

**DIABETES KNOWLEDGE AND GLYCEMIC CONTROL IN
DIABETICS AT BUTERE COUNTY HOSPITAL, KAKAMEGA**

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**A THESIS SUBMITTED TO THE SCHOOL OF PUBLIC HEALTH,
COLLEGE OF HEALTH SCIENCES IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF
MASTER OF PUBLIC HEALTH IN EPIDEMIOLOGY AND DISEASE
CONTROL**

MOI UNIVERSITY

JUNE, 2014

DECLARATION

DECLARATION BY CANDIDATE

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DEDICATION

This work is dedicated to my family for their constant encouragement and motivation in my education pursuits.

ABSTRACT

Title: Diabetes knowledge and glyceemic control in diabetics at Butere county hospital, Kakamega.

Background: Lack of knowledge on diabetes and self care practices among diabetics are some of the important factors influencing the progression of diabetes and its complications.

Objective: To assess patients knowledge on diabetes and self care practices and relate this to achievement of satisfactory glyceemic control.

Methodology: This was a cross sectional study at the outpatient clinic of Butere District Hospital involving all diabetic patients. Data was collected using pretested structured questionnaires. Blood was drawn for random blood sugar testing. Data was analyzed for descriptive and inferential statistics using Microsoft excel 2007 and Statistical Package for Social Scientists version 11.5.

Results: A total of 71 patients participated in this study, 47.8% were males. Majority (29.6%) were aged between 46-55 years. Seventy three percent were married, 86.5% had secondary education and below with only 4.2% having university education. Majority (46.5%) were self employed while 11.3% were retired. Forty eight percent of the patients had diabetes for more than 5 years and majority (80%) were on oral medication. Diabetes patients had poor glyceemic control with 87.3% having random blood sugar more than 8mmol/l with the mean random blood sugar of 12.2 ± 3.7 mmol/l. Majority of the patients (64.8%) had poor knowledge. The mean total knowledge score was 32 ± 4.3 , diabetes knowledge score was 16 ± 4.2 and self care knowledge score was 15.6 ± 3.9 . Patients scored poorly on self care practices with more than 71% scoring less than 50% of the score. There was a negative correlation between random blood sugar and knowledge score ($r = -0.340$, $p = 0.004$). Patients with good glyceemic control had knowledge mean of 37.3 ± 0.9 while those with poor glyceemic control had mean of 31.2 ± 0.7 . The difference was statistically significant ($t = 2.999$, $p = 0.004$).

Conclusion: Diabetic patients at Butere County Hospital had low knowledge on diabetes and self care practices and this was associated with unsatisfactory glyceemic control.

Recommendation: There is need to find out if knowledge deficit in these patients is the cause of unsatisfactory glyceemic control.

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LIST OF ABBREVIATIONS

CVDs:	Cardio vascular diseases.
DFU:	Diabetic Foot Ulcers
DKA:	Diabetic Ketoacidosis
DKT:	Diabetes Knowledge Test.
DM:	Diabetes Mellitus.
DMI:	Diabetes Management and Information Centre
DR:	Diabetic Retinopathy
DSME:	Diabetes Self Management Education
FBS:	Fasting Blood Sugar
GDM:	Gestational Diabetes Mellitus
GoK:	Government of Kenya
HbA1c:	Glycosylated Hemoglobin.
HBP:	High Blood Pressure
HIV:	Human Immunodeficiency Virus.
IDDM:	Insulin Dependent Diabetes Mellitus.
IDF:	International Diabetes Federation
IGT:	Impaired Glucose Tolerance
IREC:	Institution Research and Ethics Committee
KDHS:	Kenya Demographic and Health Survey
KNDS:	Kenya National Diabetes Strategy.
MNT:	Medical Nutrition Therapy

MOPC:	Medical Out Patient Clinic
MODY:	Maturity Onset Diabetes of the Young
MOH:	Ministry of Health.
MOPHS:	Ministry of Public Health and Sanitation
MTRH:	Moi Teaching and Referral Hospital
NCD:	Non Communicable Disease
NIDDM:	Non Insulin Dependent Diabetes Mellitus
RBS:	Random Blood Sugar
SD:	Standard Deviation
SMBG:	Self Monitoring of Blood Glucose
T2DM:	Type two Diabetes Mellitus
T1DM:	Type one Diabetes Mellitus
WHO:	World Health Organization

DEFINITION OF TERMS

Diabetes Mellitus: In this study RBS of more than 8mmol/L with signs and symptoms suggestive of diabetes i.e. increased urine output, increased food intake, increased feeling of thirst. Or any patient on insulin and or oral hypoglycemic medication for the last three months.

Diabetic Self Care: Activities performed by diabetes patients on a daily basis for management of blood glucose to prevent complications and allow them to live normal lives.

Satisfactory glycemic control: In this study RBS levels between 4 to 8 mmol/L will be classified as satisfactory.

Diabetic health literacy: The ability of a person to read, understand, and act appropriately on diabetes information.

Knowledge of diabetes: It's the score of the respondents as indicated by their answers to questions about diabetes with respect to causation, symptoms, complications and self care practices.

ACKNOWLEDGEMENTS

I would like to acknowledge my supervisor's Professor P. Ayuo and Dr. C. Walekhwa for their continuous guidance and support in writing this thesis. Special thanks to the Ministry of Medical services for granting me study leave to study epidemiology at MoiUniversity.

I also wish to appreciate Dr. D. C Otieno for guidance and invaluable statistical advice and for making this study possible, Mr.Kangu, Anne Maina and Washington for translating the questionnaire to Marama version and also for collecting the completed questionnaire.

Special gratitude to Butere County Hospital management for granting me permission to conduct the study in the facility, the diabetics for their cooperation and participation in this study and to the laboratory department at Butere County Hospital for allowing me to use their glucometers and for assisting in random blood sugar testing. Finally to my family for their moral and financial support.

CHAPTER ONE: INTRODUCTION

1.1 Background

Diabetes is a non communicable disease (NCD) caused by inadequate production of insulin by the body or by the body not being able to properly use the insulin resulting in high blood glucose levels. Data from the MOH in Kenya indicates that an estimated 1.2 million Kenyans live with diabetes, and the number is expected to rise to 1.5 million by the year 2025 (MOPHS, 2010). The International Diabetes Federation estimated the prevalence of diabetes in Kenya to be about 3.3% of the population in 2007. However, local studies have shown prevalence of 4.2% in the general population with a prevalence rate of 2.2% in the rural areas and as high as 12.2% in urban areas (IDF, 2009).

Management of diabetes requires the patient to be knowledgeable about the disease and be able to use good self care practices. Self care practices are necessary in the management and control of diabetes and its complications. The practices required are healthy eating, physical activity, adherence to medication, monitoring of blood glucose and reducing risks among others (Mary, 2003). Controlling and prevention of diabetes complications is possible through health educational programs. These programs should be seen as an intervention structured toward providing these patients with knowledge, attitude, and skills necessary for self care practices for them to achieve glycemic control and make behavioral changes, especially on diet and physical activity (Heloisa *et al* 2006).

Knowledge is the greatest weapon in the fight against Diabetes Mellitus (DM). Information can help people assess their risk of diabetes, motivate them to seek proper

treatment and care, and inspire them to take charge of their disease (Moodley and Rambiritch, 2007). A study by Karam *et al* (2012) showed that assessment of patient's knowledge on diabetes and self care practices is important in developing various intervention strategies and educational material. In Kenya, studies have been done targeting the general population where it was found that the level of knowledge of diabetes in all regions was low (Maina *et al* 2010). In Butere there are no documented studies of this kind. There is also need of such studies targeting diabetes patients in this area. This study aims to assess the level of knowledge of diabetes and self care practices among diabetic patients.

1.2 Problem Statement

Diabetes is threatening to overwhelm the health care system in the near future, affecting the economic growth of most developing countries and the ability to achieve the agreed international development goals as the majority of the people with diabetes in developing countries are within the productive age range of 45 to 64 years (Alberti, 2001). To reduce this burden public health interventions are required to prevent diabetes or delay the onset of its complications. This will require lifestyle modification for those at risk of diabetes and aggressive treatment for those with the disease (Dawn *et al*, 2003). To achieve satisfactory glycemic control the patients should have knowledge on the disease and its management. Lack of knowledge on the disease and self care practices may lead to unsatisfactory glycemic control. People who are not literate cannot understand written and oral health care information. This is likely to make them less knowledgeable about diabetes and unable to achieve better glycemic control (Charlotte, 2009). Studies have shown that inadequate knowledge about diabetes negatively affects behavior and self care practices (Jabbar *et al* 2001) and that majority of diabetics do not receive sufficient diabetes education

(Rafique *et al*, 2006). From the patients medical records, despite the aggressive treatment of patients at Butere County Hospital, most of these patients are unable to achieve satisfactory glycaemic control. This raises concerns as to whether this could be caused by the patients not adhering to medication, unable to access medication due to financial constraints or maybe that they are lacking knowledge on diabetes and self care practices that is essential in the management of the disease. This study therefore sets to establish the patients' level of knowledge on diabetes and self care practices.

1.3 Justification of the Study

Despite the evidence on the benefits of tight glycaemic control in diabetes patients, patients at Butere County Hospital are unable to achieve satisfactory glycaemic control and thus are vulnerable to long term diabetes complications. It is evident that education is important in the management of diabetes. In Butere there are no structured education and information program on diabetes. Obtaining information on the level of knowledge about diabetes and self care practices is the first step in formulating an education program. Most attempts that are done to assess the educational needs of the patients are studies in urban area. This study assessed the level of knowledge of diabetic patient regarding disease in Butere County hospital which mostly serves the rural population. The study also explored the association of the knowledge with glycaemic control and patient specific characteristics and this will help develop educational strategies to further improve patients self care practices. Through this education program these patients will be able to achieve satisfactory glycaemic control reducing the risk of developing complications as prevention is better than cure. This will also help reduce health care burden both to the families and the government in terms of complications management.

1.4 Research Questions

1. What is the level of knowledge on diabetes and self care practices among diabetic patients attending outpatient clinic at Butere district hospital?
2. Is there any association between the level of knowledge of diabetes, self care practices and glycemic control in diabetic patients attending care at Butere district hospital?

1.5 Main Objective

To assess patients knowledge on diabetes and self care practices at Butere district hospital and relate this to achievement of satisfactory glycemic control.

1.5.1 Specific objectives

1. To evaluate patients knowledge on diabetes and self care practices in diabetic patients at the outpatient clinic at Butere district hospital.
2. To determine the association between patients knowledge of diabetes, self care practices and achievement of satisfactory glycemic control.

CHAPTER TWO: LITERATURE REVIEW

2.1 What is diabetes?

Diabetes Mellitus is a chronic clinical syndrome characterized by hyperglycemia due to an absolute or relative deficiency of insulin. Insulin deficiency may be as a result of the destruction of β cells of the pancreas, an organ responsible for the production of insulin (Leslie *et al*, (2008). Though the exact cause of DM is uncertain genetic and predisposing factors contribute to the onset of the disease. (Al Shafee *et al* 2008). It is associated with acute complications such as ketoacidosis and hypoglycemia, as well as long term complications affecting the eyes, kidneys, feet, nerves, brain, heart and blood vessels (MOPHS, 2010). Diabetes produces significant morbidity and mortality and it's regarded as a major public health challenge (Barrel *et al*, 2008).

2.2 Epidemiology of Diabetes

According to WHO (2010) statistics the prevalence of diabetes has reached epidemic proportions with developing countries bearing the burden of this epidemic in the 21st century. Currently, more than 70% of people with diabetes live in low and middle income countries. An estimated 285 million people (6.4%) of the world's adult population lived with diabetes in the year 2010. The number is expected to rise to 438 million (7.8%) of the adult population by 2030. The mortality rate due to diabetes in 2010 shows a 5.5% increase over the estimates for the year 2007. This largely due to a 29% increase in the number of deaths due to diabetes in the North America and Caribbean Region, a 12% increase in the South East Asia Region and an 11% increase in the Western Pacific Region. Type two Diabetes Mellitus (T2DM) accounts for over 85% of all diabetes in high income countries and even higher percentage in low and middle income countries. Eighty percent of T2DM is preventable by changing diet,

increasing physical activity and improving the living environment. Yet, without effective prevention and control program, the incidence of diabetes is likely to continue rising globally (WHO, 2010).

The largest age group currently affected by diabetes is between 40 to 59 years. By 2030 this trend is expected to move to the 60 to 79 age group with some 196 million cases. DM is as one of the most common chronic diseases in nearly all countries, studies have shown even higher figure of 60.3% and 19.5% for women and men respectively in urban areas as compared to 22.6% and 10% in women and men respectively in rural areas (Shaw *et al*, 2010).

In Sub Saharan Africa diabetes was once considered a rare disease. But in 2010, over 12 million people in sub Saharan Africa were estimated to have disease with 330,000 people dying from diabetes related complications (IDF, 2009). Over the next 20 years sub Saharan Africa will have the highest growth in the number of people with diabetes with the figure reaching 23.9 million by 2030(Maina *et al* , 2010). As in the rest of the world, T2DM accounts for over 90% of diabetes in sub-Saharan Africa. With indications of 85% of cases in sub Saharan Africa having been diagnosed, the estimates vary from 60% in Cameroon (Mbanya *et al*, 2007), 70% Ghana (Amoah *et al* 2002), more than 80% in Tanzania (Aspray *et al* 2002), 85% South Africa (Motala *et al*, 2008) to 100% in rural Guinea (Balde *et al*, 2007). Although data on the condition of people with diabetes in Sub Saharan Africa and the complications of diabetes is very scarce, it is estimated that at least 4.51 million have eye complications (IDF, 2009), 2.23 million need dialysis because of kidney damage 907,500 have cardiovascular disease (Moodley and Rambirth, 2007).About 423,500 are blind

because of diabetes, 399,300 have cerebro vascular disease, and 169,400 have lost a foot because of amputation (IDF, 2009).

The International Diabetes Federation estimated the prevalence of diabetes in Kenya to be about 3.3% in 2007. Data from local studies have shown prevalence of 4.2% in the general population with a prevalence rate of 2.2% in the rural areas and as high as 12.2% in urban areas (Karam *et al*, (2012). Both type 1 and type 2 diabetes are on the rise in Kenya; with T2DM is the more prevalent. Age of onset of T2DM in Kenya is between 45 and 55, compared with 64 years in developed countries. Kenyans are also at higher risk for crippling or life threatening complications, because they report to health centers when the disease is advanced (Mc Ferran *et al*, 2008).

In Kenya economic and cultural changes are some of the factors driving the epidemiological landscape with chronic non communicable diseases becoming major contributors to the national disease burden (Brussel and Belgium, 2010). Diabetes is threatening to overwhelm the health care system in the near future, affecting the economic growth of most developing countries and the ability to achieve the agreed international development goals as the majority of the people with diabetes in developing countries are within the productive age range of 45 to 64 years (Alberti, 2001). To reduce this burden public health interventions are required to prevent diabetes or delay the onset of its complications. This will require lifestyle modification for those at risk of diabetes and aggressive treatment for those with the disease. (Dawn *et al*, 2003).

2.3 Knowledge and Self care practices in diabetes management

Healthy eating: Diabetics should have knowledge on how food affects blood glucose control and overall health. The patient should be educated on the effect of food on

blood glucose, sources of carbohydrates, fat and appropriate meal planning (Mary, 2003). Physical activity: Both those at risk and those with diabetes can improve glycemic control or reduce the risk of developing T2DM, improve body mass index, enhance weight loss, help control lipids and blood pressure, and reduce stress with appropriate levels of physical activity. Twenty to thirty minutes of moderate aerobic activity three to five times a week is considered optimal for achieving greatest metabolic benefits. The patient should be taught on appropriate types of physical activity, duration, intensity and safety precautions (Mary, 2003).

Effective therapy: Pharmacotherapy in combination with lifestyle interventions can lower blood glucose levels and reduce the risk for diabetes complications. Poor drug adherence interferes with achieving desired therapeutic outcomes. Patients should be taught on safe use of medications. They should have knowledge on each medication, its action, side effects, efficacy, toxicity, dosage, appropriate frequency and timing of administration, effect of missed and delayed doses, and instructions for storage, travel, and safety (Mary, 2003). Barriers such as issues of vision, cognitive and math skills, fear of needles, and embarrassment in following medication regimens in public and financial constraints should be addressed (Mary, 2003).

Monitoring of blood glucose: Patients should be taught how to monitor their blood glucose, be informed on how to assess the effects of food, physical activity, and medication on blood glucose levels. Patients should know how to monitor their blood pressure, urine ketones, and weight as part of the required monitoring behaviors. Daily SMBG is necessary for diabetics especially those taking medications that may lead to hypoglycemia (Mary, 2003).

Problem solving: Diabetes patients should be able to recognize and respond appropriately to situations with serious health consequences especially hypoglycemia, hyperglycemia, and sick days. With the help of diabetes education they should set individualized blood glucose goals to optimize glycemic control and emphasize wellbeing. Patients should know how to treat hypoglycemia, administration of insulin, and use of blood glucose data to determine appropriate actions regarding food, activity, and medication (Mary, 2003).

Healthy Coping:Patients should live a healthy life free from psychological factors such as stress as they affects self care behaviors leading to poor glycemic control(Mary, 2003).

Reducing Risks:Patients should monitor disease indicators and be actively involved in preventing complications.They should understand the importance of the preventive services that reduce complications by gaining knowledge on standards of care, therapeutic goals, and preventive care services to reduce risks. They should stop smoking, inspect their feet, monitor blood pressure, self monitoring of blood glucose, aspirin use and maintain personal care records(Mary, 2003).

2.4 Diabetes education, patients knowledge on diabetes, self care practices and glycemic control.

Diabetes education involves education of the patient and family members about a number of issuesimportant for optimal diabetes care, including self monitoring of blood glucose, insulin administration, guidelines for diabetes management during illnesses, management of hypoglycemia, foot and skin care, exercise and risk factor modifying activities. (Abebe *et al*, 2005).

Patient's knowledge on treatment and complications of diabetes is limited, especially the prevention aspects. There is need to empower patients with the knowledge required to help them obtain maximum benefit from their treatment for diabetes (Okolie *et al*, (2009).The burden of self care can be overwhelming to someone with inadequate literacy due the complexity of the treatment regimen, language barrier, culture and inability to access health care system (Charlotte, 2009). It is essential to provide health education on self management of the disease in order to prevent complications in the process reducing the financial burden on the health care system. Patients should be helped in achieving glycemic control through education on utilization of appropriate therapy, appropriate monitoring, and comprehensive instruction in diabetes self management(Wynn *et al*, 2010).

Patients with less diabetes education are at a high risk of developing complication (Heloisa *et al*, 2004).Diabetes education should involve multi disciplinary teams at health centers, outpatient clinics and hospitals with the aim of reinforcing the principles of knowledge for a healthy behavior. Every diabetes patient must be evaluated for their educational needs, thorough guidance directed to their needs and evaluation of the development of the education process to identify any gaps and a report about their educational outcomes (Heloisa *et al*, 2004).

Successful diabetes care requires two way communication between health care providers and patients (Charlotte, 2009), involvement of patients in treatment decisions (Heisler *et al* 2002) and active participation of patients in self care and goal setting (Piette *et al*, 2003). Patient education apart from making them more knowledgeable about their disease it helps them to manage their treatment and control blood glucose thus preventing the complications of the disease(Assal *et*

al,1997). The basis for proper management of diabetic patients have been identified as improving patients understanding of the disease,providing support for behavior change, and empowering patients to assume the primary management role for their illness (Norris *et al* , 2002). Most of the diabetic Patients are not aware of all these parameters making disease management difficult,therefore the key to closing the gaps between treatment of diabetes, self care practices and proper glycemc control by the patient's lies in the ability of the health care providers to implement and maintain patient centered interventions over time (Williams and Zeldman, 2002). There is also the need to institute behavioral changes through health educational programs with the motivation of both the patient and health care practitioners(Weather Spoon *et al*, 2005). The findings from these studies reveal an important aspect of education to the community as far as diabetes is concerned.

2.4.1 Diabetes knowledge in Kenya

The level of knowledge of diabetes in the country is very low with poor attitudes and practices of the community towards diabetes.(Maina *et al*, 2010).There is a disparity in the level of knowledge in different regions with Coast province having lowest knowledge level of diabetes 23.7% followed by Nairobi 25.5%, Eastern 28.9% and Central 30.8%. Nearly over 70% of all respondents from each of the four regions had poor knowledge of diabetes. (Maina *et al*, 2010).Despite the fact that knowledge affects people's attitude and uptake of health services, including health education, research into health knowledge and beliefs around diabetes causation and prevention among the general community in Kenya is lacking (Al Khaldi and Khan, 2002). At the moment, there are no comprehensive primary care programs for diabetes especially in the lower level hospitals in the country. Most of the diabetes health promotion efforts by different stakeholders are uncoordinated and the messages are

not standardized due to lack of clear guidelines regarding diabetes education (Baradan and Knill, 2004). There is even a reported low knowledge of diabetes among health care workers who are expected to deliver health education to the community (Gornall *et al* 2008).

Management of DM in Kenya is faced with challenges related to diagnosis, care, and treatment, lack of understanding and knowledge about the disease among healthcare professionals and the general population, a perception that diabetes is not as critical as other diseases affecting the continent, unsettled political situation that interferes with organizing a diabetes control program, illiteracy due to lack of access to education; poor housing; poverty; daily chores required for girls; and living on the streets, mostly related to boys are among other challenges (Mehta *et al*, 2006). Mc Ferran stated that these challenges are mixed up with cultural and economic issues such as lack of refrigerators making home storage of insulin injections difficult and Africans typical diet which involves eating a single big meal each day, which increases blood sugar concentrations greatly after food, has been metabolized (Mc Ferran, 2008). He also observed that most of the health care professionals are often not trained to address chronic diseases and they also lack interest as the disease is very demanding with few financial rewards.

CHAPTER THREE: METHODOLOGY

3.1 Study area

The study was conducted at Butere County Hospital, a level four health care facility in Butere division, Butere District, Kakamega county Western Kenya. The hospital had a projected catchment population of 31,899 in the year 2012. The hospital has three wards, Bed capacity of 55 and serves patients referred from 22 health centers and dispensaries. Services offered to diabetic patients at the outpatient clinic include Random blood sugar testing, medication both insulin and oral medication.

Butere is a commercial centre in Butere Sub county. The sub county is inhabited predominantly by the Marama Sub tribe of the larger Luhya tribe with a significant element of Luo immigrants from the neighborin Siaya county. The economic mainstay is subsistence maize production, large scale production of sugar cane, mixed farming and “boda boda” transport business. Residents of this division are also small scale cattle and bee keepers as well as fish keepers.

Despite the district having a national school, county school and several sub county school numerous day secondary schools, the rate of secondary school enrolment from the district is low with most of the residents being illiterate. Prevalent diseases in this sub county include malaria, diarrhea, skin diseases and respiratory tract infections. Other health conditions present in this population include diabetes, HIV and AIDs, TB, hypertension among others.

3.2 Study population

The study population consisted of all diabetic patients at the outpatient clinic at Butere County Hospital for diabetes management. Based on data at the outpatient

clinic there were 76 registered diabetic patients attending clinic at the hospital with approximately 15 to 20 patients being seen on Thursdays weekly. Since the study population was small, all the diabetic patients were included in the study.

3.3 Research design

A cross sectional study was used.

3.4 Inclusion criteria

1. Age 18 years and above.
2. Registered at Butere District Hospital outpatient clinic as diabetic patient.

3.5 Data collection tools

Data was collected using an interviewer guided structured questionnaire which consisted of mainly closed ended questions. The questionnaire consisted of three sections A, B and C. Section A consisting of information on socio demographic data that is age, sex, marital status, level of education and occupation, section B consisting of patients clinical information including duration of diabetes, type of treatment and rbs. Section C consisting of 17 questions testing the patient's knowledge on diabetes. Contents of the questionnaire were obtained from Diabetes Knowledge Test (DKT). DKT is a validated 23 test item developed by the Michigan Diabetes Research and Teaching Centre (MDRTC) to test general knowledge on diabetes (Fitzgerald J et al, 1998). It consisted of 23 questions testing the patients' general understanding of diabetes with respect to diet, blood glucose monitoring, foot care, diabetes complications, proper insulin usage, adverse effects of insulin and factors that influence blood glucose levels. The questions were modified and formulated in simple and clear language for ease of understanding with clear instructions to the subjects. The questionnaire had 8 questions testing on general knowledge on diabetes and 9

questions testing on knowledge on self care practices. The questionnaire was written in English and translated to Kiswahili and Marama (Appendix 2 and 3 respectively) to overcome language barrier. Translation to Kiswahili was done by a Kiswahili teacher while the translation from Kiswahili to Marama was done by a nursing officer at the outpatient clinic. The Marama and Kiswahili questionnaire were back translated to English by the help of other healthcare professional at the outpatient clinic. The back translated versions and the original English version of the questionnaire were compared and the discrepancies analyzed and reconciled to produce the three questionnaires. Comparison of the three versions for content and meaning was done and agreed upon by the researcher. The English and Kiswahili questionnaires were then pre-tested on ten persons who met the set inclusion criteria at Matungu Sub county Hospital while the Marama questionnaire was pre tested on five patients at Manyala Sub County Hospital.

3.6 Data collection

Data was collected during out patients clinic days every Thursday of the week between 21st March and 25th April 2013. All diabetic patients were approached and informed consent for the study obtained. Patients who met the inclusion criteria were picked and recruited in the study. Patients were sent to the laboratory department where blood samples for determination of rbs were collected by the laboratory technicians. (See appendix 7 for procedure). Results were recorded in the laboratory request form and later transferred to the data collection form. Patient's clinic register was used to ensure that all diabetics were included in the study. The questionnaire was piloted on ten patients meeting the stated criteria at Matungu District Hospital outpatient clinic to assess the suitability and reliability of the questions. All queries from the pilot study were addressed before data collection.

3.7 Data Analysis

The questionnaires were checked for any omission and corrected before the patient left the clinic. Data was edited, coded and entered into Microsoft excel spread sheet. Scores on the questionnaire were computed for each participant. Score were determined by dividing the number of correct answers by the total questions. Knowledge scores were calculated by cumulating points given for correct answers given by the patients. Total knowledge score was determined by awarding one point for each correct answer and a zero for a wrong answer or don't know response. Total knowledge score ranged from 0-70 and was categorized as < 35= poor knowledge and > 35= good knowledge. General knowledge on diabetes was classified as <17= poor and > 17= good knowledge. Self care practices knowledge was classified as < 18= poor knowledge and >18= good knowledge. Knowledge gaps were then identified for questions that were incorrectly answered by more than 50% of the respondents. Patients were classified as those who had achieved glycemic control and those who did not based on RBS levels of less than or equal to 8mmol/l as stated by ADA diagnostic criteria for DM 2010. Demographic variables were expressed as frequencies and percentages and mean. Descriptive analysis was done using percentages, frequencies and measures of central tendencies. Inferential statistics were done using Pearson's correlation, independent sample t test and analysis of variance to identify association between knowledge, RBS levels and socio demographic factors. Analysis was done using SPSS version 11.5 and Microsoft excel for windows 2007.

3.8 Ethical considerations

Research proposal was approved by Moi University's IREC (appendix 8). Permission was obtained from the hospital administration after IREC approval (appendix 9). Patients consented before being asked to complete the questionnaire. Study objectives

and data collection procedure was explained to the patients in simple language. Patients were assured of no risk involved except slight pain from needle pricks. There was no use of names on the questionnaire and at any time of data presentation to maintain confidentiality. Patient's information was not disclosed to third party without patient's approval. Information on the researcher was provided in the cases of complaints or further questions. Scientific honesty was maintained as the researcher recorded truthfully the answers given by the illiterate subjects. There was no manipulation of data as researcher and the statistician entered data from the questionnaire into SPSS computer software program. Results were produced independently by the biostatistician to avoid subjective collaboration.

CHAPTER FOUR:

RESULTS

4.1 Socio demographic characteristics.

Out of a total of 76 patients 71 consented and participated in the study. Socio-demographic characteristics of the respondents are summarized in table 1 below.

Table 1: Socio-demographic characteristics of the patients in the study (n=71)

Variables	Frequency, n (%)
Age	
25-35	3 (4.2)
36-45	17 (23.9)
46-55	21 (29.6)
56-65	18 (25.4)
66-75	12(16.9)
Gender	
Male	34 (47.9)
Female	37(52.1)
Marital status	
Single	3(4.2)
Married	52 (73.2)
Separated	6(8.5)
Widowed	10 (14.1)
Education level	
None	11 (15.5)
Primary	21 (29.6)
Secondary	23 (32.4)
Intermediate	13 (18.3)
University	3(4.2)
Occupation	
Self employed	33(46.5)
Employed	18 (25.4)
Retired	8(11.3)
Others	12 (16.9)

4.2: Clinical characteristics of the patients

Patients in this study had poor glycemic control with the mean RBS of 12.7 ± 4.5 . Majority (87.3%) had RBS values above 8mmol/l with 47.9% having the disease for more than five years. Table 2 below show a summary of the clinical characteristics of the patients

Table 2: Clinical characteristics of the patients n = 71

Variables	Frequencies	Percentages
RBS		
< 8mmol/l	9	12.7
>8mmol/l	62	87.3
Disease duration		
< 1 year	12	16.9
1 to 5 years	25	35.2
>5 years	34	47.9
Type of treatment		
Diet	2	2.8
Oral hypoglycemic drugs	57	80.3
Insulin	11	15.5
Insulin and oral hypoglycemic drugs	1	1.4

4.3 Patient's level of diabetes knowledge

Most of the patients (64.8%) scored below 35 (50%) on total knowledge score with the mean of 32 ± 4.27 . Patients scored better on diabetes knowledge than selfcare knowledge. Diabetes knowledge score mean was 16 ± 4.2 while the mean for self care score was 15.57 ± 3.88 . The results are summarized below in table 3.

Table 3: Knowledge Score among the Respondents (n=71)

Variables	Frequencies n (%)
Total knowledge score	
More than 35	25 (35.2)
Less than 35	46 (64.8)
Diabetes knowledge score	
More than 17	42 (59.2)
Less than 17	29(40.8)
Self care knowledge score	
More than 18	20(28.2)
Less than18	51(71.8)

Knowledge gaps were apparent in questions on diabetes complications and six questions on self care practices. The mean percentage of "don't know" responses per item was 10.44 ± 6.5 % (range: 1.4% - 22.5%). Knowledge of causes of high blood glucose, complication of diabetes, symptoms of nerve disease, diet, physical exercise, medication, prevention of gum disease, foot problems and monitoring of blood glucose had less than 50% of the respondents getting them right. The percentage of respondents getting it right was 28%, 36.6%, 28.2%, 36%, 36.6%, 45%, 16.9%, 15.5% and 38% respectively for these topics.

4.4 Socio-demographic characteristics and knowledge score

Total knowledge score for diabetes and self care practices was compared among different socio-demographic characteristics of the respondent. Of those scoring below 35, 43.5% were male while 44% of those scoring less than 35 were female. The results are summarized in table 4 below.

Table 4: Socio Demographic Characteristics and Knowledge (n=71)

Variables		Score (%)	
		<35	>35
Gender			
	Male	43.5	56
	Female	56.5	44
	Total	100	100
Marital status	Single	2.2	8
	Married	71.1	76
	Separated	8.7	8
	Widowed	17.4	8
	Total	100	100
Education level	None	17.4	12
	Primary	37	16
	Secondary	23.9	48
	Intermediate	17.4	20
	University	4.3	4
	Total	100	100
Occupation	self employed	50	40
	Employed	23.9	28
	Retired	4.3	24
	Others	21.7	8
	Total	100	100
Age	22-25	4.3	4
	36-45	17.4	36
	46-55	37	16
	56-65	26.1	24
	66-75	15.2	20
	Total	100	100

4.5 Statistical relationship between diabetes characteristics and knowledge score

There was a negative correlation between RBS and total knowledge score ($r = -0.340$, $p = 0.004$), and a positive correlation between RBS and diabetes score ($r = 0.144$, $p = 0.230$), RBS and self care knowledge score ($r = 0.232$, $p = 0.052$).

Patients were grouped according to their RBS values. Those with RBS less than 8 mmol/l were grouped as those with satisfactory glycaemic control while those with Rbs > 8 mmol/l were grouped as those with unsatisfactory glycaemic control. The mean knowledge score was compared between the two groups, disease duration and type of treatment. The results are summarised in table 5 below.

Table 5: Diabetes characteristics and total knowledge score

Variables	Total mean knowledge	test	Pvalue
Disease duration			
Less than one year	28.4 ± 2.6	F = 1.882	0.160
One to five years	31.8 ± 0.9		
More than five years	33.7 ± 0.8		
Type of treatment			
Diet	30	F = 0.788	0.505
Oral drugs	32.3 ± 0.8		
Insulin	29.9 ± 1.40		
Insulin and oral drugs	35		
Rbs			
< 8 mmol/l	37.3 ± 0.92	t = -2.999	0.004
>8mmol/l	31.20 ± 0.73		

4.6: Statistical relationships between patients' socio-demographic characteristics, clinical characteristics and knowledge.

There was no significant correlation between sociodemographic characteristics and knowledge score. The variation in the mean total knowledge score among different socio demographic characteristics was not significant with the exception of occupation. The results are summarized in Table 6 below

Table 6: Mean total score among different patients socio demographics

Variables	Mean total knowledge score	Statistical test	P value
Gender			
Male	33.12 ± 0.91	t = 1.002	0.320
Female	31.4 ± 0.98		
Marital status			
Single	31.5 ± 3.5	F = 0.7770	0.188
Married	32.71 ± 0.85		
Separated	30 ± 1.10		
Widowed	32.4 ± 3.5		
Education level			
None	32.7 ± 1.45	F = 1.433	0.233
Primary	31.35 ± 1.44		
Secondary	33.4 ± 1.44		
Intermediate	32.75 ± 2.15		
University	31.5 ± 4.5		
Occupation			
Self employed	30.9 ± 1.04	F = 2.763	0.049
Employed	33.8 ± 1.19		
Retired	35 ± 1.28		
Others	13.5 ± 1.4		

CHAPTER FIVE:

DISCUSSION

5.1 Discussions of the findings

Diabetes knowledge in this study was low with 64.8% of the patients scoring below 35 (50%) with the mean knowledge score of 32 ± 4.27 . Comparing the findings of this study with study by Mc Cleary *et al* (2011) which also used Michigans DKT, they found a higher knowledge score than in our study. This could be due to the fact that their population received diabetes education and had higher literacy rates compared to this study which had 86.5% of the study population with secondary education or less (low literacy). The variation in knowledge scores is also expected since these studies were conducted on different ethnic groups and in different age groups. Patients scored better on general knowledge on diabetes compared to knowledge on self care practices. Major knowledge gaps were noted in nine questions related to diabetes complications, diet, exercise, medication adherence, prevention of gum disease, prevention of foot problems and monitoring of blood glucose level. The consequence of these knowledge gaps is that it affects the patients ability of self management and hence impacting negatively on the outcomes of diabetes.

Female patients scored poorly compared to male counter parts in this study. Among the respondents scoring poorly 56.5% were female. Women were less knowledgeable than men due to low literacy rates among women in this population. A study by Gulabani *et. al*, (2008) also showed the same results with the mean score of diabetes knowledge being higher in male than female. The study also showed that female gender is predictor for lower diabetes knowledge. In contrast to this study regarding gender differences, Gonzalez *et al* (2009) and Modeley *et al* (2007) found that men

were having significantly less knowledge about diabetes than women. The differences in these studies might be attributed to the differences in the patients' populations.

Age group 36 – 45 had the highest score while age group 56 – 65 had the lowest knowledge score. Other studies have showed that increasing patient age (Westaway et. al., 2002, Hawthorne, 2001) is also a predictor of knowledge score. The studies also showed that older patients and those with less education had less knowledge on diabetes and self care practices. Older persons with diabetes tend to have less education, worse cognitive function, and more barriers to practicing appropriate self care than their younger counterparts with diabetes. The younger patients are most likely to retain what they were thought and majority of them were of school age, they remember and recall faster than older groups. (Adibe et al 2009). From these studies it is evident that educational interventions should be designed to meet the needs of the aged patients.

Patients with secondary education in this study had the highest knowledge score while those with primary education had the lowest score. Other studies have also shown that higher school education has a positive effect on diabetic knowledge (Westaway et. al., 2002). While study by Odili et. al., 2011 showed that the group of respondents with no formal education had the highest average diabetes knowledge score compared to their counterparts who had primary to post graduate education.

Married patients had better scores while separated patients had the least score in this study. The married having highest knowledge score could be attributed to high proportion (73.2%) of this group respondents and a majority of them might be men who had shown to be more knowledgeable. The separated had the least knowledge

which is likely to be associated with psychosocial traumas that are usually associated with divorce of partners.

Patients in this study had poor glycemic control with 87.3% having RBS > 8mmol/l. The mean RBS was 12.2 ± 3.7 mmol/l. Poor glycemic control in these patients could be attributed to poor knowledge on diabetes and self care practices as the correlation between knowledge and RBS was negative in this study. In this study a negative relationship between knowledge and glycemic control was found and it is consistent with other studies (Lacey et al. 2002). However a positive relationship between diabetes knowledge and glycemic control has been reported in previous studies (Colleran et al. 2003; Schneider et al. 1996). Another study by Julie et al, (2002) did not find any association between patients' diabetes knowledge scores and their glycemic control.

Socio-demographic factors and diabetes specific information had correlation with knowledge score though the correlation was not significant. As age increased according to this study knowledge score decreased. From the study by Julie et al 2002 it was found out that as patient age increased by 10 years, the diabetes knowledge test score decreased by 3% ($p = 0.02$). (Julie et al 2002). Education level had a positive correlation with knowledge score with Pearson coefficient of 0.233 and $p = 0.213$. In other studies patients with formal education and primary education had statistical significance knowledge score with higher diabetes knowledge score among respondents with no formal education being attributed to many years of experience with diabetes care (Odili et al, 2011). This was not the same as the results from this study since there was no statistical significance between knowledge score and

education level. Some studies showed that the higher the educational level, the higher the diabetes knowledge score ($p = 0.01$). (Julie et al 2002).

It is evident from this study and other studies (Aubert et. al., 2000; Lee & Shiu 2004), that certain patient characteristics are correlated with glycemic control. Therefore, socio-demographic characteristics should be taken into consideration when developing educational programs for diabetics and health care providers should identify potential barriers to learning. Attention should be given to improving knowledge and understanding in older patients and women as there may be barriers to effective learning. It is also important for health care providers to assess each specific area when determining people's needs and DSME must be adjusted to the literacy level and cultural needs of different populations (Yeates and Houlden, 1997). It is essential to understand the individual's socio-demographic characteristics, beliefs and attitudes, motives, demands and priorities in order to understand their compliance behavior. Disease duration and knowledge had a positive correlation ($r = 0.050$ at $p = 0.680$). This is contrarily to the study by Odili et, al, (2011) where they found a significant correlation between duration of disease and level of knowledge.

This study also found a negative correlation between knowledge score and type of treatment. In another study patients who used insulin and those who had had diabetes for a longer period had higher ratings of their knowledge of diabetes self-care practices (Julie et. al., 2002). Poor knowledge among diabetics at Butere District Hospital may be due to lack of communication between the health care providers and the patients. Improving these patients' knowledge of diabetes and self-care practices will allow them improve their care and this is an investment with benefit to the health care system. Regular assessment of patients' knowledge and skills is critical in the

management of diabetes and its complications (Padgett D et al 1998). Health education on Diabetes and self care practices is necessary and should be incorporated into the routine care of patients with diabetes. There must be education sessions during routine clinic checkups. The study has been able to determine the level of knowledge among diabetics at Butere and the association between knowledge on diabetes, self care practices and glycemic control in diabetes patients at Butere County Hospital.

5.2 Limitation of the Study

- i. The use of RBS instead of FBS and HbA1c. Though not the best method for testing glycemic control compared to the other two, it was used in this study because it is cheaper and easily available. A study by Otieno et al (2002) found out that morning RBS in ambulatory diabetic patients related well with HbA1c. They also found out that that blood glucose of 4 – 8 mmol/l predicted good glycemic control ($HbA1c \leq 7.8\%$) with high sensitivity at range of 86.3 – 98.4%.
- ii. While the questionnaires were self completed by the patients, some older and illiterate patients needed some help with completing the questionnaire, and any differences between the responses of these two groups were not investigated because of time constraints.
- iii. This study findings can only be generalized to diabetic patients attending care at Butere District Hospital Hospital.

5.3 Conclusion

It is evident from this study that diabetics at Butere County Hospital do not have adequate knowledge of the diabetes especially on the self care practices aspect as more than 80% of them scored poorly. The patients had unsatisfactory glycemic

control as majority of them had RBS value of more than 8mmol/l. Poor knowledge in this patients was associated with unsatisfactoryglycemic control. There was a negative correlation between level of knowledge and glycemic control among these patients and the correlation was statistically significant.

5.4 Recommendations

A prospective cohort study should be conducted in these patients to find out if knowledge deficit in these patients is the cause of unsatisfactory glycemic control.

There is need for a structured education programe for these patients to be able to understand their disease and the complications associated with it. This will help them achieve satisfactory glycemic control and prevent developing of diabetes complications. Health education program should be done routinely during regular clinic days. Socio demographic characteristics should be considered when developing education program for these patients with much attention to the women and the aged as they scored poorly. There is need for regular assessment of the diabetic patients knowledge and self care skills at butere county hospital.

REFERENCES

- Aubert, R.E. et al. (2000). Diabetes knowledge change in hispanic HMO patients with diabetes mellitus. *Diabetes*, 49(Suppl. 1), A382.
- Abebe D., Yayehirad T, Jemal A, Nejmudin R, and Sintayehu D. (2005). Diabetes Mellitus For the Ethiopian Health Center Team, Debu University, Ethiopia Ministry of Health, 2005.
- Adibe, M., Aguwa C., Ukwe C, Okonta M, Obinna P: (2009). Diabetes self-care knowledge among type 2 diabetic outpatients in south-eastern Nigeria. *Int J. Drug Dev. & Res.* 2009, vol. 1, issue 1, 86.
- Al Shafee M, Al-Shukali S, Rizvi S, AL Farsi, Khan M, Ganguly S, Afifi M, Al Adawi S. (2008). Knowledge and perception of diabetes in semi-urban Omani population. *BMC Pub Health* 2008 8 249.
- Alberti George (2007) Non communicable diseases: tomorrow's pandemics. *Bulletin of the World Health Organization*. 2001; 79(10):907. This article on Pub Med
- Al-Khaldi Y., Khan M (2002). Audit of a diabetic health education program at a large primary health care center in Asir region. *Saudi Medical Journal*; Vol 21(9) 2000: 838-842. This article on PubMed.
- Amoah. A., Owusu S, and Adjei S. (2002). Diabetes in Ghana: A community based prevalence study in Greater Accra. *Journal of Diabetes Research and Clinical Practice*. Vol 56 2002: 197-205.
- Aspray, T., Mugusi F, Rashid S, et al., (2002). Rural and urban differences in diabetes prevalence in Tanzania: The role of obesity, physical inactivity and urban living. *Transactions of the Royal Society of Tropical Medicine and Hygiene*. Vol 94 2002: 637-44.
- Assal, J, Jacquemet, S. and Morel, Y. (1997) The added value of therapy in diabetes: the education of patient for self management of their disease. *Journal of Metabolism* vol 46(12)1997. p.61-64.
- Balde N, Diallo I, Balde M, et al., (2006). Diabetes and impaired fasting glucose in rural and urban populations in Futa Jallon (Guinea): prevalence and associated risk factors. *Diabetes & metabolism*. Vol 33(2):114-20. Available at: <http://www.ncbi.nlm.nih.gov/pubmed/17363316>.
- Baradaran, H., Knill-Jones R (2004). Assessing the knowledge, attitudes and understanding of type 2 diabetes amongst ethnic groups in Glasgow, Scotland. *Practical Diabetes International Journal*; Vol 21(4) 2004: 143-148.
- Barrel E. J. (2005) Diabetes epidemic is a world-wide threat. *Clin Diab* 2004 22 47-48. Gorus FK. Epidemiology, prediction and prevention of type 1 diabetes. *Verh K Acad Geneeskd Belg* Vol 70 2008 5-24. Brussels and Belgium: International Diabetes Federation. Diabetes Atlas. 4th Edition.

- Brussels, (2005). Time to act: Diabetes and foot care.: International Diabetes Federation, 2005.
- Charlotte, N. (2009). Promoting Diabetes Self Management, Literacy and Diabetes Self Management.
- Colleran, K.M., Starr, B. & Burge, M.R. (2003). Putting diabetes to the test: analyzing glycemic control based on patients' diabetes knowledge [Letter]. *Diabetes Care*, **26** (7), 2220–2221.
- Dawn. W, Michele V, Carl J, Michael M, Barbara A, Gregg E, Geiss L, Gwen M , May J, and Vinicor F: (2003). Community based lifestyle interventions to prevent type 2 diabetes. *Journal of Diabetes Care*. 2003 ; 26(9):2643-52. This article on Pub Med.
- Fitzgerald J, Martha M., George E., Patricia A. , Robert M. , Roland G and Wayne K. (1998). The Reliability and Validity of a Brief Diabetes Knowledge Test.
- Gonzalez, H.M, Vega W.A, Rodriguz M.A, *et al*, (2009). Diabetes awareness and knowledge among Latinos: does usual sources of health care matter? *Society of General Internal Medicine* 24(3):528-533.
- Gulabani, M, John M, Isaac R. (2008). Knowledge of diabetes, its treatment and complications amongst diabetic patients in a tertiary care hospital. *Indian Journal of Community Med* Vol 33 2008: 204-6 Available from: <http://www.ijcm.org.in/text.asp>
- Hawthorne K. (2001): Effect of culturally appropriate health education on glycaemic control and knowledge of diabetes in British Pakistan women with type 2 diabetes mellitus. *Health Educ. Res*: 16(3)373-381.
- Heisler, et al., (2002). The relative importance of physician communication, participatory decision making, and patient understanding in diabetes self management. *Journal of General Internal Medicine* 17(4) :243-52.
- Heloisa C, Flavia R, Luciana R: Evaluation of the educational practices in promoting self management in type 2 diabetes mellitus. <http://www.ifc.org/ejifcc/vol13no5/1305200202n.htm>
- Hoque MA, Islam MS, Nazmul Ahasan HAM et al., (2002). Achievement of awareness in a diabetic population. *J Medicine* 2009; 10(suppl-1):7-10.
- Jabbar A, Contractor Z, Ebrahim MA, Mahmood K, (2001). Standard of knowledge about their disease among patients with diabetes in Karachi, Pakistan. *J Pak Med Assoc*. 2001; 51: 216-218.
- Julie D, & Kathleen I. (2009). :Diabetes self-care knowledge among outpatients at a veterans affairs medical center *american journal of health system pharm.*;59(9)

- International Diabetes Federation (2009). The Diabetes Atlas. Fourth Edition
- Karam P, Samir D , Trupti N and Sameer V(2012). Evaluation of knowledge and self care practices in diabetic patients and their role in disease management.
- Leslie, R, Kolb H, Schloot N, Buzzetti R, Mauricio D, De Leiva A, Yderstraede K, Sarti C, Thivolet C, Hadden D, Hunter S, Schernthaner G, Scherbaum W, Williams R, Pozzilli P. (2008). Diabetes classification: grey zones, sound and smoke: Action LADA 1. *Diabetes Metabolism Research Review* July 10.
- Lee, C.S.L. & Shiu, A.T.Y. (2004). Perceived health care climate, diabetes knowledge and self-care practice of Hong Kong Chinese older patients: a pilot study. *Journal of Clinical Nursing*, **13** (4), 534–535.
- Lacey, K., Inzucchi, S.E. & Chyun, D.A. (2002). Influence of knowledge on cardiac risk factor and glycemic control. *Diabetes*, **51** (Suppl. 2), A214.
- Maina W, Ndegwa Z, Njenga E, & Muchemi E, (2010). Knowledge, attitude and practices related to diabetes among community members in four provinces in Kenya: a cross-sectional study. *Pan African Medical Journal*. 2010. Available online at: <http://www.panafricanmedjournal.com/content/article/7/2/full/>
- Mary, M Austin (2003). Importance of Self care Behaviors in Diabetes Management. *American Association of Diabetes Educators 2003* Matwa, P., Chabeli, MM., Muller, M. and Levitt, NS. Experiences and guidelines for footcare practices of patients with diabetes mellitus. 2003. 26 (1).p.11-21.
- Mbanya J, Ngogang J, Salah J, et al(1997). Prevalence of NIDDM and Impaired Glucose Tolerance in a Rural and an Urban Population in Cameroon. *Journal of Diabetologia*. Vol 40: 1997 824-829.
- Mc Ferran. L., (2008). Obstacles in diabetes care in Kenya. *Medical journal of Therapeutics Africa*. Vol 2. (2):127-129.
- Mccleary, J.V, (2011). Health literacy and its association with diabetes knowledge, self-efficacy and disease self- management among African Americans with Diabetes mellitus. *ABNF J* 2011; 22(2):25-32.
- Mehta R, Karki P, Sharma S (2006): Risk factors, associated health problems, reasons for admission and knowledge profile of diabetes Patients admitted in BPKIHS. *Journal of Kathmandu University Medical* . 2006 Jan-Mar; 4(1):11-3. 2006; 4(13):11-13. This article on Pub Med
- Michigan Diabetes Research and Training Centre, Diabetes Knowledge Test. Available at www.med.umich.edu/mdrtc/pros/survey.html.
- Ministry of Public Health and Sanitation (2010). National Guidelines for Management of DM, 1st Ed 2010.

- Moodley, L. & Rambiritch V.(2007). An assessment of the level of knowledge about diabetes mellitus among diabetic patients in a primary healthcare setting. *Journal of South Africa Family Practice*. 2007; 49(10):16a-16d
- Motala, A., Esterhuizen T, Gouws E, et al (2008). Diabetes and other disorders of glycemia in a rural South African community: prevalence and associated risk factors. *Journal of Diabetes Care*.vol 31 2008: 1783-1788.
- Nisar, N., Khan A, Qadri M, et al: (2008). Knowledge and Risk assessment of diabetes mellitus at primary care level: A Preventive approach required combating the disease in a developing country. *Pakistan Journal of Medical Science* ;Vol 24 2008 (5):667-672.
- Okolie V, Ehiemere, O., Iheanacho, N. and Kalu I. (2009). Knowledge of diabetes management and control by diabetic patients at Federal Medical Center Umuahia Abia State, Nigeria.*International Journal of Medicine and Medical Sciences*. Vol. 1(9)2009,pp.353-358,. Available online at <http://www.academicjournals.org/ijmms>
- Otieno, F.C, Ng'ang'a L, Kariuki M. (2002). Validity of random blood glucose as a predictor of the quality of glycaemic control by glycated haemoglobin in out-patient diabetic patients at Kenyatta National Hospital.East Afr Med J. 2002Sep;79(9):491-5availableonlineatwww.uonbi.ac.ke/journals/files/journals/1/articles/.../347-1262-1-PB.pdf
- Padgett D, Mumford E, Hynes M et al. (1998). Meta-analysis of the effects of educational and psychosocial interventions on management of diabetes mellitus. *J Clin Epidemiol*. 41:1007-30.
- Rafique, G., Azam S.I, White F, (2006). Diabetes knowledge, beliefs and practices among people with diabetes attending a university hospital in Karachi, Pakistan. *East Mediterr Health J*. 2006; 12: 590-598.
- Shaw J, Sicree R, Zimmet P. (2010). “Global estimates of the prevalence of diabetes for 2010 and 2030”. *Diabetes Atlas*,
- United States Pharmacopoeia (USP) (2002). Medication counseling behaviors guidelines, in: Klasco R K (Ed), *USP Drug Information for the Healthcare Professional Vol 1*. Greenwood Village, Colo: Micromedex.
- Valentine U Odili, Paul D Isiboge and Aihanuwa E. (2011). Patients’ Knowledge of Diabetes Mellitus in a Nigerian City,*Tropical Journal of Pharmaceutical Research* October; 10 (5): 637-642
- Weatherspoon, L, Kumanyika, S., Ludlow, R. and Schatz, D: (2005). Glycemic control in a sample of black and white clinic patients with NIDDM. *Journal of Diabetes Care* .Vol 28 2005.p. 2844-2849.

- Westaway, M., Seager J, Rheeder, P. and Van Zyl D. (2005). The effects of social support on health, well being and management of diabetes mellitus: a black South African perspective. *Journal of Ethnic Health*;Vol 10(1)2005:73-89.
- WHO (2010). *Global status report on non communicable diseases 2010*.
- Wynn, S., Howteerakul N, Suwannapong N, Rajatanun T. (2010). Self efficacy, self care behaviors and glycemic control among type-2 diabetes patients attending two private clinics in Yangon, Myanmar. *Southeast Asian Journal of Tropical Medicine Public Health* 2010; 41:-51.
- Yeates, K. & Houlden, R. (1997). Canadian diabetes association clinical practice guidelines for the treatment of diabetes mellitus and Native Canadians on Manitoulin Island. *Canadian Journal of Diabetes Care*, **21**, 22–27.

APPENDICES

APPENDIX 1: QUESTIONNAIRE

A. Socio demographic data.

Instructions: fill in your age and tick where appropriately

1. Age _____

2. Gender. Male () Female ()

3. Marital status.

Single () Married () Separated () Widowed ()

4. Educational level

None () Primary () Secondary () Intermediate () University graduate ()

5. Occupation

Self employed () Employed () Retired () others (specify).....

B. Diabetes Specific Information

1. For how long have you had diabetes?

Less than one year () One to five years () More than five years ()

2. What type of treatment are you currently on?

Diet () Oral hypoglycemic drugs () Insulin ()

3. RBS _____

B. Questions on Patients knowledge on diabetes and self care practices.

Instructions: Use a tick for the correct answer and X for wrong answer.

1. What is diabetes?
 - a) Bone disease
 - b) Kidney disease
 - c) **Sugar diseases**
 - d) Eye disease
 - e) Don't know
2. What is the best method for testing glucose?
 - a) Urine testing
 - b) **Blood testing**
 - c) Don't know
3. High blood glucose may be caused by
 - a) **not enough insulin**
 - b) skipping meals
 - c) delaying meals
 - d) don't know
4. The following might affect glucose
 - a) **Being sick**
 - b) **Being very inactive**
 - c) **Stressed**
 - d) Don't know
5. The following are signs and symptoms of high blood glucose levels.
 - a) **Increased thirst**
 - b) **Increased need to urinate**
 - c) **Blurred vision**
 - d) Don't know
6. The following are signs and symptoms of low blood sugar.
 - a) **Sweating/feeling cold**
 - b) **Headache**
 - c) **Fast heart beat**
 - d) **Confusion and irritability**

- e) Don't know
7. Which of the following is not a complication of diabetes?
- a) Vision problems
 - b) Kidney problems
 - c) Nerve problems
 - d) Lung problems**
 - e) Don't know
8. Numbness and tingling sensation may be symptoms of.
- a) Kidney disease
 - b) Nerve disease**
 - c) Eye disease
 - d) Don't know
9. Self care practices to prevent or control diabetes complications include.
- a) Doing regular exercise and following a healthy eating plan**
 - b) Adhering to medication**
 - c) Buying medicines at the chemist.
 - d) Don't know.
10. What should diabetic do regarding diet?
- a) Follow a complex carbohydrate diet.
 - b) Reduce the number of calories to lose weight.**
 - c) Eat healthy diet with enough fruits and vegetables.**
 - d) Don't know.
11. What should diabetics do regarding physical exercise?
- a) Walk on daily basis**
 - b) Exercise at least 20 to 30 minutes a week.**
 - c) Fit exercise into daily routine.**
 - d) Don't know.
12. What will you do if you have high blood sugar?
- a) Drink water or sugar free liquids to stay hydrated.**
 - b) Ask your doctor on how to take the insulin**
 - c) Check every 4 hours to make sure your sugar goes down**
 - d) Don't know
13. Concerning blood glucose monitoring diabetics should?
- a) Check their sugar levels regularly.**

- b) **Get lab test every 2 to 3 months.**
 - c) Don't know.
14. What is one supposed to do in case of low blood glucose?
- a) **Take a half cup of juice.**
 - b) **Once sugar level increases eat small snack if your next planned meal is over half an hour away.**
 - c) Take insulin shot
 - d) Don't know.
15. Diabetes patients can prevent foot problems by
- a) **Inspecting feet for cuts, sores and swelling.**
 - b) **Wash feet in warm water and dry thoroughly especially between feet.**
 - c) Soak feet.
 - d) **Look for color changes in your feet**
 - e) Don't know.
16. To prevent gum disease
- a) **See dentist twice a year**
 - b) **Brush teeth twice a day**
 - c) **Tell anyone working on your teeth you have diabetes**
 - d) Don't know
17. Concerning medication diabetes patients should.
- a) Change dosage or stop taking medication when they feel better.
 - b) **Ask your doctor first before changing dosage or stopping medication**
 - c) **Refill their prescriptions before they run out**
 - d) Don't know

APPENDIX II QUESTIONNAIRE: KISWAHILI VERSION.

HOJAJI

A. Mambo ya kimsingi.

1. Umri
2. Jinsia Mume () Mke ()
3. Ndoa
Sijaolewa () Nimeolewa () Tumetengana () Mume/mke kufariki ()
4. Kiwango cha elimu Sijasoma () Msingi () Upili () Kadiri ()
Chuo kikuu ()
5. Kazi Nimejijiri () Nimeajiriwa () Mengine

B. Mambo kuhusu ugonjwa wa sukari

1. Umeugua ugonjwa wa sukari kwa muda gani?
Chini wa mwaka moja () Kati ya mwaka hadi miaka mitano () zaidi ya miaka mitano ().
2. Unatumia matibabu gani?
Vyakula () Madawa ya kumeza () Sindano ya insulin () Madawa ya kumeza pamoja na sindano ya insulin ()
3. Kiwango cha sukari-----

C. Wayajuayo wagonjwa wa sukari kuhusu ugonjwa huu na jinsi ya kujitunza wenyewe

1. Unaelewa vipi ugonjwa wa sukari?
 - a) Ni ugonjwa wa mifupa
 - b) Ni ugonjwa wa figo
 - c) Ni ugonjwa uletwao na sukari
 - d) Ni ugonjwa wa macho
 - e) Sijui
2. Njia gani bora ya kuangalia kiwango cha sukari mwilini?
 - a) Kuangalia mkojo
 - b) Kuangalia damu
 - c) Sijui
3. Kiwango cha juu cha sukari huchangiwa na
 - a) Insulini isio ya kutosha
 - b) Kutokula au kuruka kula vyakula vitatu vya siku

- c) Kuchelewa kula vyakula kila siku
 - d) Sijui
4. Yafuatayo yanaweza kuathiri kiwango cha sukari
- a) Kuwa mgonjwa
 - b) Kuwa mtu asiye fanya mazoezi
 - c) Kuwa na mhadhara
 - d) Sijui
5. Yafuatayo ni dalili za kiwango cha juu cha sukari mwilini
- a) Hamu ya juu ya kunywa maji
 - b) Kukojoa kila mara
 - c) Kutuona vizuri
 - d) Sijui
6. Yafuatayo ni dalili za kiwango cha chini cha sukari mwilini
- a) Kutoa jasho ama kuhisi ubaridi
 - b) Kichwa kuuma
 - c) Roho kudunda haraka haraka
 - d) Kukosa msimamo na kuwa na hasira ya haraka
 - e) Sijui
7. Gani sio utata utokanao na ugonjwa wa sukari?
- a) Kutoona vizuri
 - b) Shida za figo
 - c) Shida zitokanazo na nyuzi mwilini
 - d) Shida za mabafu
 - e) Sijui
8. Kufa ganzi ni dalili ya shida ipi ?
- a) Ya figo
 - b) Ya nyuzi
 - c) Ya macho
 - d) Sijui
9. Njia mbalimbali za kuzuia ugonjwa wa sukari kwa kujitunza mwenyewe ni kama zifuatazo
- a) Kufanya mazoezi na kuzingatia lishe bora
 - b) Kutumia dawa kwa kuzingatia maagizo
 - c) Kununua dawa kwenye duka la dawa

- d) Sijui
10. Yapi apasayo kufanya mgonjwa wa sukari kuhusu vyakula
- a) Zingatia vyakula vya kabohidhrati
 - b) Kupunguza idadi ya kalori kwenye chakula kupunguza uzito mwilini
 - c) Kula na kutumia matunda na mboga nyingi
 - d) Sijui
11. Yapi apasayo kufanya mgonjwa wa sukari kuhusu mazoezi ya viungo?
- a) Kufanya mazoezi ya matembezi kila siku
 - b) Mazoezi kwa dakika 20-30 kila wiki
 - c) Ongezea mazoezi kwa shughuli kila siku
 - d) Sijui
12. Utafanya nini ukiwa na kiwango cha juu cha sukari?
- a) Kunywa maji mengi au kinywaji kisicho na sukari
 - b) Uliza daktari jinsi ya kutumia insulini
 - c) Chunguza kila baada ya masaa manne kuhakikisha sukari yako imeenda chini
 - d) Sijui
13. Kuhusu uchuguzi wa kiwango cha sukari mwilini mgonjwa wa ugonjwa wa sukari anafaa kufanya nini?
- a) Chuguza kiwango cha sukari kila mara
 - b) Pata uchuguzi kwenye mabara kila badaa ya miezi mbili hadi tatu
 - c) sijui
14. Ni nini ambacho mtu anapaswa kufanya iwapo kiwango cha sukari kimeenda chini?
- a) Tumia nusu kikombe cha kinywaji cha matunda
 - b) Wakati kiwango cha sukari kimepanda kula chakula cha hiyari kama unafaa kula cha baada ya nusu saa
 - c) Jidungie dawa za insulini
 - d) Sijui
15. Wagonjwa wa sukari wanweza kupunguza ugonjwa wa miguu kwa:
- a) Kuchunguza miguu ambayo yamekatwa, vidonda na kuvimba
 - b) Osha miguu kwa maji moto na ukaushe vizuri sanasana katikati ya miguu
 - c) Kuweka miguu kwa maji
 - d) Kuangalia mabadiliko ya rangi kwenye miguu

e) Sijui

16. Kuzuyia maradhi ya meno

- a) Mwone daktari wa meno mara mbili kwa mwaka
- b) Suguu meno mara mbili kwa siku
- c) Mweleze yeyote anayekutibu meno kwamba una ugonjwa wa kisukari
- d) Sijui

17. Kulingana na matibabu ya kisukari wagonjwa wanstahili

- a) Kubadilisha madawa au kuacha matibabu iwapo wamejihisi vizuri
- b) Muulize dakatari wako kwanza kabla ya kubadilisha au kuwacha matibabu
- c) Chukua madawa ya sukari kwenye kliniki kapla ya madawa yako kuisha
- d) Sijui

APPENDIX III: QUESTIONNAIRE MARAMA VERSION

AMAREBO

1. Likhula _____
2. Luivulu Omusatsa () Omukhasi ()
3. Inzu Mbulaenzu () Mulukhali () Khwalekhana () Mulekhwa ()
4. Khusoma
Shinasoma ta() nasoma mpaka primary () Nasoma mpaka sekondari ()
Nasoma mpaka hakari () Naso mampaka muunivasiti ()
5. Ikasi Mwene khrihandika () Naandikwa () Naritaya ()
Akandi_____

Bulwale bwesukari (makhuwa)

1. Bulwale bwe sukari bwaranga mwakashi?
Hasi wo mwaka mulala () has imika chirano() Saidi ya miaka chirano ()
2. Bushirishi shina bwolininabwo?
Ibiakhulia () okhumila amalesi () isindano ya insulini ()
3. Isukari _____

Amarebo khumanya bulwale bwe sukari nende tsyinjila thiokhwilinda

1. Bulwale bwe sukarini?
 - a) Amakumba
 - b) Imbiko
 - c) Thimoni
 - d) Isukari
 - e) Shimenyiletawe
2. Injile indaiyo khupima isukari
 - a) Amenyali
 - b) Amatsayi

c) Sheminyile tawe

3. Isikari niekulu shine shirelanga?

- a) Inisulini shililotawe
- b) Khubula khulia nende khuruka biakhulia
- c) Biakhulia khuchelewa
- d) Shemenyile tawe

4. Tsihalitsino tsileranga itaabu ya isukari?

- a) Khubaomulwale
- b) Khubula khukhoramasoesi
- c) Isitress
- d) Shimenyile ta

5. Shina shimanyinja ulinende bulwale bwe sukari

- a) Khuba nende obululu bwa matsi
- b) Khwinyala sana
- c) Khubula khulola obulai
- d) Shimanyile ta

6. Isukari neli hasi mumatsayi omulwale alingariena

- a) Oluchesi nende khuhulila obushindu
- b) Omurwe okhuluma
- c) Omwoyo okhupa bwangu
- d) Okhukonyana
- e) Shimenyile ta

7. Shina shikali nende itabu khulonda khana nende bulwalebwe isukari?

- a) Khubula khulola bulai
- b) Ishinda yie etsimbiko
- c) Ishinda yie emishii
- d) Ishinda yie masukhu
- e) Shimenyile ta

8. Linakasi nende omubili okhurenga imanyinga shina?

- a) Ishida yie tsimbiko
- b) Ishinda yie mishii
- c) Ishida yie tsimoni
- d) Shimenyile ta

9. Injileyo khwilinda bulwalebwe isukari bukhasumbula ta
- Khola masoesi naolie khulonda isaa
 - Khulonda misala
 - Khukula amalesi mukemistri
 - Shimenyile ta
10. Khulondakhana nende okhulia omulwale wa sukari akhole shina?
- Alie biakhulia vya kabohitrate sana
 - Apunguze amani nende obusiro
 - Alie amatunda nende tsifwa
 - Shimenyile ta
11. Omulwale we sukari akhole shina khulondekhana nende amasoesi?
- Achendebulinyanga
 - Masoesikhutsidakika 20-30 khwijuma
 - Masoesi bulinyanga nailikhukasiye
 - Shimenyile ta
12. Olakholashina onyola obulwali bwe isukari?
- Khuywa matsi nende vinywajivindi
 - Nereba daktarii wanyala khurumishile insulin
 - Ndolenge isukari ibuli masaa kane
 - Shimenyile ta
13. Khulondekhana nende khuchunga isukari mumatsi, omulwalwe akholeshi?
- Khulolaisukari kilamara
 - Okhupi isukari mulapu buli miesi chipili namwe chitaru
 - Shimenyile ta
14. Onyola wakhola shinolinende isukari hasi
- Nywa matsi kamchungwa nusu shikombe
 - Isukari nebaekululia shikhulia shititi nibalisaa inusu habweni
 - Isindanoya insulin
 - Shimenyile ta
15. Omulwale wasukari amanyinjashi kubilenje
- Khulenga bilenge nibili nende okhubimba amakule
 - Saba ibilenje nende amatsi amayu halafu pangusia hakari we bitera
 - Ra ebilenje mmatsi

- d) Lengalikondolibilenje
- e) Shimenyile ta

16 Khwilinda nende obulwale bwa mashinini?

- a) Lola daktariwamenolulalakhumwaka
- b) Khupaomuswakikhabilikhunyanganga
- c) Bolelabulimunduolwalaisukari
- d) Shimenyile ta

17 Okhulondekhana nende Obushilishi bwe isukari omulwale anyala

- a) Lekha khumila amalesi obulwale khupoa namwe amila amalesi kandi
- b) Reba daktari noshili khubadilisha amalesi
- c) Kula malesi mikashiliokhuwa
- d) Langa dakatari nonya idalili yosiyosi khumubili
- e) Shimenyile ta

APPENDIX 4: CONSENT FORM

Participation in the research study on knowledge on diabetes and self care practices of diabetic patients attending care at Butere district hospital.

The investigator Dr. Faustina L. S has explained to me the purpose of the study and that it's meant to benefit diabetic patients in controlling and managing diabetes and its complications. I am voluntarily consenting to participate in this study by answering questions as directed by the questionnaire and drawing of blood for RBS test. I do not expect any monetary benefits from the investigator. I will receive treatment according to the hospital practices without discrimination based on my study participation. I have been assured that other than slight pain during drawing of blood no harm will be inflicted on me. My responses will be confidential and will not be revealed to any other third party. My identity will not be used at any point during data collection and presentation of this work.

Ion my own freewill accept to participate in the above study.

Signature.....Date.....

APPENDIX 7: RBS PROCEDURE.

Instrument to be used: Glucometer

Principle: Glucometer is used to determine the total amount of glucose in whole blood. Capillary, venous and arterial blood is used. Glucometers use a modified glucose dehydrogenase method. A chromogenic compound is added to the reagent with a saponin used for haemolysing the red blood cell. Absorbance is measured at two wave lengths to compensate for turbidity.

Procedure:

- i. The procedure will be explained to the patients and informed consent obtained from them.
- ii. The middle finger will be swabbed with methylated spirit and allowed to dry.
- iii. The finger is pressed using lab technician's thumb from the knuckle towards the tip to stimulate blood flow.
- iv. While pressing towards the knuckle the swabbed finger is pricked, first blood is wiped and slight pressure applied towards the finger tip until another drop of blood appears.
- v. A new micro cuvette is removed from the pack and a drop of blood placed to the tip of the micro cuvette allowing it to fill in a continuous process making sure no air bubbles occur.
- vi. Excess blood is wiped off on the outside of the micro cuvette tip without drawing blood out of the cuvette.
- vii. In case of the presence of air bubbles the technique is repeated with anew sample of blood.

- viii. The micro cuvette is placed in the cuvette holder within 40 seconds of filling the cuvette .The cuvette holder is pushed to its measuring position. Test results are displayed automatically between 40 to 240 seconds.

Quality Control: The glucometer has an internal electronic self test. It automatically verifies the performance of the optronic unit of the analyzer each time it is switched on. Test is performed every second hour if the analyzer is left turned on.

APPENDIX 8: APPROVAL LETTER FROM IREC



MOI TEACHING AND REFERRAL HOSPITAL
P.O. BOX 3
ELDORET
Tel: 33471/2/3

Reference: IREC/2012/205
Approval Number: 000954

Faustina L. Sakari,
Moi University,
School of Public Health,
P.O. Box 4606-30100,
ELDORET-KENYA.



MOI UNIVERSITY
SCHOOL OF MEDICINE
P.O. BOX 4606
ELDORET
Tel: 33471/2/3
14th March, 2013

Dear Ms. Sakari,

RE: FORMAL APPROVAL

The Institutional Research and Ethics Committee have reviewed your research proposal titled:-

“Knowledge on Diabetes, Self Care Practices and Glycemic Control in Diabetes Patients at Butere District Hospital.”

Your proposal has been granted a Formal Approval Number: **FAN: IREC 000954** on 14th March, 2013. You are therefore permitted to begin your investigations.

Note that this approval is for 1 year; it will thus expire on 13th March, 2014. If it is necessary to continue with this research beyond the expiry date, a request for continuation should be made in writing to IREC Secretariat two months prior to the expiry date.

You are required to submit progress report(s) regularly as dictated by your proposal. Furthermore, you must notify the Committee of any proposal change (s) or amendment (s), serious or unexpected outcomes related to the conduct of the study, or study termination for any reason. The Committee expects to receive a final report at the end of the study.

Sincerely,

E. Were 27/03/2013

PROF. E. WERE
CHAIRMAN
INSTITUTIONAL RESEARCH AND ETHICS COMMITTEE

cc:	Director	-	MTRH
	Principal	-	CHS
	Dean	-	SOM
	Dean	-	SPH
	Dean	-	SOD
	Dean	-	SON



APPENDIX 9: APPROVAL LETTER FROM THE HOSPITAL

MINISTRY OF MEDICAL SERVICES

Telephone 020-8028261
E-mail: buterehospital@gmail.com



Medical Superintendent,
Butere District Hospital,
P.O Box 40,
BUTERE
4/4/2013

When replying quote
Our Ref NO. BM/DH/ST/3VOL.2/66

To
Dr Faustina L.Sakari,
Moi University,
School of Public Health,
P.O Box 4606-30100
Eldoret-Kenya.

Dear Ms. Sakari,

**RE: AUTHORITY TO CONDUCT RESEARCH ON KNOWLEDGE ON DIABETES,
SELF CARE PRACTICES AND GLYCEMIC CONTROL IN DIABETES PATIENTS AT
BUTERE DISTRICT HOSPITAL**

Reference is made to the Approval Letter by Institutional Research and Ethics committee (IREC) Ref No.IREC/2012/205 dated 14th March,2013 permitting you to conduct your research investigation within Butere District Hospital.

The hospital administration hereby grants you authority to conduct your investigations as specified in your proposal. You will be expected to adhere to all regulations governing research activities and to avail a copy of the questionnaires, interview schedules or observation checklist or any other tools you will be using in your investigations.

Thank you,

Victor O.Oyugi (HAO)
FOR MEDICAL SUPERINTENDENT.



CC
Provincial Director of Medical Services-Western.

APPENDIX 10: CORRELATION MATRIX

Correlations

		age	Gender	marital status	education level	occupation	disease duration	type of treatment	rbs	score	diabetes score	self care knowledge csore
age	Pearson Correlation	1	.002	.210	-.182	.450**	.423**	-.160	.019	-.044	.032	-.101
	Sig. (2-tailed)	.	.984	.079	.130	.000	.000	.182	.873	.714	.794	.400
	N	71	71	71	71	71	71	71	71	71	71	71
Gender	Pearson Correlation	.002	1	.295*	-.170	.164	-.056	.198	.064	-.120	.280*	-.099
	Sig. (2-tailed)	.984	.	.012	.155	.171	.645	.097	.597	.320	.018	.412
	N	71	71	71	71	71	71	71	71	71	71	71
marital status	Pearson Correlation	.210	.295*	1	-.227	.318**	-.003	-.141	.052	-.158	.210	-.185
	Sig. (2-tailed)	.079	.012	.	.057	.007	.979	.240	.665	.188	.079	.122
	N	71	71	71	71	71	71	71	71	71	71	71
education level	Pearson Correlation	-.182	-.170	-.227	1	-.238*	.096	-.008	.005	.150	-.219	.094
	Sig. (2-tailed)	.130	.155	.057	.	.045	.426	.947	.965	.213	.067	.433
	N	71	71	71	71	71	71	71	71	71	71	71
occupation	Pearson Correlation	.450**	.164	.318**	-.238*	1	.293*	.058	-.113	.009	.062	-.092
	Sig. (2-tailed)	.000	.171	.007	.045	.	.013	.628	.349	.939	.610	.446
	N	71	71	71	71	71	71	71	71	71	71	71
disease duration	Pearson Correlation	.423**	-.056	-.003	.096	.293*	1	.106	-.078	.050	-.192	-.118
	Sig. (2-tailed)	.000	.645	.979	.426	.013	.	.380	.520	.680	.108	.327
	N	71	71	71	71	71	71	71	71	71	71	71
type of treatment	Pearson Correlation	-.160	.198	-.141	-.008	.058	.106	1	.030	-.183	.093	.007
	Sig. (2-tailed)	.182	.097	.240	.947	.628	.380	.	.801	.128	.440	.956
	N	71	71	71	71	71	71	71	71	71	71	71
rbs	Pearson Correlation	.019	.064	.052	.005	-.113	-.078	.030	1	-.647**	.341**	.308**
	Sig. (2-tailed)	.873	.597	.665	.965	.349	.520	.801	.	.000	.004	.009
	N	71	71	71	71	71	71	71	71	71	71	71
score	Pearson Correlation	-.044	-.120	-.158	.150	.009	.050	-.183	-.647**	1	-.313**	-.391**
	Sig. (2-tailed)	.714	.320	.188	.213	.939	.680	.128	.000	.	.008	.001
	N	71	71	71	71	71	71	71	71	71	71	71
diabetes score	Pearson Correlation	.032	.280*	.210	-.219	.062	-.192	.093	.341**	-.313**	1	-.180
	Sig. (2-tailed)	.794	.018	.079	.067	.610	.108	.440	.004	.008	.	.132
	N	71	71	71	71	71	71	71	71	71	71	71
self care knowledge csore	Pearson Correlation	-.101	-.099	-.185	.094	-.092	-.118	.007	.308**	-.391**	-.180	1
	Sig. (2-tailed)	.400	.412	.122	.433	.446	.327	.956	.009	.001	.132	.
	N	71	71	71	71	71	71	71	71	71	71	71

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).