

FACTORS ASSOCIATED WITH LEVEL OF ADHERENCE TO RECOMMENDED SELF CARE PRACTICES AMONG TYPE 2 DIABETES MELLITUS PATIENTS IN NYERI PROVINCIAL GENERAL HOSPITAL DIABETES CLINIC, NYERI, KENYA

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ABSTRACT

Prevalence of Diabetes Mellitus is increasing at a startling rate globally, in Kenya, it is estimated to be 6-10%. Diabetes Mellitus is a challenging disease to manage successfully; its treatment aims to achieve adequate glycemic control and patients need to be actively involved in their care. Adherence to self-care recommendations on lifestyle, including diet and exercise, improves disease outcomes. However, studies have shown many patients do not adhere. This proposed study aimed to determine the factors associated with the level of adherence to recommended self-care practices and explored the challenges encountered by Type 2 Diabetes Mellitus patients. Adherence was measured through the frequency of performing self-care activities using a pre-tested and modified version of The Summary of Diabetes Self-Care Activities Measure. Independent variables including socioeconomic and demographic factors, disease-related factors, knowledge on self-care, attitude towards self-care and healthcare provider and healthcare system factors were compared to the dependent variable, the level of

adherence. This study, based at the Nyeri Provincial General Hospital diabetes clinic, employed a mixed-methods study design. The quantitative phase was allowed determination of the level of adherence as a percentage and the factors associated with the level of adherence were determined through bivariate and multivariate analysis. The qualitative study helped explain the quantitative results by exploring the challenges patients encountered in adhering. Qualitative data was analyzed mathematically from the recurring codes. This study was expected to reveal factors associated with the level of adherence to recommended self-care practices and challenges encountered in adhering which provided useful evidence in designing interventions aimed at strengthening self-care practices among Type 2 Diabetes Mellitus patients. At the conclusion of the investigation, a manuscript was submitted to a relevant health journal.

Key Words: *level of adherence, recommended self care practices, Type 2 Diabetes Mellitus patients, Nyeri Provincial General Hospital, diabetes clinic, Nyeri, Kenya*

INTRODUCTION

Diabetes Mellitus is a chronic disease of major public health concern globally. It is a growing epidemic that threatens to overwhelm health services and undermine economies, especially in developing countries (WHO, NCD, 2008). Type 2 Diabetes Mellitus is the major type, subsuming 85% of the cases, followed by type 1 at 10%. The secondary and gestational types account for about 5% (WHO, 2007). Diabetes currently affects more than 366 million people worldwide, and it is expected to affect about 520 million by 2030 (IDF, 2011). The prevalence of Diabetes Mellitus is growing in every country worldwide. However, reports show that 80% of the increase is in people living in low and middle-income countries, and the greatest numbers of people with diabetes are between 40-59 years of age (IDF, 2011). The increase in the incidence of Diabetes

Mellitus in developing countries follows the trend of urbanization and lifestyle change resulting in greater levels of obesity and physical inactivity (Wild et al., 2004; Levitt, 2008).

Type 2 Diabetes Mellitus presents with metabolic anomalies: chronic high blood glucose levels, resulting either from the defective secretion or action of insulin (insulin resistance), or both of them combined. Complications due to diabetes are one of the leading causes of disability, reduced quality of life and premature death. In 2011, it was estimated that diabetes caused 4.6 million deaths worldwide and at least US Dollars 465 billion in healthcare expenditures (IDF, 2011). In 2004 out of the 9 million who died of chronic diseases, 90% were from middle and low-income countries and were in people below 60 years of age (WHO, 2011). Diabetes-related complications include cardiovascular diseases, amputations, visual impairment and renal failure all of which are life changing and the health systems in developing countries have low capacity to handle (Levitt, 2008).

In Kenya, Ministry of Health statistics and the Diabetes Atlas estimate prevalence of Diabetes Mellitus at 3.3% and 3.5% respectively, but this figure is likely to be an underestimation as over 60% of people with diabetes in Kenya are undiagnosed (IDF, 2009; IDF, 2011). Community studies have found a prevalence of 4.2% in the general population and as high as 12.2% in urban residents (Christensen et al., 2009). The Kenya National Diabetes Strategy recognizes the humanitarian, social and economic burden of diabetes and provides a platform for the development of affordable cost-effective public-health strategies towards better treatment, prevention and control methods. It calls for investment in diabetes as the effects of the investment will yield substantial returns in reducing heart diseases, stroke, kidney diseases, and hypertension (Republic of Kenya, MOPHS, KNDS, 2010). The National Clinical Guidelines for Management of Diabetes Mellitus, used by healthcare workers in Kenya, recommends specific self care practices which patients are advised on (Republic of Kenya, MOPHS, NCGMDM, 2010). Self care is a feasible intervention in improving disease outcomes in people with diabetes, delay onset of complications and lessen the healthcare burden. Its benefits far outweigh its cost. This study aims to determine the level of adherence to recommended self-care practices among Type 2 Diabetes Mellitus patients, determine the factors that are associated with level of adherence and establish the challenges the patients encounter in adhering with the view of guiding interventions aimed at strengthening self-care practice.

PROBLEM STATEMENT

The effectiveness of self-care is well known and the National Clinical Guidelines for Management of Diabetes Mellitus, used by healthcare workers in Kenya, recommend specific self-care practices. However, in Kenya, there is scarce information on Type 2 Diabetes Mellitus patients' adherence to recommended self-care practices. Studies in other parts of the world have found that patients regularly follow prescribed medications but do not regularly follow recommendations for lifestyle changes of diet and exercise (Delamater, 2006). Patients are

advised on self care but knowledge alone does not always result into practice. Knowledge improves attitude and it needs to be reinforced for it to translate into practice (Maina et al., 2011; McManus et al., 2006). A study to reveal factors associated with the level of adherence to recommended self care practices and challenges encountered by Type 2 Diabetes Mellitus patients is necessary for effective management of the disease and to guide strategies towards strengthening self care practice.

Broad Objective

To determine the factors associated with level of adherence to recommended self care practices and explore challenges in adhering among Type 2 Diabetes Mellitus patients in Nyeri Provincial General Hospital diabetes clinic, Nyeri, Central Kenya.

Specific Objectives

1. To determine the level of adherence to recommended self care practices among Type 2 Diabetes Mellitus patients.
2. To determine the factors associated with the level of adherence to recommended self care practices among Type 2 Diabetes Mellitus patients.
3. To explore the challenges encountered by Type 2 Diabetes Mellitus patients in adhering to recommended self care practices.

LITERATURE REVIEW

Types of Diabetes Mellitus

Diabetes Mellitus is a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces due to insulin resistance. Insulin is the hormone that regulates blood sugar and allows glucose to enter cells and be converted into energy. The disease is characterized by raised blood sugar (WHO, 2011).

Type 1 Diabetes Mellitus previously known as insulin-dependent, juvenile or childhood-onset is characterized by deficient insulin production and requires daily administration of insulin. Its cause is not known. Type 2 Diabetes formerly called non-insulin-dependent or adult-onset results from the body's ineffective use of insulin. It is the predominant type and comprises 90% of people with diabetes globally. It is associated with obesity and physical inactivity. Symptoms for Type 1 and 2 are similar and include excessive excretion of urine (polyuria), thirst (polydipsia), constant hunger, unexplained weight loss, vision changes, and fatigue. However they are often less marked in Type 2 and as a result, the disease may be diagnosed much later after onset, often when complications have already set in. Previously Type 2 Diabetes Mellitus was only seen in adults but it is now occurring in children (WHO, 2011).

Gestational Diabetes is raised blood sugar levels with onset or first diagnosis during pregnancy often through prenatal screening, rather than reported symptoms. Impaired Glucose Tolerance (IGT) and Impaired Fasting Glycaemia (IFG) are intermediate conditions in the transition between normality and diabetes. People with IGT or IFG are at high risk of progressing to Type 2 Diabetes Mellitus, although this it can be avoided or delayed (WHO, 2011).

Epidemiology of Diabetes

The International Diabetes Federation, Diabetes Atlas 2011, estimates global figures of people living with diabetes at 366 million with the figure expected to rise to 520 million by 2030, if the trend continues. Although projected increase in prevalence will be in every country, 80% of the increase will occur in the developing world, the low and middle income countries. Only 20% of the increase will occur in the developed world (IDF, 2011). The increasing prevalence is due to population growth, aging, urbanization, and increasing prevalence of obesity and physical inactivity (Wild et al., 2004; Levitt et al., 2008). Africa will bear the brunt of this increase; Sub Saharan Africa is among the regions where the greatest relative increase in prevalence is expected to occur. In developing countries, studies have found that the majority of people with diabetes are in the economically productive 45 to 64 year age range while the majority of people with diabetes in developed countries are older than 64 years of age (Wild et al., 2004).

Risk Factors

The most important risk factors include; physical inactivity, obesity especially intra-abdominal adipose accumulation, unhealthy diet, advancing age, family history of first degree relatives who have the diabetes, and Impaired Glucose Tolerance. Others such as smoking, harmful use of alcohol, stress levels accelerate the rate of development of the disease (Chege, 2010; WHO, NCD, 2008). In developing countries, rapid urbanization has led to urban lifestyles which are mostly sedentary fuelled by rural to urban migration in search of employment. Changes in dietary choices from traditional foods to highly processed refined foods and a growing “fast-foods culture.” Advancement in technology has also led to less manual work and by extension less exercise (Maina et al., 2011).

Kenya Perspective

In Kenya, the prevalence of diabetes is estimated to be 3.3% and 3.5% by the Ministry of Health and Diabetes Atlas, 2011, respectively. This works out to about 1.4 million Kenyans living with diabetes. But this figures are based on regional projections and are likely to be underestimations by over 60% because two thirds of people who have diabetes are undiagnosed (IDF, 2011). Studies in Kenya have found a prevalence of 4.2% in general population and as high as 12.2% in urban residents (Christensen et al., 2009). Nairobi based Diabetes Management and Information centre (DMI) which conducts epidemiological surveys estimated prevalence at 3% in 2003 and above 6% in 2007. Strikingly some rural areas, namely Nyeri in Central Kenya and Kilifi in

Coast Region have been found to have prevalence as high as 11.6% and even higher prevalence of 20% among the richer families in major urban centers (Chege, 2010). The prevalence is likely to rise to 4.5 percent by 2025 if the current trend is not checked (McFerran, 2008).

According to Diabetes Education in Kenya, a four year program run by World Diabetes Federation in partnership with Ministry of Health and DMI centre, between 2004-2008, prevalence of diabetes in Kenya was estimated at 6-10% by the Ministry of Health and community studies (Republic of Kenya, MOH/WDF/DMI, Diabetes Education, 2008). The varied estimates of prevalence are due to lack of comparable population based data on the burden and trends of diabetes and no comprehensive research exists that can inform policy on the best practices for the control of diabetes (Republic of Kenya, MOPHS, KNDS, 2010).

Prevention, Diagnosis, Treatment and Management

Lifestyle modifications such as regular physical exercises, eating a healthy diet, achieving and maintaining healthy body weight and cessation of smoking have been shown to be effective in preventing or delaying onset of Type 2 Diabetes (WHO, 2011). The diagnosis of Diabetes Mellitus is made when an individual with symptoms of polyuria and polydipsia has venous plasma glucose levels higher than 11.1mmol/L, or a fasting glucose levels higher than 7.0mmol/L on at least two occasions, or glucose levels higher than 11.1mmol/L two hours after a glucose challenge in an oral glucose tolerance test (WHO/IDF, 2006). The disease is initially managed by increasing exercise and dietary modification and medications are typically needed as the disease progresses. In Africa, at least 78% of people living with diabetes are undiagnosed and do not know that they are living have the disease (IDF, 2011). In Kenya, majority of diagnosis is through complications (Republic of Kenya, MOH/WDF/DMI, Diabetes education, 2008).

Diabetes is a chronic progressive condition that requires different treatments at different stages (Republic of Kenya, MOPHS, NCGMDM, 2010). Treatments are aimed at lowering and keeping blood glucose at near normal levels and lowering levels of other known risk factors that damage blood vessels. Tobacco use cessation is also important to avoid complications (WHO, 2011). The most important predictor of reduction of morbidity and mortality due to diabetes complications is the level of glycemic control achieved. This requires aggressive treatment of patients and currently, there has been a shift from monotherapy with one oral glucose lowering agent to combination therapy with at least two agents often from different classes, with or without insulin; in an attempt to achieve better glycemic control, reduce incidences of acute and long term complications and improve patient survival (Wabe et al., 2011). In Kenya, besides the challenges related to diagnosis, management and treatment there is lack of understanding and knowledge about the disease among health care professionals and the general population and a perception that diabetes is not as critical as other diseases such as AIDS, Malaria and TB (McFerran, 2008).

Cost saving and feasible interventions in developing countries include: moderate blood glucose control, oral medication, blood pressure control, and foot care. Other cost saving interventions include: screening and treatment for retinopathy, blood lipid control, and screening for early signs of diabetes-related kidney disease. All these measures should be supported by a healthy diet, regular physical activity, maintaining a normal body weight and avoiding tobacco use (WHO, 2011).

Public Health Importance

Over time high blood glucose levels damage the heart, blood vessels, eyes, kidneys, and nerves giving rise to serious health complications. Diabetes related complications led by cardiovascular disease contribute greatly to global disease burden. The risk of a cardiovascular event in a diabetic is 2-4 times greater than in a non diabetic. Up to 80% of deaths in people with diabetes occur through cardiovascular diseases and 75 % of hospital admissions among people with diabetes are due to cardiovascular diseases (Kengne et al., 2008).

Combined with reduced blood flow, neuropathy in the feet increases the chance of foot ulcers and eventual lower limb amputation among diabetics. Long-term damage to blood vessels in the retina results in diabetic retinopathy an important cause of blindness. Approximately 2% of diabetic people become blind after 15 years, and about 10% develop severe visual impairment. Diabetes is a leading cause of kidney failure. About 10-20% of diabetes patients die of kidney failure. Diabetic neuropathy affects up to 50% of people with diabetes. The overall risk of dying among people with diabetes is at least double the risk of their peers without diabetes (WHO, 2011).

Healthcare systems in the developing world are ill equipped to handle these life changing and fatal complications attributed to poor glycemic control and where accessible only a few can afford (Levitt, 2008; Dagogo-Jack, 2006). People with diabetes lead a low quality of life due to challenges in managing sugar levels. The disease is expensive to treat and manage and it drains the patients' economic ability and productivity as it progresses. The price of oral glucose lowering agents is out of reach of many Kenyans considering that over 60 % live below the poverty line. Prices of foods recommended by nutritionists add up to the already high cost of living in an environment of scarce resources.

Knowledge, Attitude and Practice

Knowledge on how to prevent or delay onset of diabetes for the non diabetics and knowledge on self care for those who have the disease is a powerful tool in prevention and control of diabetes. However, knowledge alone does not always result into practice. A local community study found that 49.3% of people with good diabetes knowledge had poor practices, a clear indication that knowledge needs to be reinforced for it to translate into practice (Maina et al., 2011).

Increase in knowledge levels changes attitude, preconceived ideas, towards the subject and the two are demonstrated through practice (Kaliyaperumal, 2004). In controlling diabetes self care activities should be proposed to the patients to gradually integrate them to their everyday routine. Drastic changes may be a recipe for non adherence. For instance, tobacco use seriously compounds the complications of diabetes, and the standard clinical practice is to strongly advise against its use. This can be achieved by increasing the patients knowledge on the effect of smoking to his/her condition and assisting him/her to join a smoking cessation program.

Role of Self Care Practices

Diabetes is a challenging disease to manage and patients must take active role in their own care. Adherence to self care recommendations is the cornerstone of overall diabetes management (Glasgow et al., 1997). Self care plays an integral role in treatment of chronic diseases. Lifestyle modifications by the patients, including proper diet control, regular exercise, medication, foot care, achieving and maintaining a healthy body weight, regular screening of complications effectively reduce mortality and morbidity thereby reducing health care burden (UKPDS,1998). Evidence from studies points to the critical role played by patient awareness and practice of diabetes self care practices in improving adherence to oral hypoglycemic agents, ensuring achievement of adequate glycemic control and in minimizing the likelihood and incidence of diabetic complications and by extension minimizing premature death (Wabe et al., 2011).

WHO defines self care as including “activities that individuals, families and communities undertake with the intention of enhancing health, preventing disease, limiting illness and restoring health”. At individual level, self care is the daily regimen tasks that the individual performs to manage diabetes (Weinger et al., 2005). The decision to practice self care is at a personal level and it is one of the most important and effective intervention in improving outcome among diabetics.

National Clinical Guidelines for Management of Diabetes Mellitus

Health care workers in Kenya, use the National Clinical Guidelines for Management of Diabetes Mellitus. The guidelines stipulate specific self care activities that patients attending health facilities are counseled on. This includes:

- Diet; Eat a balanced nutrition, Eat at least three regular meals in a day, Eat small countable or measurable food portions, Avoid big meals at a go, Moderate caloric restrictions, Avoid animal fat, Avoid foods containing simple sugars, Avoid excess salt.
- Exercise; Aerobic exercises such as walking and running are prescribed, Patients are encouraged to integrate exercise into daily routine, A regular 20-30 minutes of continuous moderate activity exercise at least thrice a week is prescribed.
- Body Weight; Patients are advised to follow diet and exercise recommendations in order to achieve and maintaining a healthy body weight as per Basal Mass Index

- Foot Care; Patients should Ensure foot hygiene, Always wear shoes, Always wear appropriate, comfortable and suitable shoes, To inspect shoes before wearing them, inspect feet regularly for any wounds .
- Regular Medical check-up; Regular blood glucose testing is encouraged, Blood pressure, Regular screening of complications of the eye, nerves (sensation) as well a kidney problems.
- Smoking and Alcohol; Smoking is strongly discouraged and taking alcohol should be avoided. (Republic of Kenya, MOPHS, NCGMDM, 2010).

Current Efforts and Strategies

Governments all over the world have agreed that the global burden of Non Communicable diseases, including diabetes, constitutes one of the major challenges for development in the twenty-first century and have committed to address the rising threat (UN, 2011). In Kenya, indications are that we are experiencing a double burden of communicable diseases and Non communicable diseases. To reverse the worrying trends and projections the government through the MOPHS and partners has come up with the Kenya National Diabetes Strategy 2010-2015 which champions for integrated approach in tackling Diabetes (Republic of Kenya, MOPHS, KNDS, 2010). It is hoped that the 5 year strategy and the National Clinical Guidelines for Management of Diabetes Mellitus will provide the much needed comprehensive framework for a concerted effort to reverse increase in prevalence and improve management of patients (Republic of Kenya, MOPHS, NCGMDM, 2010).

CONCEPTUAL FRAMEWORK

Problem analysis of possible factors associated with level of adherence to recommended self care practices among Type 2 Diabetes Mellitus patients.

Table 1: Conceptual Framework

Independent Variables (Possible associated factors)	Dependent Variable (To be Measured)	Output (Results and Findings)
<p>1. Demographic and socio economic characteristics. Age, Gender, Level of education and Income</p> <p>2. Disease & treatment. Duration since diagnosis, Regimen details</p> <p>3. Knowledge on self care. Actual information the patient knows about the practices in diet, exercise,</p>	<p>Level of adherence to recommended self care practices This will be measured through the frequency of performing recommended self care practices over the past 7 days.</p>	<p>1. Document the level of adherence to recommended self care practices among Type 2 Diabetes Mellitus patients.</p> <p>2. Reveal factors that are associated with level of adherence to recommended self care practices among Type 2 Diabetes Mellitus patients that may be used in strengthening self</p>

foot care, medical check-ups, smoking /alcohol and weight management.

4. Attitude towards self care.

Patients' attitude towards the recommended practices.

5. Healthcare settings.

Availability of support, Attitude of the healthcare personnel, Frequency of clinic visits.

care practice.

3. Provide information on the challenges that Type 2 Diabetes Mellitus patients are encountering in adhering to recommended self care practices.

METHODOLOGY

The current study adopted mixed methods study design where data collection used a sequential explanatory design (Creswell et al., 2003). This means that quantitative data collection was followed by qualitative, and was used to identify qualitative data sources. Quantitative study was given priority. Integration was achieved by reporting the quantitative statistical results followed by qualitative findings which supported or refuted the quantitative results. Therefore, qualitative complemented the quantitative and offered more explanation into the possible challenges encountered by the patients in adhering to the recommended self care practices.

Study Site

Nyeri District in Central Kenya and Kilifi District in the Coast, were identified through epidemiological surveys as the rural areas with a highest prevalence of Diabetes Mellitus (Chege, 2010). The current study targeted geographic area is Nyeri District. The choice of Nyeri district was due to logistic and financial considerations as the principal investigator and the team was travelling there two days in a week for a twelve week study period.

Nyeri Provincial General Hospital is the largest government facility in Central Kenya and runs a special weekly diabetes clinic on a designated day. Patients are given monthly appointments at the clinic. On average, about 60 Type 2 Diabetes Mellitus patients are attended to every week.

Quantitative Study

A cross-sectional design was adopted. This enabled the determination of adherence level and factors that were associated with the level of adherence to recommended self care practices.

Study Participants

Type 2 Diabetes Mellitus patients sought services at the diabetes clinic in Nyeri PGH.

Inclusion criteria:

- Confirmed Type 2 Diabetes Mellitus Patient above 18 years of age.

- Ability to do moderate physical activity such as walking in the past 2 weeks (14 days)
- Women who are not pregnant.
- Patients who will agree to participate and sign the consent form.

Exclusion criteria:

- Unconfirmed Type 2 Diabetes Mellitus.
- Type 1 Diabetes Mellitus patients.
- Those who are below 18 years of age.
- Inability to do moderate physical activity such as walking in the past 2 weeks (14 days).
- Those women who are pregnant.
- All those patients who decline to consent.

Sample Size Determination

Adherence rates for chronic illness regimens and lifestyle regimens were generally estimated at 50% (Delamater, 2006). Therefore a P value of 50.0% was used to calculate the sample size using the statistical formula by Fisher *et al.*, 1998. To be able to determine the true proportion at the 95% confidence level and at 7.5% level of precision, a minimum sample size below was required.

$$n = [z^2 * p (1-p)/d^2]/RR \quad (\text{Fisher } et al, 1998)$$

Where:

n= sample size

Z=1.96 standard variant which corresponded to 95% confidence interval

P= Adherence rate of 50.0%

d= Level of precision at 7.5% (acceptable error margin of 0.075)

RR=Response rate (1- 0.10)

$$n = [(1.96)^2 * 0.50 (1 - 0.50)/0.075^2]/0.90$$

n=189.7086 round off to **190** participants.

Sampling Procedure

Systematic simple random sampling where every 2nd patient attending the clinic during the period of the study, who met the inclusion criteria, was used to sample the patients as they arrived until the required number was achieved. The attending clinician at the clinic advised on the pregnancy status of the female participants before they were enrolled.

Data Collection

Data collected

Data on the patients' frequency of performing self care activities in diet, exercise, glucose monitoring, oral medication, smoking, weight management, medical check-ups, and foot-care was collected. Specifically, frequency of performing self care practices in diet, exercise, foot care, blood glucose monitoring and smoking in the past 7 days which were recommended in the National Clinical Guidelines for Management of Diabetes Mellitus (Republic of Kenya, MOPHS, NCGMDM, 2010) was used to quantify level of self care using The Revised version of The Summary of Diabetes Self Care Activities (SDSCA) measure (Toobert *et al.*, 2000).

The level of self care obtained through this measure was used to estimate adherence level since only the recommended practices were scored for adherence. Self care practices are in multi dimensional areas which have been found to be poorly correlated (Toobert *et al.*, 2000), therefore the measure assessed each domain separately, and total scores were computed by summing up the frequency scores in individual domains for each respondent. Data on the patients' socio-economic and demographic characteristics, disease, and treatment related information, knowledge on self care, attitude towards self care, healthcare provider, and healthcare system related information was also collected.

Data collection procedures

An interviewer based structured questionnaire designed in English was translated into Swahili and Gikuyu (Appendix 2). The questionnaire was pretested on a small group of 10 representative sample of the study population assessed the validity of The Revised version of the Summary of Diabetes Self Care Activities measure (Toobert *et al.*, 2000), ease of comprehension by the different individuals and effectiveness in providing useful information. After pretesting, necessary changes were factored in before data was collected. To reduce self report bias, questions asked were specific and non judgmental.

Two (2) field assistants were recruited and trained on basic research to assist in the administration of the questionnaires.

Data Management

Data collected was verified and accurately entered into a data base using Ms Access and Excel. Regular back-up copies stored in flash discs were made and files containing the data were password encrypted and accessible to the authorized persons. Hard copies of the questionnaires were kept in locked safe storage.

Data Analysis

Statistical analysis was performed using Epi Info 3.5.3. Descriptive statistics were used to generate frequency tables and descriptive summaries of all variables. Socio-economic and demographic characteristics of the patients were described fully. Level of adherence to self care practices were computed as a percentage for each patient and average level of adherence obtained. Bivariate analysis was carried out to define the nature, type, direction and strength of associations between one independent variable and variation in the level of adherence to recommended self care practices, at level of significance $p < 0.05$. Further, multivariate analysis in a regression model was carried out to observe how combinations of two or more independent variables predicted level of adherence to self care at a time.

To assure quality, confounders were sought and standardized.

Qualitative Study

Qualitative methods of inquiry aim at gathering an in-depth understanding on an issue and the reasons behind their occurrence (Malterud, 2001). In this particular study qualitative methods were used to enhance the knowledge on the factors associated with the level of adherence, by allowing the researcher to explore the challenges in adhering to recommended self care practices.

Study Informants

Type 2 Diabetes Mellitus patients who had participated in the quantitative phase of this study and the healthcare personnel at the clinic were the study informants in the qualitative phase. The patient's level of adherence to recommended self care practices were known.

Sampling Procedure

Purposive sampling was carried out among participants in the quantitative phase. This sampling strategy allowed selection of informants who were representative and informative. During sampling the main consideration was adherence level so that participants were equally distributed. Age was also considered to ensure that all ages among the participants were equally represented. Each quartile in the observed adherence level was represented by two persons; therefore there were four groups each with two patients on both sides of the gender. Through this procedure a total of 16 informants, 8 males and 8 females, were sampled. Healthcare personnel at the clinic who were available at the time were also interviewed. Eventually 4 healthcare workers were interviewed at the clinic.

Data Collection

Data to be collected

Possible challenges in adhering to recommended self care practices among Type 2 Diabetes Mellitus patients were explored through interviews with selected patients. The main topics that were addressed were the promoters, barriers, and coping mechanisms. Emergent and interesting patterns in the quantitative findings were also explored further during the interviews. Interviews with the healthcare workers targeted their observations and opinion on the factors that promoted or hindered patient's adherence to the recommended self care practices.

Data collection tool

In-depth interviews were conducted in this study. An in-depth interview was a qualitative data collection method used to obtain detailed information about an issue from a respondent. It is the appropriate tool for this study because of its strength in eliciting individual point of view, opinion, feelings, and experiences. Patients freely discussed their challenges in adhering to recommended self care practices with the interviewer and expressed their honest feelings unlike in a group setting. Healthcare workers gave their observations and opinions on factors that promoted or hindered adherence. A total of 20 in-depth interviews were carried out and were conducted by the principal investigator within the hospital compound. Two interview guides were developed for use, one with the patients and the other with healthcare personnel (Appendix 3 and Appendix 4).

Data Management

Recorded audio files of the interviews conducted in Kiswahili were transcribed verbatim and translated into English. The text-form transcriptions of notes and audio were in Word document format and were spell-checked before importing them into Nvivo 9 software. Regular back-up copies of the data were stored in flash discs and files containing the data were password protected and were only accessible to authorized persons. Hard copies of the notes were kept in locked safe storage.

Data Analysis

Word by word transcripts of the interviews imported into QSR's NVivo 9 software were organized using patients' demographic information. Thematic analysis was then carried out where transcripts were read and re-read several times then codes were generated and the data grouped into themes from recurring codes. Themes were refined and interpretations were done (Braun et al., 2006).

Ethical Considerations

Approval to carry out this study was sought from the Scientific Steering Committee and KEMRI Ethics Review Committee through the Centre for Public Health Research at Kenya Medical Research Institute. Nyeri PGH management was approached for permission to collect data from among the patients and staff.

Recruitment process/strategy

Patients attending the diabetes clinic were approached and requested to participate. The purpose, procedures, possible benefits, and risks of the study were explained to them and a written consent was sought from each participant. They were then enrolled to participate if they met the inclusion criteria.

Anticipated benefits of the study

Results of the study will benefit the participants directly as they will be used to improve services at the diabetes clinic as the healthcare providers will understand the challenges the patients are encountering in adhering. The information will benefit the society at large as it will be useful in improving diabetes management and in policy making. The information will help in designing better programs for the control of diabetes and its complications. The participants and other diabetic patients will benefit in the long run from such policies and programs.

Potential risks

There were no physical risks associated with participation in this study. The possible risk of inadvertent disclosure of information was minimized through proper data management practices. Files containing the data were password protected and were not shared with unauthorized persons.

Process of obtaining informed consent and documentation of consent

Participation was voluntary and participants could withdraw at any time. Those who agreed to participate signed an informed consent form. The Consent form and Questionnaire developed in English was translated into Swahili and Gikuyu languages so that all participants were explained to in a language they understood (Appendix 1 and 2 respectively).

Provisions for the protection of privacy of participants

All the interviewing processes were carried out in private inside the diabetes clinic. Questionnaires, interview notes, and audio recordings taken were assigned unique codes and the results of each individual questionnaire and interview were kept in strict confidence. Anonymity

was maintained as the names of the participants were not used at any stage and was not important in this study.

Ensuring confidentiality of data

Data stored in flash discs and files was password protected and was only accessible to authorized persons. Hard copies of the questionnaires and interview notes were kept in a locked cabinet in the diabetes clinic within the hospital and remained in safe storage until they were all entered and final analysis done.

Dissemination of study findings

Study findings will be shared with the management of Nyeri Provincial General Hospital and all the study participants will freely access it.

RESEARCH FINDINGS

The study found that patients had been told by a doctor or health practitioner that they had type 2 diabetes mellitus (99%), most of the patients had type 2 diabetes mellitus for a period of 1 and 5 years (51%), the patients had been prescribed diet, exercise, and oral glucose lowering medication only and most of the patients had been affected by Hypertension diabetes related disease (65%).

The study also found that the patients took a balanced diet (97%) 7 times a week (39%), took at least three meals 7 times spaced evenly throughout the day (41%) and they did not take any animal fats and simple sugars throughout the week (52%). Patients did exercises (71%) but they did not participate in at least 20-30 minutes of continuous physical activity including walking (28%) and in specific planned exercise sessions. The patients also managed their weight (66%), had achieved a healthy body weight (69%) and that they did not know about basal metabolic index (72%).

Majority of the patients were also on oral glucose lowering agents (89%), they took their recommended pills 7 times a week (66%) and most of them were not on insulin (90%). Patients were tested for glucose level regularly (92%), they were never tested for blood sugar (78%), were tested for blood glucose once a month (57%) and they regularly went for medical check-ups (97%). The patients cleaned their feet (90%), checked their feet 7 times a week (62%), inspected the inside of their shoes 7 times a week (62%), dried between their toes 7 times in a week (66%), they did not smoke (99%) and had a never smoked history (93%) and they had not taken alcohol in a week (98%).

The study further found that, (90%) eating a balanced diet, (73%) taking at least three regular meals in a day, (77%) not skipping breakfast, lunch and supper, (54%) avoiding large meals at a

go, (71%) avoiding alcohol, (81%) taking a diet higher in complex carbohydrates, fibre content, vegetables and fruits, (62%) avoiding foods with simple sugars such as sweets, sodas, animal fats and salt in the diet, (70%) to stop smoking, (77%) integrating aerobic activity such as walking, taking stairs into day to day routine activities and (55%) avoiding over exercising was not part of self care advice given at the clinic.

Having a regularly planned 20-30 minutes continuous exercise sessions of at least moderate activity such as walking, running, swimming and gym for at least 3 times a week (57%), putting on shoes always (66%). Putting on suitable, comfortable well fitting shoes always (88%), ensuring foot hygiene, by washing daily and drying between the toes (89%), checking of feet for ulcerations daily (89%) and inspecting the inside of their shoes before wearing was part of self care advice given at the clinic (88%).

The study also found that the patients agreed to the statements on attitude towards self care to a great extent as rated to an average score of 4.14 in that; patients needed their family and friends to support them in practicing self care (mean score 4.48, self care was effective in reducing illness in patients condition (mean score 4.48), the benefits of self care exceeded its cost (mean score 4.41).

It was the patients responsibility to always ensure that their sugar levels were maintained at close as possible to normal levels (mean score 4.40), the Self care recommendations that patients had been given were easy to understand and follow (mean score 4.30) and it was possible for patients to successfully achieve proper glycemic control and manage diabetes through practicing self care activities (mean score 4.21).

The study further found that that the doctors and nurses were available (97%), the patients contacted with their healthcare teams once in 3 months (50%), they accessed all the self care counseling services needed from the clinic (99%), they had a good relationship with the health care team (58%) and the environment consultations took place was good (53%).

CONCLUSIONS

The study concludes that patients had some knowledge about diabetes symptoms and treatment information, the current prescribing strategy achieved was good although glycemic control for less than half of the patients, and majority were still not meeting the recommended blood glucose target. This appeared mainly due to poor knowledge and poor practice of self management behaviors.

Diabetes self-care knowledge was generally high among the patients, though some knowledge gaps were identified. The practice of self-care practices was found to be unsatisfactory in almost all aspects except for blood sugar monitoring and adherence to treatment. Some of the self care practices like foot-care, carrying quick acting sugars, and annual eye-checkups were less

practiced by patients. This study shows that type 2 diabetic outpatients were knowledgeable about diabetes self care practices.

Patients had a positive attitude towards self-care as they followed the recommendations given by the healthcare team and they ensured that their sugar levels were maintained as close as possible to normal levels.

Patients indicated that they contacted with their healthcare teams once in three weeks and they were available whenever needed. The patients accessed all the self care counseling services needed from the clinic and they had a good relationship with the health care team. They also indicated that the environment consultations took place was good. The study then concludes that patients had a good attitude and were satisfied with health services.

RECOMMENDATIONS

There is a need for regular appraisal of drug prescribing and better monitoring of patient adherence with prescribed anti diabetic drugs and other diabetes self management practices in Nyeri Provincial General Hospital diabetes clinic. Training in learning processes and factors governing behavior are essential for all of those involved in delivery of patient care. Educational program should also be recognized the wide range of learning strategies used by different peoples. The prescriber before prescribing and pharmacist before dispensing drugs for diabetic patients, he/she should negotiate about the treatment plan that the patient understands and to which he or she commits.

Patients need to be made aware of long-term complications of diabetes on eye, heart, kidney, etc., and precautions that should be taken as they can be prevented. At the same time, efforts should be made to sensitize the patients about the importance of taking regular treatment. Public health care facilities should be utilized for easy and affordable availability of drugs so that the burden of the disease on patients' family can be reduced.

Educating the patients about diabetes should become one of the major goals for health practitioners. With education and awareness, a positive attitude may develop. Patients will then pay more concern to diabetic practices. This way, the patients, can become better equipped to battle with diabetes and its complications.

Improving patients' knowledge of self-care practices would allow them to contribute meaningfully to their care. A comprehensive pharmaceutical care program should be routinely organized for the patient with diabetes mellitus. These routine programs should consider diabetic patients' set goals to optimize blood glucose control and protocols to screen for, prevent, or manage micro vascular and macro vascular complications.

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