UNIVERSITY OF NAIROBI

PREVALENCE AND FACTORS ASSOCIATED WITH NON ADHERENCE TO DIET AND EXERCISE LIFESTYLE RECOMMENDATIONS AMONG TYPE 2 DIABETIC PATIENTS

BY

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DECLARATION

I, Mujuni Brian Muhabuura, declare that this is my original work and that there are no previous

submissions of a similar research thesis known to me.

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ACRONYMS

IDF- International Diabetes Federation

BMI- Body mass index

DPPRG- Diabetes Prevention Programme Research Group

GDM- Gestational Diabetes Mellitus

IGT- Impaired Glucose Tolerance

IFG- Impaired Fasting Glucose

OGTT- Oral Glucose Tolerance Test

KNH-Kenyatta National Hospital

ABSTRACT

Diabetes mellitus is a leading cause of heart disease, retinopathy, nerve damage and renal problems worldwide. Studies attribute delay in the development of complications of type 2 diabetes to healthy diet and physical activity. Despite this fact, rates of non-adherence to diet plan and exercise recommendations are still as high as 70%.

To determine the knowledge of the role of diet and exercise lifestyle recommendations, prevalence of non adherence to diet and exercise recommendations and describe the factors associated with non adherence to diet and exercise among type 2 diabetic patients at Kenyatta National hospital (KNH) diabetic clinic, a descriptive cross sectional study using a questionnaire was used.

The highest number of participants (83.95%) in this study understood lifestyle recommendations in the management of type 2 diabetes mellitus as both exercise & dietary habits. More participants perceived that diet and exercise control sugar levels (87.04% and 96.30%). A significant number of participants adhered to diet and exercise (n=200, CI, 0.94-0.99 and n= 176, 95% CI, 0.79-0.89 respectively) compared to those who did not.

Weather (29.41%, CI, 0.13 -0 .46), Sickness (70.59% CI, 0.54-0.87) lack of detailed written instructions regarding exercise (82.35% CI,0.69-0.96) and healthy dietary habits (17.65% CI, 0.04-0.31) from any health care provider, and lack of social support (42.86% CI 0.27-0.58) were significant reasons for non adherence to diet and exercise.

CHAPTER 1

1.0   Background

Diabetes mellitus is a major cause of mortality with an estimated 3.96 million deaths in adults per year and mortality rate of 6.8% in all ages at global level (Roglic & Unwin, 2010). The Kenya National Diabetes Strategy 2010-2015 affirms that the current 3.3% prevalence rate will increase to 4.5% by 2025 and partly links this to changes in lifestyle dynamics.

Healthy diet and physical activity improves and maintains glyceamic levels of people diagnosed with type 2 diabetes mellitus. This helps prevent and delay the development of complications by about 40% to 60% over 3 to 4 years (Lachin et al., 2002). However, rates of non-adherence to diet plan and exercise recommendations have been reported at 35 to 75% and 70 to 81% respectively in type 2 diabetes patients (Rowley, 1999).

Non-adherence to lifestyle recommendations occurs when a patient deviates below the acceptable level of adherence from mutually agreed collaborative approach to lifestyle changes (Mash, 2005). Reasons reported for not adhering to diet and exercise range from lack of communication/information to lack of exercise partner and lack of time (Otieno et al., 2003; Serour et al., 2007). Therapeutic lifestyle measures must be constantly modified to accommodate individual needs since each individual patient is unique in background and lifestyle is dynamic.

This study sought to investigate prevalence and factors associated with non adherence to diet and exercise lifestyle recommendations among type 2 diabetic patients at Kenyatta National Hospital.

1.1   Problem Statement

The Kenya National Diabetes Strategy 2010-2015 predicts that the current 3.3% diabetes prevalence rate will increase to 4.5% by 2025 and partly links this to changes in lifestyle dynamics.

Although healthy diet and physical activity improves and maintains glyceamic levels of people diagnosed with type 2 diabetes mellitus, rates of non-adherence to diet plan and exercise recommendations have been reported at 35 to 75% and 70 to 81% respectively in type 2 diabetes patients (Rowley, 1999).

In Kenya, no study has been done on rates and factors associated with non adherence to diet plan and exercise among type 2 diabetes patients.

1.2   Justification

Diabetes is a major cause of mortality with an estimated 3.96 million deaths in adults per year and mortality rate of 6.8% in all ages at global level (Roglic & Unwin, 2010).

The Kenya National Guidelines for diabetes management 2010-2015 affirms that the current 3.3% prevalence rate will increase to 4.5% by 2025 and partly links this to changes in lifestyle dynamics.

Despite this observation, studies which provide evidence for the factors responsible for poor control of diabetes especially in sub-saharan Africa, have not taken factors associated with non adherence to exercise and diet life recommendations as a primary objective (Sanal et al., 2011). This therefore calls for extra studies in prevalence and factors associated with non adherence to diet and exercise. Describing these factors will strengthen workable practices and effective advice for those with type 2 diabetes.

1.3   Research question

What is the prevalence and risk factors of non adherence to diet and exercise lifestyle recommendations at Kenyatta National Hospital diabetic clinic?

1.4   Objectives

Among type 2 diabetic patients at Kenyatta National Hospital diabetic clinic:

1. Determine knowledge of the role of diet and exercise lifestyle recommendations in management of diabetes.

2. Determine the frequency (prevalence) of non adherence to recommended diet and exercise

3. Describe reasons for non adherence to recommended diet and exercise.

CHAPTER 2

2.0   Literature review

2.1   Diagnosis and Classification of Diabetes Mellitus

Diabetes Mellitus is a clinical syndrome characterized by hyperglycemia due to absolute or relative deficiency of insulin (Davidson, 2005). The disease is defined by fasting plasma glucose of 7.0mmol/l or above, or random plasma glucose of 11.1mmol/l or above, or an abnormal oral glucose tolerance test of 11.1mmol/l or above (Davidson, 2005). This chronic disease can be classified aetiologically into type 1 diabetes, type 2 diabetes, gestational diabetes, and other specific types (Davidson, 2005). Type 1 diabetes is usually immune-mediated in origin (Davidson, 2005); but in type 2 diabetes, insulin resistance is the main defect which is usually followed by β cell exhaustion, and often associated with obesity (McWhinney, 1997). In gestational diabetes (GDM), occurrence of the disease is first noted during pregnancy, which remits after the pregnancy, but is associated with a risk of type 2 in later life (McWhinney, 1997). Repeated pregnancy may increase the likelihood of developing diabetes, especially type 2, particularly in obese women; 80% of women with gestational diabetes would ultimately develop clinical diabetes requiring life-long treatment (Davidson, 2005 & McWhinney, 1997).

Davidson (2005) defined other specific types of diabetes as those secondary to other causes such as genetic defects of β cell function, genetic defects of insulin action, pancreatic disease (for example pancreatitis, neoplastic disease, pancreatectomy and cystic fibrosis), excess endogenous production of hormonal antagonists to insulin (for example growth hormone, glucagon glucocorticoids, catecholamines, and thyroid hormones), drug-induced (for example corticosteroid, thiazide diuretics, and phenytoin).

Impaired fasting glucose or impaired glucose tolerance (IGT) is a clinical condition with impaired glucose metabolism without clinical diabetes. Impaired fasting glucose (IFG) is said to

develop when the fasting plasma glucose is between 6.1 and 6.9mmol/l (Davidson, 2005), while impaired glucose tolerance (IGT) is defined as abnormal intermediate readings of random plasma glucose and 2 hours after glucose load between 7.0-11.0mmol/l and 7.8-11.0mmol/l respectively (Davidson, 2005). Both conditions indicate the need for further evaluation with oral glucose tolerance test (OGTT) in order to make a definitive diagnosis. A quarter of individuals with IGT develop symptomatic diabetes after five years, and two-third after ten years (McWhinney, 1997). Both IFG and IGT have an increased risk of developing vascular disease and it may be necessary to keep such individuals under scheduled and strict follow-up.

2.2 Over-view of Type 1 & 2 Diabetes Mellitus global patterns.
Over 194 million adults worldwide in the age group 20-79 years was estimated to have diabetes in 2003 (IDF Diabetes Atlas, 2006). This number is estimated to increase to some 333 million of the adult populations by 2025 (Zimmet, *et al.*, 2001). The largest increase will occur in developing countries, where the prevalence will rise from 4.2% to 5.6% (IDF Diabetes Atlas, 2006)

The prevalence of type 1 and 2 Diabetes Mellitus is related to differences in behavioural, genetic, environmental and social risk factors, such as unhealthy dietary habits, increasing level of obesity and less physical activity (IDF Diabetes Atlas, 2006). The disease is frequently not diagnosed until complications appear, and approximately one-third of all people with diabetes may remain undiagnosed especially in developing countries, where resources are limited (Wens, *et al.*, 2005). As a result, the magnitude of the emerging epidemic of diabetes may be underestimated (Warren, 2004). In the United States, the disease is more frequent among American Indians, Asians, Hispanics, African Americans and Pacific Islanders due to diversity in lifestyle patterns (The DPPR Group, 2002). In Europe and North America, the ratio of types

2:1 is about 7:3 (Davidson, 2005). However, in northern Europe, the prevalence of type 1 in children has doubled in the last 20 years, especially in children less than 5 years of age (Davidson, 2005).

Diabetes is one of the most common chronic childhood diseases in the United States; more than 13,000 youths are diagnosed with diabetes every year and type 2, accounts for 8 − 45% of new childhood diabetes due to sedentary lifestyles (Peterson, *et al.*, 2007). In the United States, the prevalence of childhood type 2 diabetes has increased by 33% in the past 15 years, mirroring the increasing rates of overweight in this population and insulin resistance (Ogden, *et al.*, 2007). Overweight and insulin resistance can substantially increase the risk of unstable atherosclerosis leading to coronary heart disease and stroke (Molnar, 2004). However, optimal management of overweight in at risk individuals will significantly delay progression of the disease. This can be achieved by promoting healthy eating habits and increasing physical activity (Peterson, *et al.*, 2007).

Type 2 diabetes is characterized by insulin resistance and relative insulin deficiency, either of which may be present at the time of diagnosis. It constitutes about 85% to 95% of all diabetes in developed countries and may account for even a higher percentage in developing countries (IDF Diabetes Atlas, 2006).

Increased incidence of the disease, especially among youth, leads to increase in early mortality, health care costs, and loss of productivity (Burnet, *et al.*, 2005). Modifiable risk factors associated with the onset of type 2 diabetes include obesity, alcohol intake, cigarette smoking, physical inactivity, increasing intake of saturated fatty meals, low intake of dietary fiber and whole-grain foods (Bazzano, *et al.*, 2005). The disease is no longer confined to a particular age

group; middle aged and elderly people, but now commencing at an earlier age in many populations across the globe (Uusitupa, 2002).

The disease constitutes a major health burden in both developed and developing countries, and with rapid growing of obesity, it is becoming one of the largest challenges to health care systems (Uusitupa, 2002). It is now a common and serious global public health concern; which for most nations, has evolved in association with rapid socio-cultural changes, ageing populations, less physical activity, unhealthy eating habits, increasing urbanization and westernization (IDF Diabetes Atlas, 2006). Type 2 diabetes is recognized as a strong risk factor for cardiovascular disease and for associated complications that result in morbidity and mortality (Gertein & Melter, 1999).

Type 2 diabetes commonly occurs in individuals who are obese or overweight with body mass index equal or greater than 25 kg/m2 and insulin resistant, but these two factors alone are not sufficed to cause diabetes unless accompanied by impaired beta cell function (Uusitupa, 2002). It is usually preceded by a long period of impaired glucose tolerance (IGT) or milder disturbance in glucose metabolism and persistent excess energy consumption (Uusitupa, 2002). The natural cause of obesity or overweight has been associated with increased consumption of beverages with high sugar content, excessive eating of unhealthy diets and reduced physical activity (Ludwig *et al*, 2001). The occurrence of type 2 diabetes depends on multiple factors, with interaction of genetic and environmental factors playing a significant role. The environmental factors include unhealthy lifestyle such as over eating and less physical activity, malnutrition in utero, ageing and gestational diabetes. It should be noted that lifestyle and environmental factors does influence the onset and progression of type 2 diabetes, and that the underlying β-cell abnormality is genetically programmed (Warren, 2004). As a result, a significant proportion of

individuals will eventually require insulin to control their blood glucose levels inorder to achieve and maintain ideal glycaemic control (Warren, 2004). However, slower rate of disease progression and good quality of life for people with type 2 diabetes may be achieved using a combination of lifestyle modification recommendations and oral hypoglycemic drugs.

2.3   Overview of Diabetes in Sub-Saharan Africa

In Sub-Sahara Africa, approximately 7.1 million African were estimated to have diabetes in 2000 and this number is expected to rise to 18.6 million by 2030 (Wild, *et al.*, 2004).

Diabetes is more common among urban Sub-Saharan Africa populations compared to rural Sub-Saharan Africa with prevalence estimated at 2.2 to 6.7% and 2.2%, respectively (Sobngwi, *et al.*, 2001). The reasons for the prevalence may include physical inactivity and unhealthy eating habits like consuming diets rich in refined sugar (Azevedo & Alla, 2008). The severity of the disease is affected by other factors like low number of average visits for patient care among the diabetic population (Otieno, et al., 2003). Poor access to health care is due to various reasons such as transportation difficulties, lack of trained health care providers and inadequate health facilities (Azevedo & Alla, 2008). Statistics from Mozambique, Zambia and Mali show that 15% of people with diabetes have access to health care; 35% have difficulty accessing health care and 50 % have not been diagnosed (Azevedo & Alla, 2008). These figures point at a need to follow up patients on treatment and increase awareness about the importance and benefits of diabetes management and control.

The projected future increase in prevalence of diabetes should also be considered as a potential contributor to severe global burden of disease in especially in Sub-Sahara Africa where most people diagnosed with diabetes find it difficult to achieve and maintain the desired gylcaemic level of control (Otieno, *et al.*, 2003). Chronic shortages of drugs (including insulin) and their

high cost are the major factors for the poor gylcaemic control (Otieno, *et al.*, 2003). This means that health care systems in most Africa countries may not be well equipped with resources sufficient enough to withstand the burden of diabetes. Hence, a need to put in place effective and sustainable strategies to promote diabetes awareness and public health policies that empowers individuals with skills and knowledge on diabetes self-management (Unwin & Marlin, 2005).

The prevalence of diabetes varies from country to country in Sub-Sahara Africa. In Tanzania, estimated number of people with diabetes was 201,000 in 2000 and this number is expected to increase to 605,000 by 2030, while in Uganda, the estimated number was 98,000 in 2000 and it is expected to rise to 328,000 by 2030 (IDF, 2001). Estimated numbers of people with diabetes in Nigeria, Ghana and ivory coast were about 1.7 million, 302,000 and 264,000 in 2000 respectively and these figures are expected to increase to 4.8 million, 857,000 and 636,000 in 2030 respectively (IDF, 2001). Estimated number of people living with diabetes in Algeria was 426,000 in 2000 and this number is expected to rise to about 1.2 million in 2030 (IDF, 2001). In the Republic of South Africa, approximately 3 million South Africans have diabetes and an estimated 3 million individuals living with the disease remain undiagnosed (IDF, 2007).

Sub-Saharan Africa is therefore witnessing a growing burden of diabetes that is overwhelming the health care system. This burden is impacting on the meager resources in the continent hence making strict adherence to lifestyle modification recommendations inevitable and a cost effective option.

2.4   Risk Factors Associated With Type 2 Diabetes Mellitus

Inappropriate weight gain leading to obesity is one of the major risk factors for type 2 diabetes and risks of the disease increase steadily with increasing body mass index – BMI (IDF Diabetes Atlas, 2006). In Western countries, around 90% of type 2 diabetes mellitus cases are attributable to overweight (IDF Diabetes Atlas, 2006). Evidence suggests that obesity (especially central

obesity), physical inactivity, high fat diet, diet rich in saturated fatty acids, low intake of dietary fibers, low glycaemic carbohydrates, and whole grain cereals increases the risk of type 2 diabetes (Bazzano, *et al.*, 2005). Individuals with a diet at the highest level of the glycaemic index or glycaemic load are more likely to develop type 2 diabetes mellitus than those at the lowest levels (Bazzano *et al*, 2005).

Modest weight reduction through dietary improvement and gentle aerobic exercise can substantially reduce the development of type 2 diabetes, if not prevent it completely; among at risk populations like those with impaired glucose tolerance and impaired fasting glucose (IDF Diabetes Atlas, 2006). This intervention prevents and delays the development of associated complications amongst individuals with diagnosed type 2 diabetes. The DPPR Group (2002) has demonstrated that modest weight loss and increased physical activity (for example, brisk walking 3 hours per week) would significantly reduce the proportion of individuals with impaired glucose tolerance developing type 2 diabetes.

The natural history for people at risk of developing type 2 diabetes is weight gain and deterioration in glucose tolerance (Swinburn, *et al.*, 2001), hence healthy dietary habits and increased physical activity play a role in the prevention and management of type 2 diabetes. Engaging in regular physical activity is known to improve glucose, blood pressure, and lipid abnormalities that serve as the principal risk factors for the associated microvascular and macrovascular complications of diabetes (Boule, *et al.*, 2001). Encouraging more physical activity among patients with type 2 diabetes is a known standard of practice and should be part of routine patient education programs in all health care settings across the globe, but requires an understanding of individual exercise preference(s) and potential barriers.

2.5   Type 2 diabetes and it's management

Type 2 diabetes results from failure of the pancreas to produce adequate insulin or failure of body cells to utilize insulin or both and accounts for about 85- 90% of total diabetes burden (Kenya National Diabetes strategy, 2010-2015). Type 2 diabetes is common in individuals older than 40 years, who are obese with body mass index equal or greater than 25 kg/m² but is now also being seen more commonly in younger people and acknowledged as a very important and growing problem (IDF Diabetes Atlas, 2006).

The natural cause of obesity a risk factor for type 2 diabetes is associated with increased consumption of beverages with high sugar content, excessive eating of unhealthy diets and reduced physical activity (Ludwigm, *et al.*, 2001).

Traditionally, patients are treated with diet, exercise, and tablets known as oral hypoglycaemic agents (OHAs) and although impaired, the ß-cells still produce insulin, but they may also experience insulin resistance and in this situation, known as secondary failure, insulin is needed to obtain good metabolic control. (Uusitupa, 2002).

Approximately 50% of new cases of type 2 diabetes can be controlled adequately by lifestyle changes (diet and exercise); 20-30% will need oral hypoglycemic drugs (as an additional measure); and 20-30% will require insulin (Davidson, 2005). The management of type 2 diabetes should begin with an individualized regimen of diet, exercise, and medical counseling targeted to reduce body weight, maintain ideal glycaemic control, and reduction in risk factors for common co-morbidities of type 2 diabetes such as hypertension and cardiovascular disease (Warren, 2004). Prescribed lifestyle recommendations help in preventing diabetic complications by improving and maintaining glycaemic control. Strategies for lifestyle recommendations for people with type 2 diabetes must be incorporated in the disease management and should include

joint care between physicians, dieticians, diabetes nurses, diabetes educators, behavior consultants, exercise experts and community resources.

2.6   Barriers to Management

Adherence to diet and exercise recommendations minimizes costs of care involved in managing type 2 diabetes by reducing related morbidities. Health workers need constant and up to date information on barriers to the recommended exercise and diet regimens in order to be in a better position to mitigate them with effective and more acceptable options tailored to individual capabilities.

Serour *et al* identified unwillingness (48.6%); difficulty in following a diet regimen different from that of the rest of the family (30.2%); high frequency of social gatherings (13.7%); no advice given by health care providers (4.2%); workload (3.3%) as barriers to adherence diet. Barriers to adherence to regular exercise included lack of time (39.0%); coexisting disease (35.6%); lack of exercise partner (3.7%) (Serour, *et al.*, 2007). While overall factors influencing adherence to lifestyle recommendations (both diet and exercise) were stress (70.7%); a high consumption of fast food (54.5%); high frequency of social gatherings (59.6%) and excessive use of cars (83.8%) (Serour, *et al.*, 2007).

Results from study by Wens *et al* suggest patient's deficient knowledge on diabetes; lack of communication skills by the attending physician; lack of multidisciplinary support; over-reliance on modern/alternative medicine; fear of social isolation; patients underestimating diabetic conditions; opposition to change; and lack of patient's motivations as some of the barriers to treatment adherence including therapeutic diets and exercise in people living with type 2 diabetes Wens, *et al.,* 2005).

Patient's knowledge; attitude towards diabetic conditions; ideas; belief and experiences; as well as those of family members and friends; have also been shown to correlate with adherence (Wens *et al*, 2005). However, scheduled consultations based on patient-centeredness; multi-disciplinary teamwork; shared decision making based on patient's participation and partnership; and motivational counseling have been proven to encourage better adherence to treatment including diets and exercise in people with type 2 diabetes (Wens *et al*, 2005).

Hudon et al shows that levels of physical activity are lower among low income earners; low socioeconomic status, low educational status; decrease with age; and are low among people with functional incapacities (Hudon, et al., 2008)

Wadden *et al* demonstrates lack of self monitoring; injuries from physical activity; on-going medical problems that is, concurrent medical and surgical illness; and emotional or psychiatric problems as reasons for not adhering to therapeutic lifestyle interventions (Wadden, *et al*., 2006).

2.7   Patient's knowledge of diet and exercise lifestyle recommendations
The study by Serour *et al* stated that most patients (69.1%) had strong beliefs and knowledge that adherence to a diet regimen and regular exercise could have a positive effect on their diabetic condition. Knowledge, beliefs and responses to diabetic condition significantly influence adherence to lifestyle measures (Serour *et al.,* 2007). For example, adherence may be compromised if people with type 2 diabetes do not have knowledge that lifestyle recommendations-healthy diets and physical activity affects their glycaemic control.

Study by Thomas *et al* found that more than two third of individuals with diabetes believe exercise would improve their diabetic control; but majority find it difficult to initiate and sustain (Thomas *et al.,* 2004). Knowledge about the consequences and controllability of diabetes, and the perceived effectiveness of intervention affects patient adherence to lifestyle measure recommendations (Farmer, *et al.*, 2005). Access to high quality and professional health care is a

fundamental right for all. Persons with type 2 diabetes will achieve the outcomes of adherence to diet and exercise only if they have been equipped with the knowledge that self management is key in overall diabetes management. Effect of this knowledge should be reflected in the patients' willingness and capability to manage their condition adequately on a daily basis.

CHAPTER 3

3.0   MATERIALS AND METHODS

3.1   Study design

This was descriptive cross sectional study design in which a questionnaire was administered to

participants to determine the factors associated with non adherence to diet and exercise lifestyle

recommendations among type 2 diabetic patients at Kenyatta National Hospital (KNH).

3.2   Study area

The study was conducted at the diabetic clinic situated within Kenyatta National Hospital the

biggest referral hospital in East and Central Africa. People who attend this clinic come from

Nairobi and all other parts of Kenya especially for cases which have been referred for treatment

from specialists

The fact that Kenyatta is a referral hospital meant that diabetics from all regions in Kenya were

likely to be represented. The patients are assessed regularly by the clinicians and the dietician for

sugar levels, BMI and records are kept appropriately. Diet and exercise are recommended for all

newly diagnosed type 2 diabetes mellitus.

The clinic meets on Monday, Tuesday and Thursday and sees an average of 100 patients on each

of these days. Information on diet and exercise is provided by the dietician and the clinicians.

Patients are helped in identification of proper diet and exercise that fits their conditions.

3.3   Study population

Consenting adults (18 years and above) diagnosed with type 2 diabetes mellitus on clinic care for

one or more months at KNH diabetes clinic.

3.3.1   Inclusion Criteria

1. Type 2 diabetes mellitus patients diagnosed for one or more months and attending KNH

   diabetes Clinic and were recommended to proper diet and exercises by the clinician.

3.3.2   Exclusion Criteria

1. Presence of complications like limb amputation and back injuries

2. Non clinic attendants at KNH diabetic clinic.

3. Newly diagnosed type 2 diabetes patients

3.4 Sample size

❑ Using $N = Z^2 PQ / E^2$

Where;

N is desired sample size

Z is standard normal deviate at 95% confidence interval

P is the proportion in target population estimated to be non adhering to diet & exercise=70%

(Rowley, 1999).

E is accuracy of measuring prevalence of non adherence to diet and exercise = 5%

The estimated sample size will be 322. However with over 100 patients on follow up care every

month and with the time frame of 3 months in which to carry out this study, 108 patients will be

selected every month for three successive months hence the total sample size of 324 participants

will be used as sample size.

3.5 Sampling plan and participants' recruitment

The principal investigator with the help of clinicians, dieticians and the research assistant recruited participants from patients attending the diabetic clinic at KNH. Clinical criteria like the age of onset, relative weight, and time between initial diagnosis and initiation of insulin therapy was used to single out type 2 diabetes patients.

Random sampling technique was be used to select individual participants. A sample of type 2 diabetes patients was randomly selected from the register of patients booked on appointment days using a table of random numbers generated by stata 11.2 software.

On the clinic day, sample participants were approached to participate in the study sequentially. Screening was conducted to ensure language comprehension. Those who did not understand either Kiswahili or English were not included in the study. Information related to the study including importance and objectives will be availed to the participants and after signing the informed consent form, they will be recruited into the study.

3.6 Data collection

A structured, pilot-tested questionnaire was used to collect data. The questionnaire was formulated according to a model established during literature review and also, from related studies (modified to suit study locality). The questionnaire comprised of close-ended and multiple-choice questions. The principal investigator and research assistant read out the question as it was from the questionnaire to the participant and then document the findings. Each questionnaire was coded using participant's initials and this was cross-checked with initials on the signed informed consent form in order to ensure that the same participant was not selected more than once. Participants' responses were reviewed and verified on completion. Every subject was interviewed in one day.

3.7   Quality control measures

The inclusion of patients diagnosed one or more months and on clinical care meant that recruited participants had a relative understanding of adhering to lifestyle modification recommendations. Selection of a homogeneous sample of participants from Kenyatta National Hospital controlled for extraneous variables

3.8   Data Management and statistical analysis

Data obtained from the questionnaire was entered using Microsoft excel windows software and then exported to intercooled stata 11.2 for statistical analysis. Descriptive statistics were used to measure baseline characteristics of the participants. Prevalence of non adherence to exercise and diet recommendations was calculated as proportions of patients who did not adhere to recommended diet and exercise. Proportions of individual reasons for failure to adhere to exercise and diet were measured. Confidence intervals at 95% were used to show precision and a value of ≤ 0.05 was considered statistically significant. For statistically significant associations/ differences, logistic regression by determination of odds ratios was done to control for confounders and determine the strength of association of outcomes by gender, Education level, marital status and employment status. Data was presented in form of tables and histograms.

3.9   Ethical consideration

Ethical approval to perform the study was obtained from University of Nairobi and Kenyatta National Hospital ethical review committees.

Authorization to carry out the study was obtained from the head of the medicine department in Kenyatta National Hospital.

Written Consent was obtained from the study participants.

Confidentiality of patients' information was upheld.

CHAPTER 4

4.1 RESULTS

4.1.1 Baseline characteristics of the study participants

Table I displays socio-demographic characteristics (gender, age range in years, marital status, educational level, and employment status) of recruited participants with type 2 diabetes mellitus.

Of the 324 participants, 50.62% (n=164) were female and 49.38% (n=160) were male.

There were no participant aged between 18-27 years. 4.63% (n=15) were aged between 28-37 years. 37.65% (n=122) of the participants were 58-67 year age group, 29.01% (n=94) of the participants aged 48-57 year, and 17.28% (n=56) of the participants were aged 68 and above years, 11.42% (n=37) were aged 38-47.

25.62% (n=83) never attended school, 36.73% (n=119) had attended primary school, 17.28% (n=56) had attained secondary education and 20.37% (n=66) had attended a tertiary institution.

4.63% (n=15) were single, 79.01% (n=256) were married, 16.36% (n=53) widowed while non were divorced, separated or cohabiting.

46.91% (n=152) were unemployed, 38.89% (n=126) were employed, 0.93% (n=3) were on pension and 13.27% (n=43) were house wives.

Table 1: Socio-demographic characteristics of the study population

Variable		Frequency	Percentage
Gender	Male	160	49.38%
	Female	164	50.62%
Age	18-27	0	0%
	28-37	15	4.63%
	38-47	37	11.42%
	48-57	94	29.01%
	58-67	122	37.65%
	68 & above	56	17.28%
Education Level	None	83	25.62%
	Primary	119	36.73%
	Secondary	56	17.28%
	Tertiary	66	20.37%
Marital Status	Single	15	4.63%
	Married	256	79.01%
	Divorced	0	0%
	Cohabiting	0	0%
	Separated	0	0%
	Widowed	53	16.36%
Employment Status	Unemployed	152	46.91%
	Employed	126	38.89%
	Pensioner	3	0.93%
	House wife	43	13.27%

Table 1 shows the frequency and percentages of the socio-demographic characteristics of the study population.

4.1.2 Patient's knowledge of lifestyle recommendations (diet & exercise)

Table 2 shows that 3.7% (n=12) indicated that their understanding of lifestyle recommendations in the management of type 2 diabetes mellitus was gentle aerobic exercise only. 12.35% (n=40) showed that they understood lifestyle recommendations in the management of type 2 diabetes mellitus as only healthy dietary habits while 83.95% (n=272) understood lifestyle recommendations in the management of type 2 diabetes mellitus as both gentle aerobic exercise & Healthy dietary habits.

Table 2: Patient's knowledge of lifestyle recommendations (diet & exercise)

Variable	Frequency	Proportion (%)
Gentle aerobic exercise only	12	3.7
Healthy dietary habits only	40	12.35
Both gentle aerobic exercise & Healthy dietary habits	272	83.95
Perceives diet helps to control sugar level	282	87.04
Perceives diet does not help to control sugar level	42	12.96
Perceives exercise helps to control sugar level	312	96.30
Perceives exercise does not help to control sugar level	12	3.70

Table 2 shows patient's knowledge of lifestyle recommendations (diet & exercise)

4.1.2.1 Patient's knowledge of lifestyle recommendations (diet & exercise) by Gender

A significantly high number of male participants (52.2%) compared to the females (47.8%) (p=0.02) understood lifestyle recommendations in the management of type 2 diabetes as both gentle aerobic exercise and diet (see fig 1). Unadjusted odds ratio showed statistical significance for the association between both healthy dietary habits and exercise and sex (p=0.022, OR 2.1, CI 1.11-3.83) but adjusted odds ratio showed that this association wasn't statistically significant (p=0.478, OR 1.5, CI 0.47-4.94). There was no significant difference between males (41.7%) and

females (58.3%) (p=0.586) who understood lifestyle recommendations in the management of type 2 diabetes as gentle aerobic exercise only.

A significantly high number of female participants (67.5%) compared to the males (32.3%) (p=0.023) understood lifestyle recommendations in the management of type 2 diabetes as healthy dietary habits only (see fig 2). Unadjusted odds ratio showed statistical significance for the association between healthy dietary habits and gender (p=0.03, OR 0.4 CI 0.22- 0.90) but adjusted odds ratio showed that this association wasn't statistically significant (p=0.56, OR 0.7 CI 0.18-2.54). There was no significant difference between males and females perceptions about the usefulness of diet (p=0.216) and exercise (p=0.965) in controlling sugar levels.

Fig 1: Patient's knowledge of lifestyle recommendations (Both diet & exercise) stratified by Gender
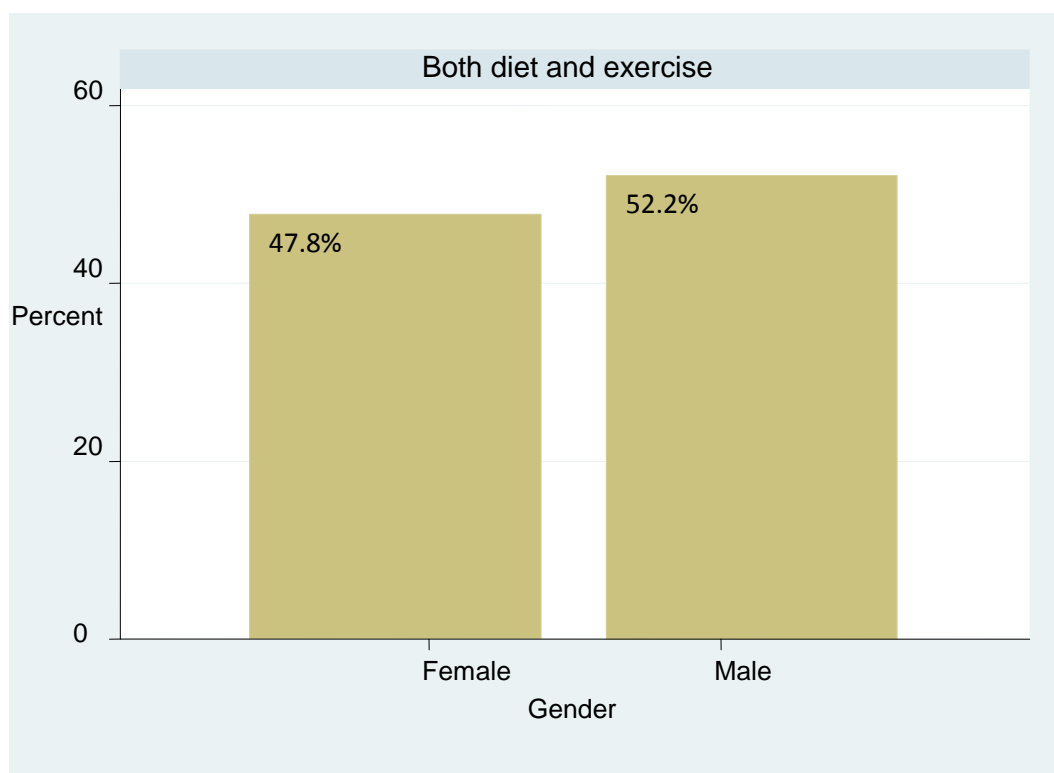
Fig 1shows patient's knowledge of lifestyle recommendations (Both diet & exercise) stratified by Gender

Fig 2: Patient's knowledge of lifestyle recommendations (Healthy dietary habits) stratified by sex
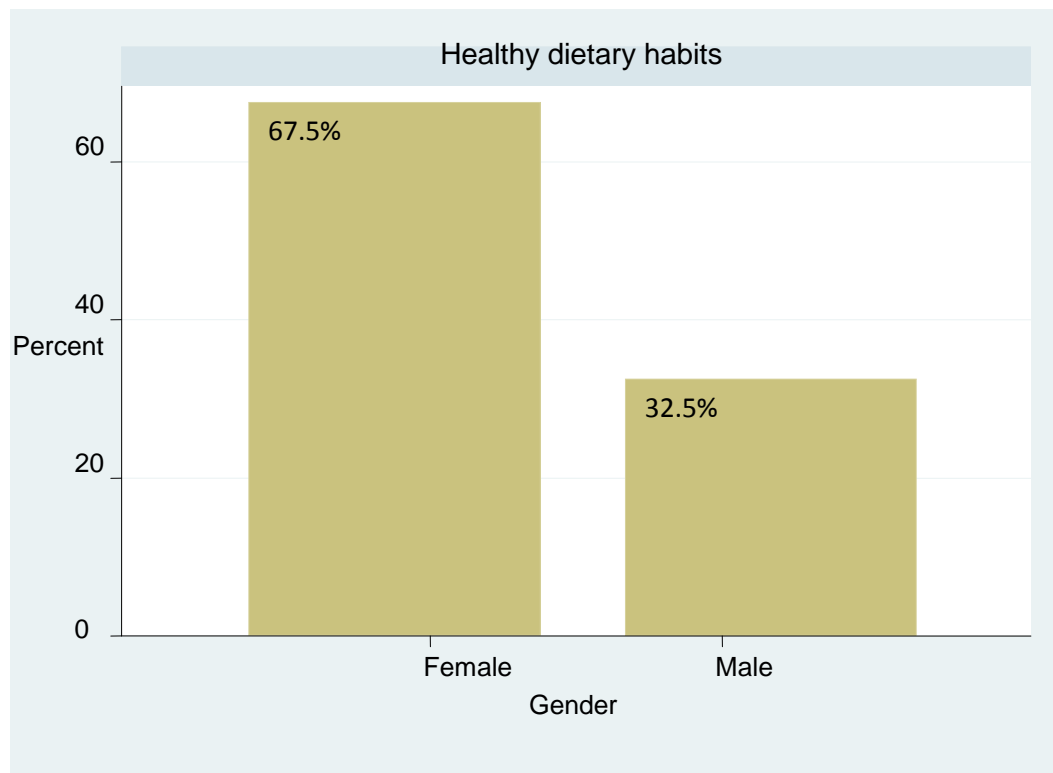
Fig 2 shows patient's knowledge of lifestyle recommendations (Healthy dietary habits) stratified by sex

4.1.2.2 Patient's knowledge of lifestyle recommendations (diet & exercise) by Age

There was no significant difference between age and patients knowledge of lifestyle recommendations (diet & exercise) as gentle aerobic exercise (p=0.906), healthy dietary habits (P = 0.984). There was no significant difference between age and participants' perception about the usefulness of diet (p=0.766), or exercise (p= 0.811) in controlling sugar levels.

4.1.2.3 Patient's knowledge of lifestyle recommendations (diet & exercise) by Employment status

There was no significant difference between employment status and patients knowledge of lifestyle recommendations (diet & exercise) as gentle aerobic exercise (p=0.951), healthy dietary habits (P = 0.620) or both (p=0.838). There was no significant difference between employment status and participants' perception about the usefulness of diet (p=0.648), or exercise (p= 0.941) in controlling sugar levels.

4.1.2.4 Patient's knowledge of lifestyle recommendations (diet & exercise) by marital status

There was no significant difference between marital status and patients knowledge of lifestyle recommendations (diet & exercise) as gentle aerobic exercise (p=0.738), healthy dietary habits (P = 0.965) or both (p=0.931). There was no significant difference between marital status and participants' perception of diet (p=0.681), or exercise (p= 0.517).

4.1.2.5 Patient's knowledge of lifestyle recommendations (diet & exercise) by Education level

There was no significant difference between marital status and patients knowledge of lifestyle recommendations (diet & exercise) as gentle aerobic exercise (p=0.937), healthy dietary habits (P = 0.952) or both (p=0.924). There was no significant difference between marital status and participants' perception of diet (p= 0.55), or exercise (p= 0.649).

4.1.3 Adherence/non adherence to lifestyle recommendations.

Table 3 and figure 3 show that 83.81% (n=176; 95% CI, 0.79-0.89) and 16.19% (n=34; 95% CI, 0.11 − 0.21) of the participants were adherers and non adherers to exercise respectively. 100% (n=76) of the participants indicated that brisk walking was the kind of gentle aerobic exercise

30

they were adhering to. 71.59 % (n=126) adhered to brisk walking daily while 28.41% (n=50) adhered to brisk it at least three times a week as shown in table 4. All of the participants 100% (n=176) adhered to exercise for a time duration of 40 minutes and above.

Table 5 and figure 4 show that 96.15% (n=200; 95% CI, 0.94- 0.99) and 3.85% (n=8; 95% CI, 0.01-0.06) of the participants were adherers and non adherers to diet respectively. 4.5% (n=9) had a diet preference of high starch and fiber, 5% were consuming fruits and vegetables, 3% (n=6) were on diet for High starch and fiber and low saturated fat, 8% (n=16) were taking a diet rich in low saturated fat and caloric intake and fruits and vegetables, 60.5% (n=121) were n diet for high starch, and fiber and fruits and vegetables, 19% (n=38) consumed high starch, and fiber and low saturated fat and caloric intake and fruits and vegetables. 30% (n=60) were adhering to their dietary habits once a day, 5% (n=10) were adhering at least once a week and 65% (n=130) were adhering to their dietary habits at least 3 times a week as shown in table 6.

4.1.3.1 Non adherence to gentle aerobic exercise recommendations (for a minimum of 30 minutes per day for at least 3 days/week) by Gender

There was significant difference between gender and nonadherence to exercise (p=0.053).

However the association between females (n= 22, 64.7%) non adherers to gentle aerobic exercise compared to males (n=12, 35.3%) was not statistically significant (p=0.056, OR 2.1, CI 0.98-4.51)

4.1.3.2. Non adherence to gentle aerobic exercise recommendations (for a minimum of 30 minutes per day for at least 3 days/week) by age, employment status, education level and marital status

There was no significant difference between age (p=0.928), employment status (p=0.798), marital status (p=0.755), Education level (p=0.820) and non adherence to gentle aerobic exercise

4.1.3.3 Non adherence to healthy dietary recommendations by Gender, age, education level, marital status and employment status.

There was no significant difference between gender (p= 0.956) and non adherence to healthy dietary habits recommendation, age (p= 0.526), education level (p= 0.768), marital status (p= 0.421), Employment status (p= 0.348)

Table 3: Prevalence of adherence/non adherence to exercise as a lifestyle recommendation (for a minimum of 30 minutes per day for at least 3 days/week).

Variable	Frequency	Proportion (%)	95% Confidence Interval (C.I)
Adherence to exercise	176	83.81	0.79- 0.89
Non adherence to exercise	34	16.19	0.11- 0.21

Table 3 shows prevalence of adherence/non adherence to exercise as a lifestyle recommendation.

Figure 3: Prevalence rates of adherence/non adherence to exercise as a lifestyle recommendation (for a minimum of 30 minutes per day for at least 3 days/week).
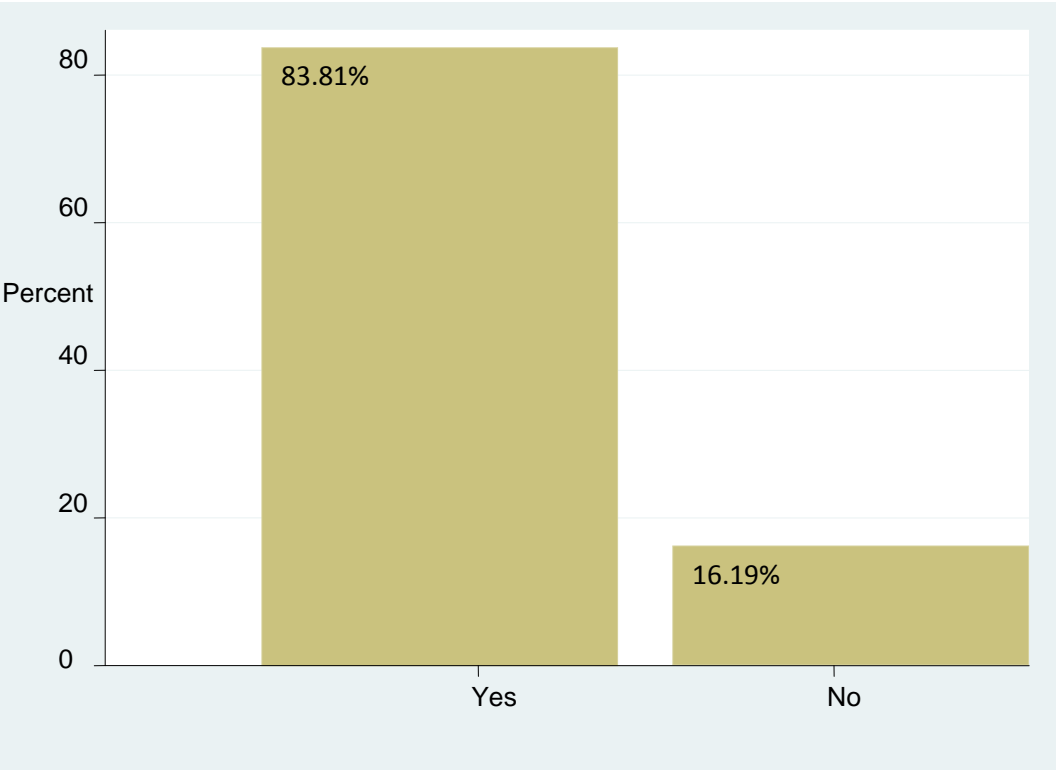
Adherence/Non adherence to exercise

Figure 3 illustrates the percentage rates of adherence/non adherence to exercise as a lifestyle recommendation.

Table 4: Characteristics of the participants adhering to exercise

Variable		Frequency	Proportion (%)
Exercise Preference	Brisk walking	176	100
	Cycling	0	0
	Jogging	0	0
	Sports Activities	0	0
	Other	0	0
Frequency of Exercise	Once daily	126	71.59%
	Once weekly	0	
	At least thrice weekly	50	28.41%
	Once monthly	0	0
Duration of Exercise session	<10 minute		
	10-19 minutes		
	20-29 minutes		
	30-39 minutes		
	40 minutes and above	176	100%

Table 4 shows the characteristic of the participants adhering to exercise

Table 5: Prevalence of adherence/non adherence to diet as a lifestyle recommendation.

Variable	Frequency	Proportion (%)	95% Confidence Interval (C.I)
Adherence to diet	200	96.15	0.94- 0.99
Non adherence to diet	8	3.85	0.01-0.06

Table 5 shows prevalence of adherence/non adherence to diet as a lifestyle recommendation.

Figure 4: Prevalence rates of adherence/non adherence to diet as a lifestyle recommendation

Adherence/Non adherence to diet

Adherence/Non adherence to diet
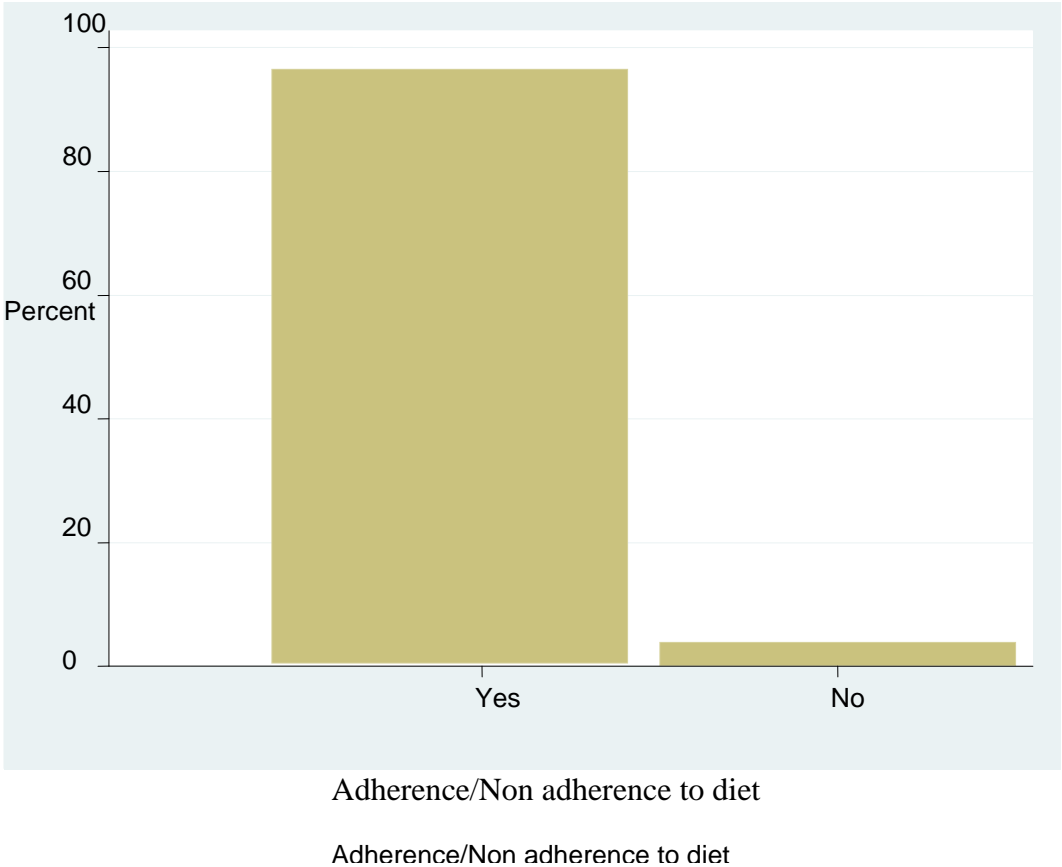
Figure 4 illustrates the percentage rates of adherence/non adherence to diet as a lifestyle recommendation.

Table 6: Characteristics of the participants adhering to diet

Variable		Frequency	Proportion (%)
Diet Preference	High starch and fiber	9	4.5
	Low saturated fat and caloric intake	0	0
	Fruits and vegetables	10	5
	Regulated alcohol intake and smoking cessation	0	0
	Eat more of sugar, Carbohydrate and fat meals	0	0
	High starch, and fiber and Low saturated fat and caloric intake	6	3
	Low saturated fat and caloric intake and Fruits and vegetables	16	8
	High starch, and fiber and Fruits and vegetables	121	60.5
	High starch, and fiber and Low saturated fat and caloric intake and Fruits and vegetables	38	19
	Eat any kinds of food	0	0
	Other		
Frequency of dietary habit	Once daily	60	30
	Once weekly	10	5
	At least thrice weekly	130	65
	Once monthly	0	0
	Other	0	0

Table 6 shows characteristics of the participants adhering to diet

4.1.4 Reasons for not adhering to diet and exercise life style recommendations

Table 7 shows that all of the 8 participants who were not adhering to diet cited financial constraints as a reason for their non adherence. 29.41% (n=10, 95% CI, 0.13 - 0 .46) of the participants who were not adhering to exercise gave weather as a barrier while 70.59% (n=24, 95% CI, 0.54 - 0.87) indicated that sickness from diseases such as arthritis and asthma was a barrier to adherence to exercise as shown in table 7.

Table 8 All non adherents to exercise (100%, n=34) reported exercise as a potential exacerbater of illness and 17.65% (n=6, 95% CI, 0.02 - 0 .29) reported that they had never received detailed written instructions regarding exercise programs from any health care provider. 25% of the non adherents to diet (n=2, 95% CI, -0.14 - 0.64) reported that they had never received detailed written instructions regarding healthy dietary habits from any health care provider (see table 8). 61.9% of all the non adherents to diet and exercise (n=26, 95% CI, 0.47 - 0.77) reported that they don't receive support from their spouse or partner, 16.67% (n=7, 95% CI, 0.05 − 0.28) of all the non adherents to diet and exercise did not receive support from family members while 42.86% (n=18, 95%CI, 0.27 - 0.58) did not receive support from friends.

4.1.4.1 Reasons for non adherence to exercise by socio demographic factors

There was no significant difference between gender (p= 0.248), age (0.425), education level (P= 0.176), Marital status (P= 0.242), Employment status (P= 0.407) and reasons for non adherence to exercise

4.1.4.2 Reasons for non adherence to diet by socio demographic factors

There was no significant difference between gender (p= 0.248), age (0.425), education level (P= 0.176), Marital status (P= 0.242), Employment status (P= 0.407) and reasons for non adherence to exercise

Table 7: Non-adherence to lifestyle measures and barriers for not adhering to diet and exercise

Variable		Proportion (%)	95% Confidence Interval (C.I)
Non adherence to diet		3.85	0.01-0.06
Barriers to recommended diet	Eating out	0	0
	Financial constraints	100	0
	Poor self control	0	0
	Granting self permission	0	0
	Lack of information	0	0
Non adherence to exercise		16.19	0.11- 0.21
Barriers to recommended exercise	Too busy schedule	0	0
	Weather	29.41	0.13 - 0 .46
	Lack of exercise partner	0	0
	Specific locations away from home	0	0
	Criticism	0	0
	Others	70.59	0.54 - 0.87

Table 7 shows non adherence to lifestyle recommendations and barriers for not adhering to diet and exercise

Table 8: Overall barriers to diet and exercise recommendations

Variable		Proportion (%)	95% Confidence Interval (C.I)
Exercise as potential exacerbater of illness	Yes	100	0
	No	0	0
Detailed written instructions regarding exercise	Yes	82.35	0.69 - 0.96
	No	17.65	0.04 - 0.31
Detailed written instructions regarding diet	Yes	75	0.36-1.14
	No	25	-0.14 - 0.64
Support from spouse/partner	Yes	38.1	0.23 - 0.53
	No	61.9	0.47 - 0.77
Support from family members	Yes	83.33	0.72 - 0.95
	No	16.67	0.05 - 0.28
Friends support	Yes	57.14	0.42 - 0.73
	No	42.86	0.27 - 0.58

Table 8 shows overall barriers to diet and exercise recommendations

CHAPTER 5

5.1 DISCUSSION

The highest number of participants (83.95%) in this study understood lifestyle recommendations in the management of type 2 diabetes mellitus as both gentle aerobic exercise & Healthy dietary habits. A higher number (12.35%) of participants understood lifestyle recommendations in the management of type 2 diabetes mellitus as only healthy dietary habits compared to a percentage of participants who understood lifestyle recommendations in the management of type 2 diabetes mellitus as gentle aerobic exercise only (3.7%). More participants perceived that diet (87.04%) and exercise (96.3%) control and maintain sugar levels. A significant number of participants adhered to diet and exercise (83.81%, 95% CI, 0.79-0.89 and 96.15%, 95%CI, 0.94-0.99 respectively) compared to those who did not (16.91% 95%CI 0.11-0.21 and 3.85% 95%CI 0.01-0.06 respectively). Weather, Sickness, lack of detailed written instructions regarding exercise programs, lack of detailed written instructions regarding healthy dietary habits from any health care provider, lack of support from a spouse or partner, lack of support from family members and lack of support from friends were significant reasons for non adherence to diet and exercise.

Serour, *et al* has previously reported a high number of patients (69.1%) with knowledge that adherence to a diet regimen and regular exercise could have a positive effect on their diabetic condition (Serour, *et al.,* 2007). A study by Shah, *et al* showed that 83.16% and 74.78% of the participants had knowledge that exercise and diet respectively can control type 2 diabetes (Shah, *et al.,* 2009). Thomas' *et al* reported that more than two third of individuals with diabetes believe exercise would improve their diabetic control (Thomas *et al.,* 2004). This study has showed that 83.95% of the patients attending the KNH diabetic clinic have the knowledge that both diet and

exercise are life style recommendations used in the management of type 2 diabetes while 87.04% and 96.3% perceive that diet and exercise respectively help control sugar level.

This study shows that 16.19% of the participants were non adherers to exercise and 3.85% of the participants were non adherers to diet. Rates of non adherence to diet and exercise in this study are lower when compared to other studies by Cawood (both diet and exercise, 40-50%) (Cawood, 2006), Rowley (diet at 35 to 75%; exercise, 70 to 81%) (Rowley, 1999), and Serour (diet, 63.5%; exercise, 64.4%) (Serour, *et al.*, 2007). The high rates of non adherence seen in these other studies could be due to high rates of other factors including co-morbidities such as hypertension and arthritis as compared to this study.

Adherence to diet and exercise requires support from relatives, friends and spouses/partners. Thomas *et al* has previously found out that support from spouse, family members and friends positively predict adherence to diet and exercise recommendations (Thomas, *et al.*, 2004). Lack of social support has been reported to affect patients' abilities to adhere properly to diet and exercise (Miller et al., 2013). This suggests the need for support and presence of relatives especially when the meal and exercise plans are being made with the dietician and/or clinician. In this study, lack of support from a spouse/partner, family members and friends were reported as reasons for non adherence to diet and exercise

Non adherers to diet cited financial constraints and lack of detailed written instructions regarding diet as a reason for their non adherence while non adherers to exercise reported bad weather, sickness (especially arthritis and asthma) and lack of detailed written instructions regarding exercise programs from health care providers as reasons for their non adherence. Providing written instructions for diet and exercise prescriptions is helpful because patients may not remember all the details discussed during the clinical encounter (Alan, 2006).

A study by Pascal *et al* reported financial constraints as the most common reason for non-adherence to diet (Pascal et al., 2012). Lack of detailed written instructions regarding diet and exercise has been reported in studies undertaken by Rowley and Wens (Rowley 1999; Wens, *et al*., 2005). In this study the lack of detailed written instruction regarding diet is almost double the number of lack of detailed written instruction regarding exercise. Frank *et al* asserts that healthcare providers need to explain the specific steps of the regimen, review the most important details, use written instructions, and encourage their patients to ask questions about the regimen for adherence to occur (Frank et al 1997).

Bad weather and co morbidities have been reported in other similar studies as a reason for non adherence to exercise (Thomas *et al.,* 2004; Serour *et al.,* 2007). The high rates of non adherence to exercise due to co morbidities suggest a need to tailor exercise plans to an individual type of co infection. For instance an individual with both asthma and type 2 diabetes might want to exercise at the time of the day when weather and/or environmental conditions are less likely to trigger an asthmatic attack.

5.2 CONCLUSION

The results from this study demonstrated lower rates of non-adherence to diet and exercise recommendations amongst people diagnosed with type 2 diabetes mellitus at KNH. It also revealed financial constraints and lack of detailed written instructions regarding diet as reasons for non adherence to diet while reasons for non adherence to exercise were lack of information and exercise as a potential exacerbater of illness. Lack of detailed written instructions regarding diet and exercise, and social support were reported as reasons for failure to adhere to diet and exercise. It is hoped that information from this study will contribute to development of

guidelines that suite people from different backgrounds and improve the effectiveness of lifestyle

recommendations in the management of the disease.

5.2 RECOMMENDATIONS

 There is need for active involvement of family and friends of diabetic patients in management of

type 2 diabetes. Detailed written instructions on proper diet and exercise should be tailored to

individual patients taking into account other factors such as presence of other co morbidities.

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APPENDICES

APPENDIX I: BUDGET
EXPECTED SUPPORT FROM AFFILIATED INSTITUTIONS

TYPE OF SUPPORT	NAME OF INSTITUTION
Internet facilities, computer facilities, supervision of the proposal and report writing	University of Nairobi Institute of Tropical and Infectious Diseases
Clinician (support/ research assistant), consultation services, research space	KNH Diabetes Clinic.

BUDGET ESTIMATE

Item	Quantity	Unit cost (ksh)	Total Cost(ksh)
Stationery			
Ream of papers	1	450	450
Photocopy (questionnaires, data and consent forms)	150 copies*3	2	900
Flash disk	1	1400	1400
Personnel			
Research Assistant	3 months	15000	15000
Consultant	3 months	15000	15000
Translator	1	3000	3000
Total			35,750

BUDGET JUSTIFICATION

I used services of a consultant working at KNH diabetic clinic with experience in management of diabetes in reading and interpretation of the blood sugar level results and also in identifying and recruiting patients with type 2 diabetes patients on one or more months(s) clinical care. I used services of a clinician (Research assistant) working at KNH and one who was well versed with Kiswahili and in diabetes management as well to help me communicate with the study participants. Other commercially available items like papers and a flash disk were purchased for use in the exercise of drafting a questionnaire.

APPENDIX II: RECOMMENDED MEAL PLAN

Guide to recommending a meal plan

Profile of person with diabetes	Number of servings from each food group
Recommend about **1200 – 1600** calories a day if the person is: • A small woman who exercises • A small or medium woman who wants to lose weight • A medium woman who does not exercise much	To provide **1200 – 1600** calories • 6 starches • 3 vegetables • 2 fruit • 2 milk and dairy • 2 meat or meat substitute • Up to 3 fats
Recommend about **1600 – 2000** calories a day if the person is: • A large woman who wants to lose weight • A small man at a healthy weight • A medium man who does not exercise much • A medium to large man who wants to lose weight	To provide **1600 – 2000** calories: • 8 starches • 4 vegetables • 3 fruit • 2 milk and dairy • 2 meat or meat substitute • Up to 4 fats
Recommend about **2000 – 2400** calories a day if the person is: • A medium to large man who does a lot of exercise or has a physically active job • A large man with a healthy weight • A large woman who does a lot of exercise or has a physically active job	To provide **2000 – 2400** calories • 11 starches • 4 vegetables • 3 fruit • 2 milk and dairy • 2 meat or meat substitute • Up to 5 fats

APPENDIX III: QUESTIONNAIRE
SECTION A: Demographics

Please tick the appropriate response inside the box.

1. Please indicate your sex.

Male _____ ☐

Female _____ ☐

2. Please indicate your age group by ticking the appropriate box.

18 – 27 years _____ ☐

28 – 37 years _____ ☐

38 – 47 years _____ ☐

48 – 57 years _____ ☐

58 – 67 years _____ ☐

68years and above_____ ☐

3. Please indicate your marital status.

Single _____ ☐

Married _____ ☐

Divorced _____ ☐

Separated _____ ☐

Widowed _____ ☐

Co-habiting/living- in _____ ☐

4. Please indicate your highest educational level.

None _____ ☐

Primary _____ ☐

Secondary_____ ☐

Tertiary _____
☐

5. Please indicate your employment status.

Unemployed _____ ☐

Employed _____ ☐

Pensioner _____ ☐

Housewife _____
☐

SECTION B: PATIENT'S KNOWLEDGE OF LIFESTYLE RECOMMENDATIONS

(DIET & EXERCISE)

This section contains questions to determine the knowledge of patients on the role of lifestyle

recommendation in the management of type 2 diabetes mellitus.

6) Please indicate below your understanding of lifestyle recommendations in the management of

type 2 diabetes mellitus.

Gentle aerobic exercise only_____ ☐

Healthy dietary habits only_____ ☐

Both gentle aerobic exercise & Healthy dietary habits_____ ☐

☐

Other _____

7) Do you feel that gentle aerobic exercise has a role to play in the management of type 2 diabetes?

Yes_____ ☐

No_____ ☐

If NO, please proceed to question 9.

8) Do you think that gentle aerobic exercise helps to control and maintain glucose (sugar) level?

Yes_____ ☐

No_____ ☐

9) Do you feel that healthy dietary habits have a role to play in the management of type 2 diabetes?

Yes_____ ☐

No_____ ☐

If NO, please proceed to question 11

10) Do you think that healthy dietary habit helps to control and maintain glucose (sugar) level?

Yes_____ ☐

No_____ ☐

SECTION C: ADHERENCE/NON-ADHERENCE TO LIFESTYLE

RECOMMENDATIONS

This section contains questions to establish whether or not type 2 diabetes mellitus patients are

adhering to lifestyle recommendations (diet and exercise)

Please tick the appropriate option inside the box.

11) Do you adhere to any form of gentle aerobic exercise recommendations (i.e. do you exercise

for a minimum of 30 minutes per day for at least 3 days/week)?

Yes _____ ☐

No _____ ☐

If NO, please proceed to question 15.

12) If YES, what kind of gentle aerobic exercise recommendations are you adhering to?

Brisk walking_____ ☐

Cycling_____ ☐

Jogging_____ ☐

Sport activities_____ ☐

Other_____ ☐

13) How often do you adhere to gentle aerobic exercise recommendations?

Once daily _____ ☐

Once weekly_____ ☐

At least thrice weekly_____ ☐

Once monthly_____ □

Other_____ □

14) What is the duration of your gentle aerobic exercise per session?

Less than 10 minutes_____ □

10 – 19 minutes_____ □

20- 29 minutes_____ □

30 – 39 minutes_____ □

40 minutes and above_____ □

15) Do you adhere to any form of healthy dietary habits recommendations?

Yes_____ □

No_____ □

If NO, please proceed to question 18.

16) If YES, what kind of healthy dietary habits recommendations are you adhering to?

 (You may tick more than one option)

High starch and fiber diets_____ □

Low saturated fat and caloric intake_____ □

Fruits & vegetables_____ □

Regulated alcohol intake and smoking cessation _____ □

Eat more of sugar, Carbohydrate and fat meals_____ □

Eat any kinds of food_____ □

□

Other_____

17) How often do you adhere to healthy dietary habit recommendations?

Once daily_____ ☐

Once weekly_____ ☐

At least thrice weekly_____ ☐

Once monthly_____ ☐

Other_____ ☐

SECTION D: TO BE ANSWERED BY NON-ADHERERS

REASONS FOR NOT-ADHERING TO DIET & EXERCISE LIFE STYLE

RECOMMENDATIONS

Please tick the option (s) that expresses your view about each of the statements describing

reasons for non-adherence to lifestyle recommendations (i.e. what is preventing you?) You may

tick more than one option.

18. From the following list, Please indicate reason(s) for non-adherence to exercise.

Too busy schedule _____ ☐

Weather (especially during cold season) _____ ☐

Lacking exercise partner/spouse_____ ☐

Specific locations away from home (e.g. trips) _____ ☐

Criticism (presence of others make you uncomfortable) _____ ☐

Others_____ ☐

19) From the following list, please indicate reason (s) for non-adherence to dietary habits/prescriptions.

Eating out (restaurant, ceremonies, work, family & friends' homes) _____ ☐

Inappropriate dietary habits (e.g. eating snacks in-between meals) _____ ☐

Financial constraints (to buy ideal healthy diets) _____ ☐

Poor self control _____ ☐

Granting self permission (e.g. just this once, a little won't hurt) _____ ☐

Another's home (e.g. on trips) _____ ☐

Other_____ ☐

Please tick the appropriate option inside the box.

20) Do you view exercise as potentially exacerbating illness i.e. has negative physical reactions such as physical weakness, body pain, sickness or ageing?

Yes _____ ☐

No _____ ☐

21) Have you ever received detailed written instruction regarding exercise programs from any health care provider?

Yes _____ ☐

No _____ ☐

22) Have you ever received detailed written instruction regarding healthy dietary habits from any health care provider?

Yes_____ ☐

No_____ ☐

23) Do you enjoy any form of moral and/or emotional supports from your spouse/partner towards adhering to lifestyle recommendations?

Yes_____ ☐

No_____ ☐

24) Do you consistently receive moral and/or emotional supports from your family members towards adhering to lifestyle recommendations?

Yes _____ ☐

No _____ ☐

25) Do you consistently receive friends' support towards adhering to lifestyle recommendations?

Yes _____ ☐

No _____ ☐

Thank you very much for your participation and completing this questionnaire.

APPENDIX IV: INFORMED CONSENT FORM

INFORMED CONSENT FORM

FOR PARTICIPANTS IN THE STUDY ARM

FACTORS ASSOCIATED WITH NON ADHERENCE TO DIET AND EXERCISE

LIFESTYLE RECOMMENDATIONS AMONG TYPE 2 DIABETIC PATIENTS

PRINCIPAL INVESTIGATOR CONTACT INFORMATION:

Mujuni Brian Muhabuura, University of Nairobi Institute of Tropical and Infectious Diseases

P.O Box 19676-00202 Nairobi, Kenya. Tel. +254715824365

STUDY SPONSOR: UNIVERSITY OF NAIROBI INSTITUTE OF TROPICAL AND

INFECTIOUS DISEASES

PART 1:   INFORMATION SHEET

INVESTIGATOR'S STATEMENT: I am asking you to be in a type 2 diabetes research study. The purpose of this consent form is to give you the information you will need to help you decide whether to participate or not. Please read this form carefully or listen as it is read to you. You may ask me questions about what shall be asked of you to do, the risks, the benefits and your rights as a volunteer, or anything about the program and study that is not clear. When all your questions are answered, you can decide if you want to participate. This process is

called "informed consent". If you wish, we will give you a copy of this form for your records. You are free to refuse to participate or to withdraw from the program and study at any time without penalty or loss of benefits.

PURPOSE AND BENEFITS: We are conducting a non adherence to exercise and diet recommendations among type 2 diabetes patients research study here at KNH clinic. The aim of this study is to determine factors associated with non adherence to exercise and diet lifestyle recommendations among type 2 diabetics in Kenya. The research study will help us find better ways to support patients with type 2 diabetes. We are asking you to be in the program and study because you are a client at this clinic. We are inviting all type 2 diabetes patients attending this clinic to participate.

PROCEDURES: If you agree to participate in this study, you will be asked by a trained health worker to fill a questionnaire they will provide so that we can get information from you regarding the any challenges you face while trying to adhere to exercise and diet recommendations. The health worker will be available during this process to answer any questions you have.

You are one of 324 participants chosen by chance to participate in this study. We are asking you to participate.

RISKS, STRESS AND DISCOMFORTS: Participation in the study will require you to commit your time. Answering the questionnaire will last about 25 minutes. You can also stop at any time if you feel that you do not have to answer any more questions.

REIMBURSEMENT: You will not receive any money or gifts for participating in this and study.

ALTERNATIVES TO PARTICIPATION: You can choose whether or not to participate in this research study. If you choose not to participate, your access to services at this clinic or within the community will not be affected in any way.

CONFIDENTIALITY: We will keep your identity and the answers in the questionnaire confidential. To make sure your information is kept private; your name will not be recorded. Instead we will assign you a study number. We will use this number and not your name on the questionnaire to collect your information. Only the investigator, study personnel, and the institutional ethics review board will have access to information about you. Once we are done with the study, all documents and other study information will be destroyed. Your name will not be used in any published reports about this study.

VOLUNTARINESS: Your decision to be in this program and study is completely up to you. You do not have to participate if you do not want to. If you decide not to participate, you will still get all the same clinical services. You also have the right to withdraw from the study at any time.

CONTACT: If you have questions regarding the study, you can contact the investigator listed above. If you suffer any adverse events due to participation in this study, call the principal investigator, Mujuni Brian Muhabuura, on the emergency number shown above. You may also contact the Kenyatta National Hospital Ethics and Research Committee. Their phone number is 2726300 ext: 44102.

Do you have any questions for me?

PART 2:   CERTIFICATE OF CONSENT

Do you consent to participate in this research study?

Subject's Statement:

This research study on non-adherence to diet and exercise lifestyle recommendations among type 2 diabetes patients was explained to me. I have had a chance to ask questions about it and any questions that I have asked have been answered to my satisfaction. I volunteer to take part in this program.

_____   _____

Signature or left thumbprint of subject   Date

_____   _____

Name of subject   Date

Witness' Statement (*if thumbprint is used)*:

I have witnessed the accurate reading of the consent form to the potential participant, and the individual has had the opportunity to ask questions. I confirm that the individual has given consent freely.

_____   _____

Signature of witness   Date

_____   _____

Name of Witness   Date

Study Personnel Statement:

I have accurately read aloud the information sheet to the potential study subject, and to the best of my ability made sure that the subject understands the procedures. I confirm that the subject was given an opportunity to ask questions which were answered correctly and to the best of my ability. I confirm that the individual was not coerced into giving consent, and the consent has been given freely and voluntarily.

_____   _____

Signature of study personnel obtaining consent   Date

_____   _____

Name of study personnel obtaining consent   Date