes Association, 2006). On one hand, results by Mohamed (2015) found that a third of diabetic patients adhered to their physical exercise regime in their study.

The results of this study also showed that gender was not associated with level of physical activity. In addition, the results show that more than half of respondents who were males had low physical activity compared to females. These findings are consistent, Leitzmann, Rimm, Hu (2003) who found that males were more likely to do physical activity compared to females. Also, two-third of those with primary education had low physical activity, while half of those with no education had no physical activity in the current study. Level of education has been found to influence one's level of physical activity, where educated people have been reported to be more physically active compared to uneducated people.

The results of this study also showed that age of respondent was not associated with physical activity. A study by Lim & Taylor (2005) found that about half of older adults report adequate levels of physical activity. On overall the results from this study showed that respondents were relatively fair on attitude towards physical exercise, yet, good attitude and good knowledge did not really yield increased level of participation of physical activity in the current study. In summary, analysis on the association showed that there was no significant difference between genders, no association between education or age and knowledge of the study participants.

These findings are consistent with Hawal, et al., (2012) who found that there was no significant difference according to gender and no association between level of physical activity; age and duration of diabetes. The results also showed that occupation of the study participants was associated with knowledge.

The results of this study showed that there was a significant association between knowledge and physical activity. These results are consistent with findings by Srinual (1993) in which there was a significant association between knowledge and level of physical activity. The results show that almost most of respondents with poor knowledge had poor practice whilst respondents with good knowledge had good physical activity/ practice.

The results of the study further revealed that there was no significant association between attitudes and level of physical activity. The results showed that a higher percentage of respondents with fair attitude had low level of physical activity. A few respondents who had good attitudes also had low levels of physical activity. The result on attitude towards physical exercise is also not in line with Okonta, Ikombele and Ogunbanjo (2014) who found that majority of respondents reported that they did not exercise regularly.

The results from the logistic regression analysis showed that males were more likely to have poor knowledge compared to females. The results also show that males were more likely to have positive attitudes toward diabetes compared to females. Respondents with no education were more likely to have poor practices compared to those with higher education.

5.2 CONCLUSION

On overall, the results show that female respondents have slightly higher knowledge on diabetes. Respondents who have secondary education, aged 41- 50 years employed and not married had fair knowledge on diabetes. The relationship between knowledge on diabetes and occupation of respondents is significant. The results of this study showed that the level of knowledge is relatively high among the items used to measure knowledge. The study concludes that although the knowledge, attitude and practice levels among respondents are relatively high, there is a need to educate individuals with diabetes in order to improve awareness. Therefore there is a need for structured programmes to improve knowledge, attitude and practices of diabetic patients. This could be achieved by increasing quality and scope of health education at Ministerial level. Education and counselling about all the aspects of diabetes is needed. Interventions should be put in place to sensitize individuals and this

could lead to better preventative and management techniques in diabetes. Thus, there is need for arranging large scale awareness programs for community at large and also to identify and use media to spread the message which can change the attitude and practice of the public in the future.

5.3 RECOMMENDATIONS

- The Ministry of Health must develop a framework for addressing Diabetes Mellitus as a chronic disease. This framework is to be patient centred and approach challenges faced by patients holistically
- There is need for the Ministry of Health to develop diabetes education curricula for both patients and health care providers, by so doing patients will be supported throughout the health care system and not only when in attendance in the "specialist clinic"
- Ministry of Health to consider supplying DM patients with Glucometers so that they can monitor their blood sugar levels before and after exercises. Patients with a medical insurance may be encouraged to use the insurance to purchase the Glucometers.
- The staffing of the clinic should be reviewed so as to put in place a truly multidisciplinary team that consists of professionals who can teach patients about exercise as an integral part of Diabetes Mellitus management.
- A clinic –based lifestyle intervention program should be in place in order to improve knowledge and practice of patients regarding healthy lifestyle.

5.4 LIMITATIONS OF THE STUDY

There were some limitations and everything possible was taken into consideration so that the results of the study are not altered. The participants were drawn from one facility in Gaborone because of the time frame for conducting the study.

Purposive sampling was used as opposed to random sampling to give all diabetic patients an equal chance of taking part in the study and this was also due to the time frame as the study was conducted in a health facility where patient are seen every three to four months; only patients visiting the health facility during the study period participated. Therefore the findings cannot be generalised to the entire population.

REFERENCES

Abdo, N.M, & Mohamed, M.E. (2010). Effectiveness of Health Education Program For Type 2 Diabetes Mellitus Patients Attending Zagazig University Diabetes Clinic. *Egypt J Egypt Public Health Assoc*. 85(3–4):113–130.

Agurs-Collins, T.D, Kumanyika, S.K, Thomas, T.R & Adams-Campbell, L.L. (1997*). A Randomized Controlled Trial of Weight Reduction and Exercise for Diabetes Management in Older African-American Subjects*, retrieved March 29

Alwan, A. D,David, R, MacLean, Leanne, M. Riley, Edouard Tursan d'Espaignet, Colin, D. M, Gretchen, A. S, Douglas, B. (2011). *Development at Risk: Addressing non communicable diseases at United Nations high-level meeting*. 89(8): 545-620.

Anderson, J. W. (2008).*Importance of weight management in Type 2 Diabetes: Review with meta-analysis at clinical Studies*. 22(5):881-889, retrieved March 29, 2013, from http://www.jaen.org/content/22/5/331.full.

Anju Gautam, Dharma Nand Bhatta, and Umesh Raj Aryel(2015).Diabetes related health knowledge, attributes and practice among diabetic patients in Napal., retrieved December 31, 2015, from www.ncbi.nlm.nih.gov>NCBI>Literature>PubmedCentral(PMC)

American Diabetes Association. (2007). Diabetes Mellitus and Exercise. 25(1), 564. Retrieved from http://care.diabetesjournals.org/content/25/suppl_1/s64.full

Azimi-Nezhad, M, Ghayour-Mobarhan, M, Parizadeh, M. R, Safarian, M, Esmaeili, H, Parizadeh, S. M. J, . & Ferns, G. (2008). *Prevalence of type 2 diabetes mellitus in Iran and its relationship with gender, urbanisation, education, marital status and occupation*. *Singapore Medical Journal*, 49(7): 571.

Baldi JC[1], Snowling N.(2003). Resistance training improves glycaemic control in obese type 2 diabetic men.,24(6):419-23, International journal of sports medicine., retrieved December 26,2015,from http://www.ncbi.nlm.nih.gov/pubmed/12905089

Barrett, J. E, Plotnikoff, R. C, Courneya, K. S, & Raine, K. D. (2007). *Physical activity and type 2 diabetes exploring the role of gender and income*.The Diabetes Educator, 33(1):128-143.

Bernard, N. (2007). Dr. Neal Barnard's program or reversing Diabetes: *The Scientifically Proven System for reversing Diabetes without Drugs*. 13,109-114.

Botswana Population and Housing Census. (2012). retrieved March 29, 2013, from http://www.cso.gov.bw/media/2011%20Census%20_Alphabetical%20Index%20of%20Districts.pdf.

Brink, P.J,& Wood, M.J. (2002). Advanced Design in Nursing Research. London: SAGE publishers.

Brind'Amour, K. (2012). *What is Type- 2 Diabetes*. retrieved April 15, 2013, from http://www.healthline.com/health/type-2-diabetes.

Burns, N. (2009).*Fundamentals Research Methodology for Health Care Professionals*. 2nd edition Cape Town, Juda & co (pty) Ltd.

Burns, N,& Grove, S. K. (2009). The practice of nursing research: *Conduct, critique, and utilization.* 6th Ed .Philadelphia: Saunders Elsevier.

Central Statistics Office. (2010). *Botswana Family Health Survey*, retrieved April 15, 2013, from

http://www.cso.gov.bw/index.php?option=com_content1&parent_id=184&pparent=364&id=419&nid=184.

Chalem, L. (2008). Thrive with Diabetes: *Lead an Optimistic, fun, challenging, fit, Tenacious, Enlightened, Innovative and Heroic life*. Retrieved April 5, 2013, from Online Book Surge Publishing.

Chiasson, J.L, Josse, R.G, Gomis, R, Hanefeld, M, Karasik, A, Laakso, M.(2002). *Acarbose for prevention of type 2 diabetes mellitus: the STOP-NIDDM randomized trial*. Lancet. 359, 2072-2077.

Clin, J. (2011). *Diabetes Mellitus and Alzheimer's disease*. 71(3):365-376, retrieved April 15, 2013, from http://www.ncbi.nih.gov/pmc.articles/PMC30445545.

Colberg, S.R, Sigal, R.J, Fernhall, B, Regensteiner, J.G, Blissmer, B.J, Rubin, R.R, Chasan-Taber, L, Albright, A.L, Braun, B.(2010). *Diabetes Care: Exercise and Type 2 Diabetes*, 33(12):147-167, retrieved April 15, 2013, from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2992225.

Constantini,N.W, Harman-Boehm,I, Dubnov-Raz. (2005)**.** Exercise prescription for diabetics: More than a general recommendation, 144(10):717-23, 750 retrieved June 20, 2015, from https://www.researchgate.net/publication/7486183_Exercise_prescription_for_diabetics_More_than_a_general_recommendation

Devamalar, P. M. (2010). *Introduction to Diabetes*. chapter3, Annual Report, retrieved March 29, 2013. https://www.ndr.nu/pdf/Annual_Report_NDR_2013

Diabetes Mellitus. (2008).*In Reference .com*. retrieved March 29, 2013, from http://www.reference.com/browse/diabetes-mellitus.

Danik, M, Martirosyan, PhD. (2009). *Functional Foods for Chronic Diseases:Obesity, Diabetes, Cardiovascular Disorders and AIDS*. 55, D&A Inc/FF Publishing, U.S.A.

De Vos, A.S, Strydom, H, Fouché, C.B, &Delport, C.S.L, (2006)*Research at Grass roots for the Social Sciences and Human Service Professions*. 3rd edn, J.L. van Schaik Academic, Pretoria.

Foot Gangrene, (2012). *The common Complication of Diabetes*. retrieved April 15, 2013, from http://www.reversegangrene.com/foot_gangrene_diabetes_ulcer.htm.

Geyer, S, Hemström, Ö, Peter, R, &Vågerö, D. (2006). Education, income, and occupational class cannot be used interchangeably in social epidemiology. *Empirical evidence against a common practice. Journal of epidemiology and community health*. 60(9):804-810.

Ghalmreza Sharfi Rad, Leila Azad Bakht, Avat Feizi, & Siamak Moh. (2013).*Importance of health Education* .*ebi*Educ Health Promot. 2: 62. retrieved April 5, 2013,http://dx.doi.org/10.4103%2F2277-9531.120864.

Gulve, E. A. (2008). *Exercise and glycaemic control in diabetes: benefits, challenges, and adjustments to pharmacotherapy*. Physical Therapy, 88(11):1297-1321.

Hoogwerf, J. B. (2010). *Diabetes mellitus, Disease Management, Importance of health Education r*etrieved April 5, 2013,: htt r//www.clevelandclinicmeded.com/ http://www.clevelandclinicmeded.com/medicalpubs/diseasemanagement/endocrinology/diabetes-mellitus.

Horton, E. S. (1988). *Role and management at exercise in diabetes mellitus*. retrieved April 15, 2013, from http://www.ncbi.nlm.nih.gov/pubmed/3289869.

Ikombele,J. B,. Knowledge, attitudes and practice regarding lifestyle modification in type 2 diabetic patients attending Mamelodi Hospital, Pretoria, Gauteng, Department of Family Medicine and Primary Health Care, University of Limpopo, Medunsa Campus, Pretoria 2 Mamelodi District Hospital, Pretoria , retrieved December 31, 2015, from http://ul.netd.ac.za/bitstream/handle/10386/699/Final%20version%20of%20dissertation%20prior%20to%20submission%20to%20external%20review.pdf?sequence=1&isAllowed=y

Jasper US[1], Ogundunmade BG, Opara MC, Akinrolie O, Pyiki EB, Umar A.(2014). Determinants of diabetes knowledge in a cohort of Nigerian diabetics., 13(1):39. Retrieved September 17, 2014, from http://www.ncbi.nlm.nih.gov/pubmed/24593904

Khurshid, T. K, & Othman, S. M. (2014). *Knowledge and practice about diabetes among adult diabetic patients in Erbil, Iraq*. Zanco J. Med. Sci., Vol. 18, No. (1):659-666

Knight, K. M., Dornan, T. and Bundy, C. (2006), The diabetes educator: trying hard, but must concentrate more on behaviour. Diabetic Medicine, 23: 485–501. doi: 10.1111/j.1464-5491.2005.01802. Retrieved from http://onlinelibrary.wiley.com/doi/10.1111/j.1464-5491.2005.01802.x/full

Launiala, A. (2009). *Anthropology Matters*. 11(1):2-3 retrieved April 15, 2013 from http://www.anthropologymatters.com/index.php/anth_matters/article/view/31/53.

Lopez,A.D, Mathers, & C.D. (2006*). Measuring the Global burden of disease and epidemiological transitions*. 2002-2030, 100 (5 & 6):481-499 retrieved April 15, 2013, fromhttp://care.diabetesjournals.org/content/20/10/1503.short .

Lim,K. Taylor, L. Factors associated with physical activity among older people--a population-based study. *Prev Med*. 2005 Jan;40(1):33-40.

Madden, K. M. (2013). Evidence for the benefit of exercise therapy in patients with type 2 diabetes. *Diabetes, metabolic syndrome and obesity: targets and therapy*. 6, 233.

Michelle, A, Mendez &Popkin, M. (2004).*Globalization, Urbanization and Nutritional change in the Developing World*, 1(2):220-241, retrieved April 5, 2013, from www.fao.org/es/esa/eJADE.

Ministry of Health Botswana and World Health Organization [MoHB WHO].Botswana STEPS Chronic disease risk factor surveillance report 2007.http://www.who.int/chp/steps/2007_STEPS_Report_Botswana. pdf. (accessed10 December 2015).

Morowati Sharifabad, S, Mazlomy, M, Baghiani, N, & Rouhani. (2009). *Relationships between locus of control and adherence to diabetes regimen*, 9(1):37-44, retrieved March 25, ,2015, from http://applications.emro.who.int/imemrf/J_Res_Health_Sci/J_Res_Health_Sci_2009_9_1_37.pdf.

Mshunqane, N, Cohen, D, & Kalk, J. K. (2004). *Effects of an exercise programme on non-insulin dependant diabetes mellitus.*South African Journal of Physiotherapy, 60(4): 26-30.

Novatec: Immunodiagnostic GmbH .(2004). *Diabetes Monitoring*: ELISA, retrieved April 15, 2013, from http://www.novatec-id.com/products/diabetes.

Odili, V. U, Isiboge, P. D, & Eregie, A. (2011). Patients' Knowledge of diabetes mellitus in a Nigerian city. Tropical Journal of Pharmaceutical Research, 10(5): 637-642.

Okonta H.I, Ikombele J.B, Ogunbanjo G.A.(2014).*Knowledge, attitude and practice regarding lifestyle modification in type 2 diabetic patients*. Afr J Prm Health Care Fam Med. ;6(1), Art. #655, 6 pages. http://dx.doi.org/10.4102/ phcfm.v6i1.655.

Praet SF[1], Manders RJ, Lieverse AG, Kuipers H, Stehouwer CD, Keizer HA, van Loon LJ. Med Sci Sports Exerc. 2006 Dec;38(12):2037-44.

Parahoo, K. (2006).*Nursing Research: Principles, Process and Issues*. 2nd Edition. Palgrave: Mc Milan

Persell, S.D, Keating, N.L, Landrum, M.B, Landon, B.E, Avanian, J.Z,& Borbas, C. (2004).*Relationship of diabetes-specific knowledge to self-management activities, ambulatory preventive care, and metabolic outcomes*. Prev Med (39):746–52.

Polit, D.F,& Beck, C.T. (2012).*Nursing Research: Generating and Assessing Evidence for nursing Practice.* 9th Edition. Philadelphia: Lippincott &Wilkins

Qiu, S.H, Sun, Z.L, Cai, X, Liu, L, Yang, B.(2012). - *Improving patients' adherence to physical activity in diabetes mellitus* retrieved February 14, 2013, from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3283821/ .

Ramachandran, A, ,Snehalatha, C, Mary, S, Mukesh, B, Bhaskar, A.D,&Vijay, V.(2006).The Indian Diabetes Prevention Programme shows that lifestylemodification and Metformin prevent type 2 diabetes in Asian Indian subjects with impaired glucose tolerance (IDPP-1). Diabetologia, 49, 289-297.

Rathod, G.B, Rathod, S, Parmar, P, Parikh, A. (2014).Study of Knowledge, Attitude and Practice of General Population of Waghodia towards Diabetes Mellitus. IJCRR. 2014; 6(1): 63-68Rippe, J, B. (2013). Lifestyle Medicine. 2nd ed, 450. USA, Taylor & Francis Group.

Shah, V.N, Kamdar, P,& Shah, N. (2009).*Assessing the knowledge, attitudes and practice of type 2 diabetes among patients of Saurashtra region*. Gujarat. Int J Diabetes Dev Countries. 29(3):118. doi: 10.4103/0973-3930.54288.

Rathod, G.B, Rathod, S, Parmar, P,& Parikh, A. (2014).*STUDY OF KNOWLEDGE, ATTITUDE AND PRACTICE OF GENERAL POPULATION OF WAGHODIA TOWARDS DIABETES MELLITUS*. IJCRR. 6(1): 63-68.

Shah, V.N, Kamdar, P,& Shah, N. (2009).*Assessing the knowledge, attitudes and practice of type 2 diabetes among patients of Saurashtra region, Gujarat. Int J Diabetes Dev Countries*. 29(3):118. doi: 10.4103/0973-3930.54288.

Silverstein, J,'Klingensmith, G, Copeland, K, Plotnick, L, Kaufman, F, Laffel, L, Deeb, L, Grey, M, Anderson, B, Holzmeister, L.A,&Clark, N.(2005).*Care at children and Adolescents with Type 1 Diabetes*. 28 (1):186-212 retrieved March 29, 2013, from http://care.diabetesjournals.org/content/28/1/186.long.

Viral N. Shah,P. K. Kamdar, and Nishit Shah[1](2009).Assessing the knowledge, attitudes and practice of type 2 diabetes among patients of Saurashtra region, Gujarat retrieved December 15 2015 from http://rssdi.in/new/diabetesbulletin/2009/JULY/IntJDiabDevCtries293118-8320677_021840.pdf

Voncella, McCleary-Jones. (2010).*Official journal of the Association of Black Nursing Faculty in Higher Education*. 22(2):25-32 retrieved March 25, 2015, from http://web.a.ebscohost.com/ehost/pdfviewer/pdfviewer?sid=1086fcb0-213f-4c99-b0cb-ac1ab3ca32b5%40sessionmgr4003&vid=0&hid=4214

World Health Organization, Global Burden of Disease Database 2004 update, retrieved March 29, 2013, from http://www.who.int/healthinfo/global_burden_disease/projections/en/index.ht

World Health Organization/International Diabetes Federation Report of WHO/IDF consultation. Definition and diagnosis of diabetes mellitus and intermediate hyperglycaemia. Geneva: WHO Press; 2006:1–46.

World Health Organization, Global Burden of Disease Database 2008 , retrieved March 29, 2013, from http://www.who.int/healthinfo/global_burden_disease/projections/en/index.ht

WHO . World Health Organization. Global health risks: mortality and burden of disease attributable to selected major risks. 2009.

WHO. World Health Organization. Global status report on noncommunicable diseases 2010. Geneva: World Health Organization, 2011; 2013

WHO. World Health Organization. Global recommendations on physical activity for health. 2010

Zeyana S., Bimani .A., Khan S.A., David .P.,(2013) Evaluation of T2DM related knowledge and practices of Omani patients 23(1):22-27 retrieved August 17, 2015, from http://www.sciencedirect.com/science/article/pii/S1319016413001175

Zoloedov, V. I., Miroshinichenko, L. A., Volynkina, A. P., Kulakova, S. N., & Martirosyan, D. M. (2009). The Influence of Dietotheraphy With Amaranth and Sunflower Olis on the Lipid and Carbohydrate Exchange of Diabetic Patients with Obesity. In D. M. Martirosyan (Ed.), *Functional Foods for Chronic Diseases, Volume 4 Obesity, Diabetes, Cardiaovascular Disorders and AIDS* (pp. 55-66). Richardson: D&A Inc.

APPENDICES

APPENDIX A. BUDGET

The total budget for the entire research

ACTIVITY	AMOUNT (Rands)
Stationery	R3000
Telephone calls	R2000
Travel expenses	R2500
Editing and binding	R8000
Translator	R4500
Total	R20,000

APPENDIX B. Time Frame for the research

ACTIVITY	TIME PERIOD
Finalize proposal	March 2014
Submission to SDC	May 2014
Submission to MREC	June
Seek permission from ministry of health Botswana	July
Seek permission from Greater Gaborone DHMT	July
Data collection	August
Data analysis	September
Report writing	September
Submission draft report to supervisor	October
Submission of final report	November
Graduation	September 2015

APPENDX C. QUESTIONNAIRE

PLEASE ANSWER

SECTION A: **DEMOGRAPHIC DATA**

Today's date: _____

1.

Age	
Gender	Male
	Female
Highest educational level(tick only once):	Never been to school
	Primary School
	Secondary School
	Tertiary (Certificate, Diploma, Degree, Masters)
Marital status(tick√ only once)	Single
	Cohabitate
	Married
	Divorced or widowed

1.

Occupation (tick only once):	Scholar
	Employed
	Self employed
	Unemployed

2.

Religion(Tick only once):	Christian
	Muslim
	Other
	None

3.

Race(tick only once):	African
	Coloured
	Indian/Asian
	White

4. How long have you been diagnosed with diabetes(check √ only once):

Less than 1 year	
1 year to 3 years	
3 years to 5 years	
5 years to 10 years	
More than 10 years	

5. Do you have a parent, sibling of child who has diabetes (tick√ only once):

Yes	
No	
Don't know	

SECTION B: **KNOWLEDGE ON DIABETES**

Knowledge Assessment (Total Score:10)

1. The major symptoms of diabetes are urination, increased thirst and hunger? (tick√ only once)

Yes	
No	
Don't know	

2. What is the normal fasting blood sugar level?(tick √only once)

Less 6 mmol/L	
6-12mmol/L	
12-24 mmol/L	
24-48mmol/L	
Don't know	

3. Which of the following is not a complications that can result when diabetes is not well controlled?(tick √only once)

Loss of vision	
Kidney problems	
Heart disease	
Cancer	
Amputation	

4. Which of the following is not an important factor in controlling diabetes? (tick√ only once)

Exercise	
Fasting	
Drugs	
Diet	

5. What is the recommended minimum amount of exercise that a person with diabetes should get in a week?(tick √ only once)

Don't. know	
20 minutes 2 days	
30 minutes 2 days	
20 minutes 3 days	
30 minutes 3 days	

6. When a person who is on insulin does running exercises, where should they not inject themselves?(tick√ only once)

Arms	

Abdomen	
Thighs	
Don't know	

7. Regular urine analysis test help with knowing the amount of protein in ones urine? (tick√ only once)

Yes	
No	
Don't know	

8. During exercise what happens to the amount of insulin required by the body?(tick √ only once)

Increases	
stays the same	
Decreases	
Don't know	

9. What must you do if you discover that your blood sugar reading is high just before your planned exercise time?(tick √ only once)

don't exercise	
go ahead and exercise	
Wait till it becomes normal	
Don't know	

10. How frequently should a person with diabetes have their eyes checked? (tick √ only once)

Once a month	
Once every six months	

Once every year	
Once every 5 years	
Don't know	

SECTION C: **ATTITUTES TO EXERCISES**

Attitude Assessment (Total Score: 10)

1. Do you think you can lead a normal life if you take appropriate measures for diabetes?(tick √ only once)

Yes	No	Don't know

2. Are you willing to do regular exercise to prevent further complication due to diabetes? (check √ only once)

Yes	No	Don't know

3. Do you think people with diabetes who are on insulin should measure blood sugar before, during, and after exercise to determine their body's typical response to exercise?(tick √ only once)

Yes	No	Don't know

4. Are you willing to do specially prescribed exercises as given by your health worker? (tick √only one)

Yes	No	Don't know

5. Will you wear footwear as recommended by your health worker when you go to exercise? (tick √ only once)

Yes	No	Don't know

6. Do you think that seeing a health care worker for your diabetes at least once every 6 months is beneficial?(tick √ only once)

Yes	No	Don't know

7. Do you feel that you can control your diabetes so that it does not interfere with the things you want to do? tick √ only once)

Yes	No	Don't know

8. Do you feel that you can follow your recommended diet even when you have to share food with other people who do not have diabetes?(tick √ only once)

Yes	No	Don't know

9. Do you feel that you can judge when the changes in your illness mean you should visit the doctor?(tick √ only once)

Yes	No	Don't know

10. Do you feel that you can eat all your meals as per the time intervals recommended by your health worker? (tick √ only once)

Yes	No	Don't know

SECTION D: **PRACTICE**

Practice Assessment (Total score: 10)

1. Do you exercise?(tick √ only once)

Yes	No	Don't know

2. During the past week, did you spend at least 30 minutes, 3 days per week doing stretching or muscle strengthening exercises such as lifting weights? (tick √ only once)

Yes	No	Don't know

3. During the past week, did you spend at least 30 minutes, 3 days per week doing any of the following exercises; walking, running, riding bicycle, swimming, climbing stairs, or any other aerobic exercises? (tick √ only once)

Yes	No	Don't know

4. In the past month, have you exercised for at least 30 minutes/ 3 days per week? (tick √ only once)

Always	Sometimes	Never

5. Do you have a machine to measure your blood sugar (glucose) level? (tick √only one)

Yes	No	Don't know

6. In the past month, how often have you checked your blood sugar level before you exercise? (tick √ only once)

Always	Sometimes	Never

7. In the past month, how often have you checked your blood sugar level after you exercise? (check √ only once)

Always	Sometimes	Never

8. In the past week, how often have you eaten breakfast when you got up? (tick √ only once)

Always	Sometimes	Never

9. In the past week did you take your diabetes medication as prescribed by your health worker? (tick √ only once)

Always	Sometimes	Never

10.When you exercise do you wear the type of shoes recommended by your health provider? (tick √ only once)

Always	Sometimes	Never

APPENDX C. SETSWANA QUESTIONNAIRE

TSWEETSWEE ARABA TSOTLHE

KGAOLWANA: **A DEMOGRAPHIC DATA**

Letsatsi la gompieno

1.

Dingwaga	
Bong	Monna
	Mosadi
Thutego ye o e fitlheletseng (tshwaya √go le gongwe):	Ga ke a tsenasekolo
	Dithutotse di Potlana
	Dithutotse di kgolwane
	Dithhutotse di tona (setlankana, Dipoloma, Dikeree, tsedikgolwane)
Seemo sa lenyalo (tshwaya √go le gongwe)	Ga ke a nyalwa
	Kenna le monna re sanyalana
	Ken ye tswe
	Ketlhokafaletswekemonna/mosadi

2.

Tsa Pereko tshwaya √go le gongwe)	Ngwanawasekolo
	Ke a bereka
	Ke a ipereka
	Ga kebereke

3. Ke lebaka le lekae o na le bolwetsi jwa sukiri (tshwaya √go le gongwe):

Kwa tlase ga ngwaga	
Gwagago ya tsetharo	
Tsetharogo ya tse tlhano	
Tse tlhano go ya tse lesome	
Gofeta dingwaga tse lesome	

4. A o na le motsadi kana morwarrago yo o nang le bolwetse jwa sukiri (tshwaya √go le gongwe):

Ee	
Nnyaa	
Ga ke itse	

KGAOLWANA B: **KITSO KA BOLWETSE JWA SUKIRI**

TSOBOKANYO KA KITSO (10)

1. DIKAI TSE DI KGOLO TSA SUKIRI? (tshwaya √go le gongwe)

Ee	
Nnyaa	
Ga keitse	

2.Selekanyo sa sukiri se se siameng ke bokae?(tshwaya √go le gongwe)

Kotlasega 6 mmol/L	
6-12mmol/L	
12-24 mmol/L	
24-48mmol/L	
Ga keitse	

3.Kesefe se e seng setlamoragosabolwetsijwasukiri jo bosalaolesegeng?(tshway√go le gongwe)

Go latlhegelwakepono	
Mathata a diphilo	
Bolwetsijwapelo	
kankere	
Go kggaolwaserwe	

4.Kesefe se sesengbotlhokwa mo go laolengbolwetsejwasukiri ? (tshwaya√go le gongwe)

Itshidilommele	
Go itimadijo	

melemo	
Dijo	

5..Keselekanyo se sekae se seletlelesegangsa go itshidilammelese se kwatlase mo molwetsengwasukiri?(tshwaya √go le gongwe)

Ga keitse	
Metsotswana 20 mo malatsing a mabadi	
Metsotswana 30 mo malatsing a mabadi	
Metsotswana 20 mo malatsing a mararo	
Metsotswana 30 mo malatsing a mararo	

6..Molwetseyo o tsayangmokentowasukiriga a tshwanela go ikenta fa kae fa a ya go taboga?(tshwaya √go le gongwe)

Mo matsogong	
Mo dimpeng	
Mo diropeng	
Ga keitse	

7.Go tlhatlhoba motlhapo kana kotso go thusa go lemotsha selekanyo sa kotla ee agang mmele mo motlhapong (tshwaya √go le gongwe)

Ee	
Nnyaa	
Ga keitse	

8..Fa motho a itshidila mmele go diragalang kase lekanyo sa insulin(selo se sesilang sukuri mo mmeleng?(tshwaya √go le gongwe)

Ya oketsega	
E nna e tshwanafela	
Ya fokotsega	
Ga keitse	

9..O tshwanetse go dira eng fa o lemoga gore sukiriya gago e le ko godimo pele ga o itshila mmele?(tshwaya √go le gongwe)

O seka wa itshila mmele	
Tswelela o itsidile mmele	
Letela go fitlhela e boela mo selekanyong	
Ga keitse	

10.Molwetse wasukiri o tlhatlhojwa matlho ga kae? (tshwaya √go le gongwe

Gangwe mo kgweding	
Gangwe mo kgweding tse thataro	
Gangwe mo ngwageng	
Gangwe mo ngwageng tse tlhano	
Ga keitse	

KGAOLWANA C **Maikutlo mo itshidilo mmeleng**

Tshoboko mo maikutlong (10)

1. A o tsaya gore o ka tshela sentle ka bolwetse jwasukiri fa o tsaya dikgato tse di maleba ?(tshwaya √go le gongwe)

Ee	Nnyaa	Ga keitse

2. A o ikemiseditse go itsidila mmele kgapetsakgapetsa go fema ditlamorago tsa bolwetse jwa sukiri? (tshwaya √go le gongwe)

Ee	Nnyaa	Ga keitse

3. A o akanya gore balwetse ba sukiri baba mo mokentong batshwanelwa ke go tlhatlhoba sukiri pele ga itshidila, kana ha ba itshidila le basena go itshidila go re

batle le baitse gore mmele wa bone o tsaya itshidilo mmele jang?(tshwaya √go le gongwe)

Ee	Nnyaa	Ga keitse

4. A o ikemiseditse go ka dira itshidilo mmele e o fiwang ke modiri wa botsogo go e sala morago ? (tshwaya √go le gongwe)

Ee	Nnyaa	Ga keitse

5. A o tla rwala ditlhako tse di tshwanetseng ebile di letlelelwa keba botsogo fa o itshidila mmele? (tshwaya √go le gongwe)

Ee	Nnyaa	Ga keitse

6. A o tsaya gore go bona ba botsogo gangwefela morago ga kgwedi tse thataro go siame?(tshwaya √go le gongwe)

Ee	Nnyaa	Ga keitse

7. A o tsaya gore o oka kgona go laola bolwetse jwa sukiri gore bo seka ba go kgoreletsa go dira dilo tse o ratang go di dira? (tshwaya √go le gongwe)

Ee	Nnyaa	Ga keitse

8. A o akanya gore o ka sala morago thulaganyo ya dijo e o filweng le fa o tshwanela go tlhakanela dijo le batho baba sa bolaiweng ke bolwetse jwa sukiri?(tshwaya √go le gongwe)

Ee	Nnyaa	Ga keitse

9. A o tsaya gore go lebala go tsaya melemo ya gago ya sukuri go kanna diphatsa mo go laoleng bolwetse jwa gago? (tshwaya √go le gongwe)

Nakotsotlhe	Nakonngwe	Ga keitse

10. A o tsaya gore o ka kgona go lemoga fa diphetogo mo bolwetseng jwa gago di batla gore o e go bona ngwaka?(tshwaya √go le gongwe)

Ee	Nnyaa	Ga keitse

11. A o tsaya gore o kgona go ja dijo tsa gago ka fa go tshwanetseng le ka dinako tse di tshwanetseng jaaka o laetswe ke modiri wa botsogo? (tshwaya √go le gongwe)

Ee	Nnyaa	Ga keitse

KGAOLWANA D: **ITSHILO MMELE**

ITSHILO (Matshwao: 10)

1. A o itshidila mmele?(tshwaya √go le gongwe)

Ee	Nnyaa	Ga keitse

2. Mo bekeng ee fitileng a o tsere metsotwana e e masome mararo , malatsi a mararo mo bekeng o itsidila go gagamatsa mesifa jaaka go tsholetsa dilo tse di bokete? (tshwaya √go le gongwe)

Ee	Nnyaa	Ga keitse

3. Mo bekeng ee fitileng a o tsere metsotswana e e masome a mararo , malatsi a mararo o itshidila ka go dira dilo tse di latelang go tsamaya ka dinao, go palama baesekele, go thuma, go palamela ko go dimo,kana sengwe sa go tlolatlola? (tshwaya √go le gongwe)

Ee	Nnyaa	Ga keitse

4. Mo kgweding e e fitileng o o ne o itshidila metsotswana e e masome a mararo ,malatsi a mararo mo bekeng? (tshwaya √go le gongwe)

Nako tsotlhe	Nako nngwe	Nnyaa ga keitse

5. A o na le matshine o o tlholang selekanyo sa sukiri mo mading? (tshwaya √go le gongwe)

Ee	Nnyaa	Nnyaa ga keitse

6. Mokgweding e efitileng o ne wa tlhola sukiri mo mading jang? (tshwaya √go le gongwe)

Nako tsotlhe	Nako nngwe	Nnyaa ga keitse

7. Mo kgweding e e fitileng a o ne wa tlhola sukiri mo mading pele ga o itshidila mmele? (tshwaya √go le gongwe)

Nako tsotlhe	Nako nngwe	Nnyaa ga keitse

8. Mo bekeng e e fitileng o jele dijo tsa mo mosong ?(tshwaya √go le gongwe)

Nako tsotlhe	Nako nngwe	Nnyaa ga keitse

9. Mo bekeng e e fitileng a o ne o tsaya melemo ya gago ya sukiri jaaka o laetswe ke modiri wa botsogo ? (tshwaya √go le gongwe)

Nako tsotlhe	Nako nngwe	Nnyaa

10. Ha o itshidila mmele a o rwala ditlhako tse o laoletsweng ke modiri wa botsogo? (tshwaya √go le gongwe)

Nako tsotlhe	Nako nngwe	Nnyaa

APPENDIX D. LETTERS

Letter of permission from the Ministry of Health

P.O. Box 8372
Gaborone
The Permanent Secretary
Ministry of Health
Gaborone
Dear Sir
RE: request for permission to conduct the study at Block 6 clinic

I hereby request for permission to conduct a study among patients at the above mentioned clinic, whicvh is specializing in treatment and control of diabetes.. I am currently an enrolled student for Master of Public Health Degree at School of Health Sciences, University of Limpopo (turf loop campus). I am required to submit a research report in partial fulfilment of my degree.

The title of my study is “Knowledge, Attitudes and Practices amongst Diabetes mellitus patients on Exercise at Primary Health Centre in Gaborone Botswana

This study will assist to develop a training exercise package for diabetic patients, to inform policy on preventative interventions and strategies for managing lifestyle diseases.

The protocol has been submitted to the Medunsa Research Ethics Committee for ethical consideration and University of Limpopo Senior Degree Committee. The research will commence after approval by the two committees

All the participants will be required to give the consent prior to participating in the study and they will be informed that the participation is voluntary and that they may withdraw from the study at any time. The findings of the will be shared with the ministry.

Yours sincerely
Shirley Boshale Keakile
Contact no: +267 72541804
Email address skeakile@gov.bw

Letter for permission from the Greater Gaborone DHMT

P.O. Box 8372
Gaborone
The Permanent Secretary
Ministry of Health
Gaborone
Dear Sir
RE: Request for permission to conduct the study at Block 6 clinic
I hereby request the permissions conduct the study among patients. I am currently an enrolled student for Master of Public Health Degree at the Faculty of Health Sciences, University of Limpopo (turf loop campus). I am required to submit a research report in partial fulfilment of my degree.

The title of my study is Knowledge, Attitudes and Practices amongst Diabetes mellitus patients on Exercise at Primary Health Center in Gaborone Botswana

This study will assist in developing a training exercise package for diabetic patients, informing policy on preventative interventions and strategies for managing lifestyle diseases.

The protocol has been submitted to the Medunsa Research Ethics Committee for ethical consideration and University of Limpopo Senior Degree Committee. The research will commence after approval by the two committees

All the participants will be required to give the consent prior to participating in the study and they will be informed that the participation is voluntary and will be allowed to withdraw from the study at any time. The findings of the will be shared with the ministry

Yours sincerely
Shirley BoshaleKeakile
Contact no: +267 72541804
Email address skeakile@gov.bw

University of Limpopo (Turf loop campus) consent form

Statement concerning participation in a Research Study

Name of the study: “Knowledge, Attitudes and Practices amongst Diabetes mellitus patients on Exercise at Primary Health Center in Gaborone Botswana

I have read the information on the aims and objectives of the proposed study and was provided the opportunity to ask questions and given adequate time to rethink the issue

The aims of the study are sufficiently clear to me. I have not been pressurized to participate in any way

I understand that participation in this study is completely voluntary and that I may withdraw from it at any time and without giving reasons. This will have no influence on services I receive neither will it influence the relationship with the health workers at the health facility.

I know that the study has been approved by the Senior Degree Committee university of Limpopo (turf loop campus). I am fully aware that the results of the study will be used for scientific purposes and may be published. I agree to this, provided my privacy is guaranteed

_____

Name of Participant Signature of Participant

_____ _____

_____

Place Date Witness

Statement by the Researcher

I provided verbal and written information regarding this study.

I agree to answer any future questions concerning the study as best as I can.

I will adhere to the approved protocol

_____	_____	_____
Name of researcher	signature	Date

Medusa research & ethics committee clearance certificate

UNIVERSITY OF LIMPOPO
Medunsa Campus

MEDUNSA RESEARCH & ETHICS COMMITTEE

CLEARANCE CERTIFICATE

MEETING:	**07/2014**
PROJECT NUMBER:	**MREC/HS/274/2014: PG**
PROJECT:	
Title:	Knowledge, attitudes and practice amongst diabetes mellitus patients on exercise at primary health center in Gaborone Botswana
Researcher:	Ms SB Keakile
Supervisor:	Prof L Skaal
Department:	Medical Science, Public Health & Health Promotion
School:	Health Sciences
Degree:	MPH

DECISION OF THE COMMITTEE:

MREC approved the project

DATE: 04 September 2014

UNIVERSITY OF LIMPOPO
Medunsa Campus
2014 -09- 04
MEDUNSA RESEARCH ETHICS COMMITTEE
MREC CHAIRPERSON

pp

PROF GA OGUNBANJO
CHAIRPERSON MREC

The Medunsa Research Ethics Committee (MREC) for Health Research is registered with the US Department of Health and Human Services as an International Organisation (IORG0004319), as an Institutional Review Board (IRB00005122), and functions under a Federal Wide Assurance (FWA00009419)
Expiry date: 11 October 2016

Note:
i) Should any departure be contemplated from the research procedure as approved, the researcher(s) must re-submit the protocol to the committee.
ii) The budget for the research will be considered separately from the protocol.
PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES.

Finding Solutions for Africa