THE PREVALENCE OF SEXUAL DYSFUNCTION AMONG PATIENTS WITH DIABETES MELLITUS ATTENDING THE OUTPATIENT DIABETIC CLINIC AT KENYATTA NATIONAL HOSPITAL.

A THESIS IN PART FULFILLIMENT FOR THE AWARD OF THE DEGREE OF MASTER OF SCIENCE IN CLINICAL PSYCHOLOGY OF THE UNIVERSITY OF NAIROBI

BY

GEOFFREY M. LIKATA UNGAYA
DEPARTMENT OF PSYCHIATRY
UNIVERSITY OF NAIROBI
2009

DECLARATION

I, Geoffrey M. Likata Ungaya, do hereby declare that this is my original work, and further, that I have not presented the same for the award of any other degree or to any other university.

Signed _____

Date _____

APPROVAL

This thesis has been submitted for examination with our approval as the University supervisors:

1. Dr. Mary Wangari Kuria, MBChB (Nrb), MMed Psych.(Nrb), PhD Psych.(Nrb)
   Lecturer, Department of psychiatry, Faculty of medicine, College of health sciences, University of Nairobi

   Signed: _____

   Date: _____

2. Dr. Fredrick R. Owiti, MBChB (Nrb), MRC Psych. (UK)
   Lecturer, Department of psychiatry, Faculty of Medicine, College of Health Sciences, University Of Nairobi.

   Signed_____

   Date: _____

ACKNOWLEDGEMENTS

My heartfelt appreciation and gratitude goes to all those who in one way or another enabled me to accomplish this work. I am profoundly honoured to have worked with you.
I would like to thank the following:

My supervisors, Dr. Mary Wangari Kuria and Dr. Fredrick Owiti for their patience, in-depth advice and guidance throughout the entire research process. It was like working with a sister and brother.

The course coordinator, Dr. Mathai for her insightful intellectual support in the course of my research work.

Dr. Dammas Kathuku for his input and support during my research.

Too, I acknowledge the staffs at the psychiatry department, viz, the secretary Ms. Florence and Mr. Alfonse for their supportive role and constant assurance time and again as they egged me on to complete the research.

Finally, I would like to acknowledge my statistician, Mr. Mutai who patiently did the data analysis.

Above all, thanks to God, the almighty for enabling me to complete this work.

DEDICATION

This is to all persons living with diabetes mellitus who day in and out are constantly faced with challenges in regard to the management of this chronic lifetime condition.

Too, I dedicate this work to my son Brian and the mother Mirriam Iswan for their support and understanding for the time I was engaged in the studies, as this enabled me to accomplish.

Table of Contents

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

WHO- World Health Organization

ED- Erectile dysfunction

FSD- Female Sexual Dysfunction

IDDM – Insulin dependent diabetes mellitus

DM- Diabetes Mellitus

HTN- Hypertension

NO- Nitric Oxide

MMAS- Massachusetts Male Aging Study

U.S.A- United States of America

MALES - Men's Attitudes to Life Events and Sexuality

IIEF- International Index of Erectile Dysfunction

SD- Sexual Dysfunction

QOL- Quality of Life

FSFI- Female Sexual Dysfunction Index

KNH- Kenyatta National Hospital

SSPS- Statistical Package of Social Science

DSM-Diagnostic and Statistical Manual of Mental Disorders

JAMA- Journal of the American Medical Association

I.C.D – International Classification of Diseases

FSAD – Female Sexual Arousal Disorder

ROC-Researcher Operating Characteristic

EF – Erectile Function

UON – University of Nairobi

OR – Odd Ratio

CI – Confidence Interval

OPERATIONAL DEFINITION OF TERMS

Diabetes Mellitus

Diabetes mellitus is a condition in which a person has high blood sugar(glucose) level as a result of the body either not producing enough insulin or because body cells do not properly respond to the insulin that is produced (WHO,1999)

For the purpose of the research, diabetes mellitus patients will be regarded as those living with the condition and are on management.

Sexual Dysfunction

Sexual dysfunction refers to a difficulty experienced by an individual or a couple during any stage of a normal sexual activity. Sexual dysfunction disorders may be classified into four categories: sexual desire disorders, arousal disorders, orgasm disorders and pain disorders (http: // en.wikipedia.org / wiki / Sexual_ dysfunction).

For the purpose of this study sexual dysfunction will be in regard to difficulties encountered in the sexual response cycle as measured by the research instruments.

ABSTRACT

Background

Sexual dysfunction can impact a person's ability to form or sustain intimate relationships and has been found to interact with mental health conditions such as anxiety and depression yet epidemiological, etiological, and health association to sexual dysfunction has only begun to explored. The result of research to date indicates that neurovascular mechanisms may be important for both sexes (Heiman, 2001).

Diabetes mellitus, among the chronic conditions is on the increase in the society and due to associated complications of which sexual dysfunction is one; the researcher will endeavor to show how prevalent it is in the society (Kenya).

Diabetes has been associated with sexual dysfunction in men and women. Neuropathy, vascular insufficiency, and psychological problems have been implicated in impotence, impaired ejaculation and decreased libido in men and in decreased vaginal lubrication, orgasmic dysfunction and decreased libido in women (Zemel, 1988).

Although prevalence on sexual dysfunction has been widely researched on in the western world, little has been done in Africa including Kenya where studies specific to the study being undertaken are yet to be carried out.

Setting: The outpatient diabetic clinic at Kenyatta National Hospital.

Objective: To establish the prevalence of sexual dysfunction among patients with diabetes mellitus.

Design: A descriptive cross - sectional study.

Sampling method: Purposive sampling.

Participants: A total of 350 participants making up the sample size were involved in the study.

Data Collection Instruments: This was by use of: Researcher prepared socio-demographic questionnaire, Female Sexual Function Index and the International Index of Erectile Function.

Data analysis: The data was analyzed by a computer data base developed using statistical package for social sciences (SPSS). The results were presented in descriptive form using frequency tables, bar charts and narratives.

Results: 350 respondents were studied of whom 186 were males and 164 were females at a ratio of 1.134:1. The age range was 18-100 years in general, where for females it was 18-74

years and 19-100 years for the males respectively. The mean age was 50.4 years for males and 44.6 years for the females. The standard deviation was 14.5 for the males and 13.5 for the females. The gender age difference was significant with males being older than females ($p<0.001$). The mean age onset of diabetes was 43.4 years males and 38.2 years in females that was statistically significant, $P<0.001$.

Prevalence of sexual dysfunction was assessed using standard measures of FSFI and IIEF for females and males respectively. In males prevalence of sexual dysfunctions was: erectile dysfunction (68.8%); orgasmic dysfunction (48.4%); sexual desire (81.7%); intercourse satisfaction (86.6%) and overall satisfaction (68.4%).The female sexual dysfunction was 36.6% and was categorized as mild (17.1%); moderate (18.3%) and severe (1.2%). In regard to the types of sexual function which were independent of each other, the dysfunctions were: desire (76.8%); arousal (60.4%); lubrications (35.4%); orgasm (43.9%); satisfaction (28.0%) and pain (14.6%). On multivariate analysis there was significant association of sexual dysfunction with age OR, 1.08 (1.04-1.12) <0.001 and reported sexual problem OR7.7 (3.4-17.6), $P<0.001$ in females. In regard to male sexual functioning; age was associated significantly with most categories of sexual function except in male's erectile function while reported sexual problem was significantly associated in all categories of sexual functioning. Duration with diabetes and education were also associated with ED.

Conclusion: Diabetic patients do experience various forms of sexual dysfunction as noted by the prevalence rates in the study for both females and males and do compare well with prevalence rates of studies done elsewhere. Prevalence rates in this study for males were higher in categories of erectile, orgasmic and satisfaction functions than in females and vice versa for sexual desire and arousal which were higher in females. Age and reported sexual problem were significantly associated, hence independent predictors in regard to sexual functioning.

Recommendations: There is need to pay due attention to sexual dysfunctions by the health personnel in the health care system in regard to management of patients with diabetes mellitus right from the point of diagnosis. This would enable prompt intervention and appropriate treatment, both medical and psychotherapy; hence stem any would be complications arising and therefore undue effect on the individuals' quality of life.

1.0. INTRODUCTION

Adequate sexual expression is an essential part of many human relationships, and may enhance quality of life and provide a sense of physical, psychological and social well-being; Sexual dysfunction can arise from physical conditions and from psychological factors (Baldwin., 2001).

In 2000, according to the World Health Organization, at least 171 million people worldwide suffer from diabetes, or 2.8% of the population. Its incidence is increasing rapidly, and it is estimated that by 2030, this number will almost double. Diabetes mellitus occurs throughout the world, but is more common (especially type 2) in the more developed countries. The greatest increase in prevalence is, however, expected to occur in Asia and Africa, where most patients will probably be found by 2030. The increase in incidence of diabetes in developing countries follows the trend of urbanization and lifestyle changes (Wild et al., 2004)

It has been estimated that approximately 35 – 75% of men with diabetes will experience at least some degree of erectile dysfunction during their lifetime. They tend to develop erectile dysfunction 10 – 15 years earlier than men without diabetes (Livshits & Seidman., 2009). Enzilin et al., 2002 in studies conducted found that more women with diabetes than control participants reported sexual dysfunction (27 vs. 15%; $p = 0.04$).

1.1. BACKGROUND

Physicians dealing with sexual dysfunction must consider the psychological and behavioral aspects of their patients' diagnosis and management, as well as organic causes and risk factors. Integrating sex therapy and other psychological techniques into their practice will improve effectiveness in treating SD, in regard to psychological forces of patient and partner resistance, which impact patient compliance and sex lives beyond organic illness and mere performance anxiety (Perelman, 2003).

Zemel (1988) noted that the diabetic hypertensive patient should be evaluated for sexual dysfunction, and appropriate therapy, including changes in medication or referral for sex counseling, should become routine in clinical care.

In Kenya, studies done in regard to sexual dysfunction are not very much in relation to prevalence in diabetes mellitus.

Few studies have been done in Africa. Reports from Africa indicate that ED is highly prevalent among certain populations and associated with chronic diseases, including diabetes mellitus and hypertension (Levinson., 2003).

In Africa, medical care for erectile dysfunction is underprovided, profoundly altering the quality of life of the patients. The prevalence of erectile dysfunction in 187 diabetic patients followed in the department of endocrinology of the Conakry teaching hospital was estimated using the international index of erectile function (IIEF). Erectile dysfunction concerned 90 patients (48%) of whom a severe form was observed in 54%, a moderate form in 35%, and a mild form in 12%. In 28% of the cases, erectile dysfunction was associated with decline in libido and 26% with ejaculation disorders. Therefore, it was noted that erectile dysfunction was frequent and severe among diabetic patients in Guinea. It was also noted that the medical staff plays an essential role to initiate early diagnosis, promote psychological support and provide medication, if possible (Balde et al., 2006).

Sexual dysfunctions are highly prevalent, affecting 43% of women and 31% of men. Hypoactive sexual desire disorder has been reported in approximately 30% of women and 15% of men in population based studies, and is associated with a wide variety of medical and psychological causes. Sexual arousal disorders, including erectile dysfunction in men and female sexual arousal disorder in women are found in 10% to 20% of men and women. Orgasmic disorder is relatively common in women, affecting 10% to 15% in community based studies. In contrast, a premature ejaculation is the most sexual complaint of men, with a reporting rate of approximately 30% in most studies. Finally, sexual pain disorders have been reported in 10% to 15% of women and less than 5% of men. In addition to their

widespread prevalence, sexual dysfunctions have been found to impact significantly on interpersonal functioning and overall quality of life in both men and women (Rosen., 2007).

Current report estimate that over 150 million men all over the world have some degree of erectile dysfunction and the projected prevalence for 2025 is 322 million men worldwide. The Massachusetts Male Aging Study in 1994 reported an unexpectedly high rate of 52% erectile dysfunction prevalence. Since then, many studies have reported the prevalence of erectile dysfunction in the general population all over the world, ranging from15% in Brazil to 74% in Finland (Manolis & Doumas., 2007).

Diabetes mellitus affects 3 - 6% of the general population. There is a 36% prevalence of ED in men with diabetes, which is about three times higher than in the in the general population (Fedele., 2005).

A study done in the U.S.A (2003) on prevalence of ED among men with diabetes (45.8%), it was noted that it was nearly double that of men without diabetes (24.1%). Men with more recent diabetes diagnosis reported better erectile function than men diagnosed more than five years in the past (Bacon et al., 2003).

It is regarded that sexual problems in men with diabetes mellitus are common and often result from diabetic complications. However, although complications are similar in both sexes, little attention has been given to the effects of diabetes on female sexuality and sex function. It is reasonable to suggest that women with diabetes will experience sexual problems due to neuropathy, endocrine and vascular complications (Dereck & Andrew, 2006).

1.2. Statement of the problem

How we express and experience sexuality is an important part of being human. Difficulties with sexual function can lead to psychological problems like depression, relationship problems and low self-esteem. Many women experience sexual problems and statistics suggest between 25% and 63% across the whole lifespan. (www.jcu.edu.au / research / excellence / JCUPRD _037285.html)

Sexual dysfunctions is currently considered a serious quality-of-life related health problem, exerting a major impact on patients' and their sexual partners' life. (Manolis & Doumas, 2008). Diabetes and hypertension have been associated with sexual dysfunction in both men and women and an estimated 40% to 80% of diabetic hypertensives have reported sexual dysfunction in several investigations (Zemel, 1988).

Sexual function is an important component of patient's quality of life and subjective well being. Recent epidemiologic data reveal that sexual problems are widespread and adversely affect the mood, well-being, and interpersonal functioning. ED is perhaps the most commonly recognized and treated sexual dysfunction. It affects 30% of men 40 to 70 years of age (DeBusk et al., 2000). A 34% prevalence of ED is estimated among male family practice patients and is associated with a loss of self- image, self-confidence, and even chronic anger (Perttula, 1999)

Sexual dysfunction has a significant negative impact on quality – of – life. Many men with ED have low self esteem and feel isolated because they are unable to discuss this sensitive issue with the physician for fear of embarrassment (Bener et al, 2007)

Chronic diseases like diabetes with their complications may affect marital adjustment and health of the couple leading to dissatisfaction with the marriage and marital relationship. Therefore sex therapy, psychotherapy and couple therapy would be a vital component of treatment in these patients (Ahmadi et al, 2007)

1.3. Rationale / Justification

The study is of necessity because the condition of diabetes mellitus is a risk factor to developing sexual dysfunctions.

Prevalence in western countries is fairly well known, and with few studies done in Africa and there being quite little in Kenya, where the few related studies done on sexual dysfunction hardly related to diabetes mellitus, were unspecific and did not reflect out the prevalence of the problem the study is therefore intended to bring out this aspect and hence enable clear understanding of the effects of the diabetes, hence sexual dysfunction, for better management so as to ameliorate to a large extend the psychological problems that result and in addition see how it compares to past studies done elsewhere.

Again, with the increase in diabetes mellitus, it is appropriate to know the variability of sexual dysfunction among patients with diabetes in the population.

The significance of the study is of concern to the individual and society. At the individual level it does affect his or her sexual performance hence leading to disharmony with the partner and hence marital conflicts, separation and even divorce. Too, there is the stigma associated with it at a societal level. This results in life dissatisfaction and impaired well-being.

In addition, the study will enable not only improved involvement but collaboration in the management of patients by the medical / health personnel. It will also enable and allow for state planning and allocation of resources through policy making as noted in a study done on sexual dysfunction in United States: Prevalence and Predictors, indicated that sexual dysfunction is an important public health concern, and that emotional problems likely contribute to the experience of these problems(Laumann et al., 1999).

The psychologists on the other hand will gain deeper understanding of the conditions, what will enable putting into place appropriate interventions measures for the benefit of the patients. Until recently, the management of sexual dysfunction had been the domain of urologist, gynecologists and mental-health specialists. The field of sexual-health medicine has recently broadened to encompass multiple medical specialties, particularly primary care and cardiology (Debusk et al, 2000).

In view of the overall quality of life, the field of mental health would be of significant value to the patients. Psychologists could re-educate patients and modify behaviour such that the patient could enjoy sexual function within the limits imposed by irreversible factors.

1.4. Research questions

1. What are the social and demographic data or variables of the study population?
2. What is the prevalence of sexual dysfunction among patients with diabetes mellitus?
3. What is the prevalence of the types of sexual dysfunction among female patients with diabetes?
4. What is the prevalence of the types of sexual dysfunction among male patients with diabetes?

1.5. Objectives

1.5.1. General objective

To establish the prevalence of sexual dysfunction among patients with diabetes mellitus attending outpatient diabetic clinic at Kenyatta National Hospital.

1.5.2. Specific objective

1. To determine the prevalence of sexual dysfunction among patients with diabetes mellitus.

2. To determine the prevalence of the types of sexual dysfunction among female patients with diabetes mellitus.

3. To determine the prevalence of the types of sexual dysfunction among male patients with diabetes mellitus.

4. To determine the factors associated with sexual function among both female and male patients with diabetes mellitus.

1.6. Hypothesis

There are sexual dysfunctions among patients with diabetes mellitus attending the outpatient diabetic clinic at K.N.H (Kenyatta National Hospital).

2.0. LITERATURE REVIEW

2.1. INTRODUCTION

Sexual dysfunction, in psychology also referred to as psychosexual dysfunction is the inability of a person to experience arousal or to achieve sexual satisfaction under appropriate circumstances as a result of either physical disorder or, more commonly psychological problems (Encyclopedia Britannica., 2009).

In regard to association of sexual problems with social, psychological and physical problems in men and women, a cross sectional population survey study done in England resulted in strong association. In men, erectile problems and premature ejaculation were associated with increasing age, hypertension and diabetes (Dunn, Croft & Hackett., 1999).

Proper sexual functioning is one of the most important components of quality of life and of maintaining a satisfying intimate relationship. The most common dysfunction amongst women is decrease in sexual desire reported by approximately a third of the women. The most common dysfunctions amongst men are erectile dysfunction and premature ejaculation. Despite the importance and high prevalence of sexual dysfunction, most sufferers do not seek help either due to feeling of embarrassment or because they do not view it as a medical problem (Zemishlany & Weizman., 2008)

2.2. SEXUAL DYSFUNCTION

Sexual dysfunction is defined by WHO as the various ways in which an individual is unable to participate in a sexual relationship as he or she wish. As it is obvious, sexual dysfunction affects both men and women. Erectile dysfunction is defined as the persistent inability to obtain and / or maintain penile erection sufficient for sexual intercourse. The definition of female sexual dysfunction is more difficult, as women's' perception about sex is much more complicated and there is no objectivity in female sexual function. Although several definitions exist, the most descriptive defines female sexual dysfunction as the persistent or recurring decrease in sexual desire or in sexual arousal, or the difficulty or inability to achieve an orgasm, or the feeling of pain during sexual intercourse. Thus,

Female sexual dysfunction covers all four aspects of women sexuality; desire, arousal, orgasm, and pain (dyspareunia) (Athanasios & Michael., 2008).

Sexual dysfunction encompasses disorders of the sexual response cycle or sex-related pain. The identification of sexual dysfunction has long been a challenging issue. According to a 2000 survey, the prevalence of sexual disorders is 43% in women and 31% in men. These disorders as cause significant physical, emotional, and interpersonal distress in patients. DSM-IV-TR identifies four phases of the sexual response cycle: desire, excitement (arousal), orgasm, and resolution. Sexual dysfunction is categorized according to the first three of these phases in addition to sexual pain, and DSM-IV-TR lists two sexual disorders in each one of them as follows (IsHak et al, 2005).

2.2.1. Sexual Desire Disorders

Desire or libido is characterized by the wanting of sexual intimacy and physical involvement and sexual desire disorders are; Hypoactive Sexual Desire Disorder, which is the persistent or recurrent deficiency or absence of desire for sexual activity and Sexual Aversion Disorder, which is the persistent or recurrent aversion to and avoidance of genital sexual contact with a sexual partner.

2.2.2. Sexual Arousal Disorders

Arousal or excitement is characterized by the development of pelvic vasocongestion leading to erections in men and lubrication, swelling, and vaginal elongation in women and sexual arousal disorders are; Male Erectile Disorder, which is the inability to attain or maintain an erection for the completion of sexual activity and Female Sexual Arousal Disorder, which is an inability to attain and / or maintain vaginal lubrication, vaginal elongation, and engorgement of the external genitalia for the completion of sexual activity.

2.2.3. Orgasmic Disorders

Orgasm is characterized by pleasurable rhythmic contractions within the sex organs, and orgasmic disorders are; Premature Ejaculation which is the persistent or recurrent ejaculation with minimal sexual stimulation or before, on, or shortly after penetration and

before the person wishes it; Male Orgasmic Disorder, which is the persistent or recurrent delay in or absence of orgasm following a normal sexual excitement phase during sexual activity and Female Orgasmic Disorder, which is the persistent or recurrent delay in or absence of orgasm following a normal sexual excitement phase.

2.2.4. Sexual Pain Disorders

This is pain related to sexual activity and the pain disorders are; Vaginismus, which is the recurrent or persistent involuntary spasm of the musculature of the outer third of the vagina that interferes with sexual intercourse and Dyspareunia, which is the persistent genital pain associated with sexual intercourse in either a male or a female. It is not caused by vaginismus or lack of lubrication.

2.3. DIABETES MELLITUS

Diabetes mellitus on the other hand is the name given to a heterologous group of conditions characterized by hyperglycaemia (high blood glucose concentration) and other metabolic derangements secondary to insufficient insulin action. Thus, the clinical picture can be created by absolute insulin deficiency as in type I or insulin - dependent diabetes mellitus (IDDM) or by insulin resistance and failure of compensatory additional insulin secretion as in type II or non - insulin dependent diabetes mellitus (NIDDM) (Rees & Williams., 1995).

Insulin is a hormone produced in the pancreas which enables body cells to absorb glucose, to turn into energy. If the body cells do not absorb the glucose, the glucose accumulates in the blood (hyperglycemia), leading to various potential medical complications. Diabetes mellitus is characterized by recurrent or persistent hyperglycemia, and is diagnosed by demonstrating any one of the following (WHO, 1999):

- Fasting plasma glucose level at above 7.0mmol/L (126mg/dl).
- Plasma glucose at or above 11.1 mmol/L(200mg/dl) two hours after a 75g oral glucose load as in a glucose tolerance test.
- Symptoms of hyperglycemia and causal plasma glucose at or above 11.1mmol/L (200mg/dl).

- Glycated hemoglobin (hemoglobin AIC) at or above 6.5 (This criterion was recommended by the American Diabetes Association in 2010; it has yet to be adopted by the WHO).

1999 WHO Diabetes criteria

Condition	**2 hour glucose mmol / I(mg/dl)**	**Fasting glucose mmol / I(mg/dl**
Normal	< 7.8 (<140)	< 6.1(110)
Impaired fasting glycaemia	< 7.8(<140)	≥6.1(≥110) & < 7.0 (<126)
Impaired glucose tolerance	≥7.8(≥140)	<7.0 (<126)
Diabetes mellitus	≥11.1(≥200)	≥7.0 (≥ 126)

Diabetes mellitus (DM) may cause devastating effects on sexual function by virtue of its effects on both neurologic and vascu1ar components. Additionally, the presence of poorly controlled diabetes may increase the morbidity associated with the treatment of erectile dysfunction (ED) (Brant, Bella & Lue., 2006).

Sexual problems that may affect diabetic men include erectile dysfunctions (impotence), ejaculation problems and low levels of testosterone. Diabetic women frequently experience vaginal dryness, pain during intercourse, decreased vaginal sensitivity, difficulty climaxing and decreased sexual desire or response. Sexual dysfunction in people with diabetes often involve damage to blood vessels (diabetic angiopathy) or nerves (diabetic neuropathy).This damage usually results from poorly controlled glucose (blood sugar) (Cooper.,2008).

2.4. PATHOGENESIS

2.4.1. Erectile Dysfunction

Penile erection is a vascular process, and the small vessels of the penis are very sensitive to occlusive changes. Endothelial dysfunction, in which damage to the lining of the arterial

walls impairs the NO (Nitric Oxide) pathway and vasodilatation, is an important pathophysiologic factor underlying both ED and cardiovascular disease in men who have ED but no overt cardiovascular disease (Böhm et al., 2007).

2.4.2. Female Sexual Dysfunction

The female genital arousal response is a neurovascular process characterized by genital engorgement, swelling, and lubrication. Disorders of arousal include decreased labial and clitoral sensation and engorgement as well as lack of vaginal smooth muscle relaxation. It appears that the main mediators of male sexual function (nitric oxide and catecholamines) exert the same effects on female genital tissue as well (Manolis & Doumas., 2008).

2.5. PREVIOUS STUDIES

2.5.1.International studies

Sexual health has been a taboo subject in many quarters - most people preferring to keep their sexual problems to themselves for fear of incurring disapproval or worse ridicule. However, the media hype around Viagra has encouraged both sexes to talk about issues around sexual dysfunction. Female sexual dysfunction is a multifactorial condition that involves biological, medical and psychological factors. Sexual problems in women are highly prevalent and often associated with significant personal distress and diminished quality of life (Sietsema, Bruno, Fella., 2005).

Sexual dysfunction represents a common condition in the general population placing a major burden on patients' and their sexual partners' quality of life. Sexual dysfunction has traditionally been attributed to psychogenic origins and managed by mental health professionals and urologists. However, advances in pathophysiology research point to a vascular origin of the problem in the majority of patients, possibly due to atherosclerotic lesions in the genital arterioles that result in decreased blood flow (Manolis et al., 2007).

Lewis et al., 2004, in an epidemiological study noted that the prevalence of sexual dysfunction increased as men and women aged; about 40 — 45 % of adult women and 20 -

30% of adult men had at least one manifest sexual dysfunction. One of the common risk factor categories was diabetes mellitus.

The prevalence of diabetes mellitus and hypertension in the United States is increasing partly because of the incidence of these diseases in the growing geriatric population. Diabetes and hypertension have been associated with sexual dysfunction in both men and women. Neuropathy, vascular insufficiency and psychological problems have been implicated in impotence, impaired ejaculation and decreased libido in men and in decreased vaginal lubrication, orgasmic dysfunction and decreased libido in women (Brant, Bella, &Lue., 2007).

Erectile dysfunction in diabetes mellitus affects up to one third of adult men. The prevalence increases with age, and it is common in men with systemic disorders such as hypertension, ischaemic heart disease, or diabetes mellitus. In a survey study in 541 men aged 20 - 59 years with diabetes attending a large community diabetic clinic, the prevalence of erectile dysfunction increased progressively with age, from 6% in men 20 - 24 years, to 52% in men aged 55 - 59 years. In addition to age, the main factors associated with erectile dysfunction were peripheral or autonomic neuropathy, retinopathy, long duration of diabetes and poor glycemic control. Five years later, new erectile dysfunction had developed in 75 of 275 men. In contrast, only 11 of 128 men (9%) who initially had erectile dysfunction regained erectile function; these men were usually younger, had a shorter duration of diabetes and had features suggesting psychogenic erectile dysfunction when first evaluated (McCulloch et al., 2009).

Erectile dysfunction (ED) is estimated to affect over 152 million men worldwide. Based on estimated and projected male population distributions from the United Nations and prevalence rates of ED from the Massachusetts Male Aging Study, projections for 2025 indicate an expected 111% rise in worldwide prevalence, with the largest increases in developing countries that have expanding populations and increased life expectancies. In Africa, the prevalence of ED, currently estimated to exceed 12 million men, is projected to

increase at a rate surpassing that of any other continent as a result of escalating risk factors and improved diagnosis (Levinson et al., 2003).

On the prevalence of hypertension, hyperlipidemia, diabetes mellitus and depression in men with erectile dysfunction it was noted that hypertension, hyperlipidemia, diabetes mellitus and depression were prevalent in patients with ED. Therefore, as a pathophysiological event, ED could be viewed as a potential observable marker for these concurrent diseases. This finding suggests that clinicians could include ED in the assessment profile of these concurrent conditions for earlier detection and treatment (Seftel et al., 2004).

A study in Italy of the 2,010 men interviewed, 257 (12.8%) reported ED. The prevalence increased with age, from 2% in men aged 18-39 to 48% in those aged over 70 years. A history of cardiopathy, diabetes, hypertension, neuropathy, thrombotic / hemorrhagic stroke, peripheral vascular disorders, pelvic/medullary injury and pelvic surgery / radiation all increased the risk of ED. The association of hypertension and diabetes tends to increase the risk of ED (Parazzini et al., 2006).

In assessing the prevalence of ED in patients with diabetes (DM), hypertension (HTN), or both diseases, and to evaluate the effect of patient age, medical treatment, and disease duration and control in which 14l2 patients were included: 37% had DM, 38% had HTN, and 25% had both diseases. Then mean age was 55, 58, and 60 years, and 62, 46, and 67% had some degree of ED respectively. The prevalence of ED increased with age and disease duration in each age group and was higher in subjects with DM than in those with HTN, especially in those aged less than 65 years. Poor glycemic control was associated with a higher prevalence rate of ED early in the course of the disease. Diabetic men are affected earlier than those with HTN. Given the high frequency of ED in young patients with these risk factors, physicians should encourage an open discussion on the subject during routine visits to promote early detection and treatment (Roth et al., 2006).

Several risk factors increase the risk of erectile dysfunction. Prevalence is increased by 20-40% in patients with diabetes, hypertension, and those over 65 years old. While erectile dysfunction is generally acknowledged as an important health problem, misconceptions remain as to the need for clinician-initiated discussion regarding the issue. (Perttula, 1999)

A survey on 7689 patients (mean ± SD age 58.9 ± 9.2 years), including 6719 (87%) in a stable sexual relationship, it was noted that in patients with hypertension alone (n = 3906) and diabetes alone (n = 2377), ED was reported by 2379 (61%) and 1603 (67%) and was present in 2634(67%) and 1677 (7 1%), respectively, as defined by an IIEF-5 score of less than 21. ED was reported by 924 (78%) of 1186 patients with both diseases and was present in 917 (77%) according to the IIEF-5 score. Overall, ED was reported by 5063 patients (66%) with hypertension and/or diabetes, was present in 5391 (70%) according to the IIEF-5 score, and increased in prevalence with age. ED was fairly to very bothersome in 4027 (80%) but untreated in 3312 (65%), of whom 2278 (69%) wanted treatment. Most of those wanting treatment would have welcomed discussion with their physician (1861 [82%] of 2278), and most wanted their physician to broach the subject (1292 [69%] of 1861) (Giuliano., 2004).

In 2003, Enzlin et al, in a study found that sexual dysfunction was reported by 27% of women and 22% men with type I diabetes. No differences were found in sexes in types of reported sexual dysfunction. The study suggested that in men with diabetes, sexual dysfunction was related to somatic and psychological factors whereas in women with diabetes, psychological factors were more predominant. Regarding prevalence and predictors of sexual dysfunction in patients with type I diabetes, it was shown that both women and men with diabetes are at increased risk for sexual dysfunction. Although women run the same risk to develop diabetic complications, the sexual problems of women with diabetes have received much less attention in research and clinical practices.

Many women with type 2 diabetes report symptoms of FSD. Although sexual dysfunction is a well established complication of type 2 diabetes in men, it has not been well studied in women with diabetes. Information on the prevalence and etiology of FSD in diabetes is

increasing but still sparse (Brown & Lowry., 2008)

A study conducted by Doruk et al, 2005, to investigate the effects of diabetes mellitus upon female sexual function, and to detect possible risk factors that might predict sexual dysfunction, noted a prevalence of sexual dysfunction to be 71% in type 1 diabetic group, 42% in type 2 diabetic group and 37% in the control subjects.
A prevalence study of sexual dysfunction and correlated conditions in a sample of Brazilian women noted that prevalence increased with age and lower educational levels, with at least one sexual dysfunction being reported by 49% of the women. Preventive medical care for the female population mainly for patients with chronic and /or degenerative diseases considerably reduced the chances of sexual dysfunction (Abdo et al., 2004).

In a study to evaluate the impact of diabetes mellitus on sexual function among Peruvian postmenopausal women it was noted that diabetes mellitus affects all areas of female sexuality and this condition is independent of depression. The prevalence of sexual dysfunction among diabetics was found to be 75.0% versus 30.6% in the control group (Mezones — Holguin et al., 2008).

The mean prevalence of ED is reported by many authors to be three times higher in men with diabetes than in the general population (30 - 40%). According to the MMAS, ED occurs to some degree in 28% of men with diabetes, compared with about 10% in the general population. An epidemiological study in Italy to evaluate the prevalence of ED in around 10,000 men aged 18-70 years with diabetes, including both type I and 2, prevalence was about 36%, three times higher than that of the general population. An ED prevalence rate of 39% in men with diabetes was reported by the MALES study, compared with 10% in tie general population (Fedele., 2005).

In a population study of 1040 Israeli men with diabetes who completed a self-report questionnaire, erectile dysfunction severity increased with diabetes duration, poor glycemic control, diuretic therapy and presence of microvascular or cardiovascular disease. In

addition, observational studies suggest that the presence of erectile dysfunction is a predictor of cardiovascular events in men with diabetes, as it may be for men without diabetes (McCulloch et al., 2009).

2.5.2. Regional studies

The prevalence and correlates of erectile dysfunction(ED) in developing countries are largely unknown.

In a study on prevalence and associated factors of ED in three countries(Pakistan, Egypt, Nigeria) that represent very different cultures among men 35-70 years of age, prevalence rates of ED was found to be 57.4% in Nigeria, 63.65% in Egypt, and 80.85% in Pakistan. This multicultural study demonstrated that in every country studied, high proportions of men older than age 35 had some degree of ED (57- 81%). Both severity and prevalence increased consistently with age. Factors associated with ED were similar, but their distribution differed across countries (Shaeer et al., 2003).

In determining the prevalence and types of sexual dysfunction (SD) amongst female with diabetes mellitus (DM) in Benin City, Nigeria, it was found that 6.6% subjects with DM had sexual dysfunction and 1.7% in the control group had SD, with sexual pain disorder being the commonest SD, seen in both groups. Other SD seen was lubrication disorder and sexual arousal disorder. It therefore appeared that dysfunction was relatively uncommon amongst Nigerian women with Diabetes' mellitus (Unadike et al., 2009).

In assessing the sexual function of women with diabetes and determine the clinical correlates, the female sexual function score in diabetic women was 20.5% compared with a score of 31.25% in the control. Therefore, this showed that diabetes significantly impairs the sexual performance of the Nigerian women afflicted with the disease (Olarinoye.J & Olarinoye.A., 2008).

Berrada, 2003, on prevalence of ED and its correlates in Casablanca, morocco, prevalence was noted to be 54%, increased noticeably with age and was highly prevalent between both

the illiterate and those employed. Risk factors were diabetes, hypertension, heart disease and smoking. Limited sexual satisfaction, low frequency of intercourse, and a disturbed psychological state with depressed mood had negative effects on erectile function.

The studies done in Africa, though few do show that sexual dysfunction is prevalent among patient with diabetes and as such it is an area that needs to be researched on more on the continent.

2.5.3. Local studies

Though no study specific on prevalence of sexual dysfunction in diabetes has been carried out in Kenya, few related studies concerning SD have been done.

A study carried out in northern Kenya among the Ariaal tribe which is a nomadic community was not specific to diabetes mellitus, indicated that the Ariaal men showed increasing erectile dysfunction with increasing age, with men aged 60 years and older having significantly higher erectile dysfunction compared with men in their 20s.40s,and 60s. An investigation of erectile dysfunction and its correlates among the Ariaal pastoral nomads of northern Kenya showed that part of the age-related increase in erectile dysfunction was related health conditions, including metabolic dysfunction, type II diabetes, hypertension and heart disease and other health complications, all associated with elevated risk of erectile dysfunction even after controlling for age (Gray & Campbell., 2005).

Monda, 2009, on sexual dysfunction on women in Kenya, noted that chronic illnesses like diabetes can have a major impact on a woman’s self-image and her sexuality, and that diabetes cause a reduction in lubrication and blood flow to the genitals and some medication can also affect her libido. She further noted that men are not the only ones who experience challenges in the bedroom but women too, from female sexual dysfunction, which includes loss of libido, a diminished sexual drive, and pain during intercourse, thus disrupting their sexual life.

2.6. Psychological effects

Diabetes can cause sexual problems in both men and women; however, these problems are rarely discussed with the physician. This could lead to psychological problems and further worsen the already curtailed sexual performance. The aetiology of diabetic sexual dysfunction is muiltifactorial and commonly include both organic and psychogenic factors. Psychogenic factors are implicated more than was once thought and exploration of these factors can teach patients to deal with their fears and achieve good disease acceptance (Harland & Huws., 1997).

Studies on sexual dysfunction in diabetic women have been less conclusive than those of sexual dysfunction in diabetic men. When the relationship between symptoms of sexual dysfunction, neuropathy and depression on diabetic women was examined, it was noted that diabetic women with neuropathy experienced significantly more symptoms of sexual dysfunction and depression than diabetic women without neuropathy. Furthermore, among women with neuropathy, there was a significant positive correlation between the degree of sexual dysfunction experienced and the degree of depression (Liane et al., 1991).

Erectile dysfunction compromises the overall quality of life (QOL) and is associated with loss of self-esteem, anxiety, and depression. Erectile dysfunction directly affects men's confidence on the ability of a successful sexual performance; this confidence is an important psychological aspect of sexual function. Negative thinking about sexual ability results in increased anxiety, poorer sexual performance and, finally, any efforts to avoid sexual activity. On the contrary, increased confidence results in greater spontaneity and less concerns about ability during sexual intercourse. The uncertainty may persist even after successful medical management of erectile dysfunction, as men still believe that they are reliant on treatment and experience a loss of manhood (Manolis et al., 2007).

Erectile dysfunction exerts a significant impact on men's social and psychological well being, their QOL, and their relationship with their sexual partners. Couples affected by sexual dysfunction frequently lose emotional and physical intimacy and may experience lower satisfaction with their sexual life and their relationship. Erectile dysfunction

adversely affects patients' sexual partners, as almost 60% of women whose partners experience erectile dysfunction report reduced interest in sex compared with only half (30%) of those with healthy partners (Manolis et al., 2007).

2.7. Underlying assumptions

Though the study was seeking to investigate the prevalence of sexual dysfunction among diabetic patients; it is possible sexual dysfunction could result from other aspects of the disease itself like the patient being depressed about the disease, being anxious about it apart from the pathophisiological complication that result from diabetes.

3.0. METHODOLOGY

3.1. Study design

A descriptive cross-sectional study.

3.2. Study site

The research study was done at Kenyatta National Hospital outpatient diabetic clinic. Kenyatta National Hospital is about three (3) kilometers from the city centre situated on the northern side of Nairobi city. Kenyatta National Hospital is the oldest hospital in Kenya. It was founded in 1909 with a bed capacity of 40 as the Native Civil hospital, renamed the King George VI in 1952. It was renamed Kenyatta National Hospital after Jomo Kenyatta following independence from the British. It is currently the largest referral and teaching hospital in the country. It has a capacity of 1800 beds, has over 6000 staff members, and covers an area of 45.7 hectares. The university of Nairobi medical school and several government agencies are located on the campus (http://en.wikipedia.org/wiki/Kenyatta National Hospital, 2009).

KNH (Kenyatta National Hospital) has 50 wards, 20 outpatient clinics, 24 theatres (16 specialized) and an accident and emergency department. Out of the total bed capacity of 1800, 225 beds are for the private wing. There is a Doctors Plaza consisting of 60 suites for various outpatient specialties. The hospital offers a wide range of diagnostic services such as laboratories, radiology / imaging and endoscopy among other specialized services.
Sometimes, the average bed occupancy rate goes to 300%. In addition, at any given day the hospital hosts in its wards between 2500 and 3000 patients. On average, the hospital caters for over 80, 000 in-patient and or 500,000 outpatients annually
(Wikimapia.http://wikimapia.org/ 1016902/ Kenyatta-National Hospital- Hospital).

The study area was chosen and noted to be suitable because as a referral hospital it receives patients from other parts of the country and its immediate environs and thus does give a broad spectrum of the patients with diabetes mellitus.
The results of the study will be generalized to all patients with diabetes in Nairobi, its environs and the country, who form the target population because as a referral hospital K.N.H attends to patients from Nairobi and other parts of the country.

3.3. Study population

These were patients with diabetes mellitus aged 18 years and over attending KNH outpatient diabetic clinics. It involved both the female and male patients.

Inclusion Criteria

1. Those patients with diabetes mellitus who were attending outpatient diabetic clinic at KNH.
2. Those with informed consent.
3. Those in a heterosexual relationship.

Exclusion criteria

1. Those with other chronic conditions like hypertension that could bring about sexual dysfunction apart from diabetes mellitus.
2. Those below 18 years.
3. Those who did not consent
4. Those patients who presented in a state that in one way or another would not make it easy for them to participate in the study.

3.4. Sample size

The sample size was determined according to Fisher et al (1999) formula:

(i) $$n = \frac{Z^2 pq}{d^2}$$

Where,

n = the desired sample size if the target population is greater than 10,000

Z = the standard normal deviate at the required confidence level

P = the proportion in the target population estimated to have the characteristic being measured

q = 1 – p

d = the level of statistical significance set.

To work out the sample size, the formula would apply since the target population in this study was more than 10,000. This is because the target population was all the patients with diabetes mellitus in Nairobi.

The accessible population who were all the patients attending the outpatient diabetic clinic at K.N.H in a year was approximately 5760 from whom the participants were sampled.

The variable used in sample calculation was; sexual dysfunction. In studies done both in the western countries and Africa reflect out the prevalence rates of sexual dysfunction as per the study objectives. There are estimates available of the proportion in the target population assumed to have the characteristic of interest as noted by the prevalence rates in the various studies.

Estimates of prevalence in regard to the study being done were deduced from the literature review. In western studies the lowest prevalence was at 6 % (McCulloch et al, 2009) and the highest at 75 % (Mezone - Holguin, 2008). This gave an average of 40.5%

The African studies had prevalence's as; the lowest was at 6.6 % (Unadike, 2009) and the highest at 54 % (Balde, 2006).This gave an average of 30.3%.

To work out a single figure, an average of the two above, that is 40.5% and 30.3% was worked out as 35.4% and rounded off to a whole figure of 35%.

In working out the sample size, fisher et al (1999) formula was used,

Thus:

If,

$Z = 1.96$

$P = 0.35$

$q = 1 - p\ (0.65)$

$d = 0.05$

Then,

$$n = \frac{(1.96)^2\ (0.35)\ (0.65)}{(0.05)^2}$$

$$= \frac{3.8416 * 0.2275}{0.0025}$$

$$= \frac{0.873964}{0.0025}$$

$$= 349.5856$$

Therefore, the sample size calculated was approximated at 349.5; for easier calculations, the researcher used a figure of 350 as sample size for the study.

To distribute the sample size of 350 between the males and the females; the prevalence rates according to studies as per the literature review were used as follows:

For males, the average prevalence rate was 74% (McCulloch et al, 2009; Livshits & Seidman., 2009 and Balde et al, 2006).

For females; the average prevalence rate was 65 % (Enzilin et al., 2002; Mezone - Holguin, 2008; Unadike, 2009 and Olarinoye.J & Olarinoye.A., 2008).

Hence, in regard to above; for males the sample proportion was 186 and that of the females was 164.

3.5. Sampling method

Purposive sampling was used in the study. This is because the patients who attend the diabetic clinic are not purely diabetic, as some have both diabetes and hypertension. Infact half of the booked patients for the clinic day have both conditions. Due to this and because the study only dealt with patients with diabetes only, the researcher only sampled those with diabetes. This was done until the required sample size was reached.

3.6. Data collection procedure

Since registers and patients' files are used at the clinic and are usually prepared a day in advance to the specific clinic days; the participants were noted and sampled accordingly. This was done by the researcher and his two assistant helped by the staff at the clinic. The assistants and the staff did undergo some training in regard to the study requirements. Once identified and recruited, consent was sought from the participants.

The researcher and his assistants explained to the participants the consent explanation form contents and any questions raised were answered. Those who agreed to participate in the study were given the informed consent form by the researcher to fill and sign and consequently recruited into the study.

This was followed by the participants being given the sociodemographic questionnaire and once filled; the researcher afterwards gave them the research instruments (FSFI / IIEF) with respect to the sex of the patient. Once data had been collected, it was kept safely in a locker only accessible to the researcher.

To ensure that there was no double participant recruitment, the clinic attendance registers and patient record files were used and therefore the outpatient registration numbers of the patients noted at all times throughout the sampling and data collection.

Since the clinics begins at 8a.m and end at 5p.m; and since the registers would have been used to identify the participants, recruitment would begin immediately the patients arrived and as they waited to be attended to by the doctors, and if already seen by the doctors, they would continue with the process, though they would also be allowed to collect the prescribed drugs or go for any tests or investigations requested for by the doctors.

3.7. Research Instruments

To collect data, the questionnaires as indicated below were used.

1. This was done by use of a questionnaire prepared by researcher to obtain the socio - demographic data among patients with diabetes mellitus.
2. Instruments: 1. The Female Sexual Function Index (FSFI)
    2. International Index of Erectile Function (IIFF) Questionnaire

3.7.1 The Female Sexual Function index (FSF1) (Rosen.R., Brown.C., Heiman .J et al., 2000).

It is a multidimensional self - report instrument for the assessment of female sexual function. The FSFI, a 19-item questionnaire was developed as a brief multidimensional self-report instrument for assessing the key dimension of sexual function in women. It takes about 15 minutes to be completed.

It records any information relevant to special language / multicultural or gender issues. This is relevant if the test requires involvement or performance by the person, especially if accurate comprehension of the task is a concern.

The FSFI was validated in two groups of women, including subjects with sexual arousal disorder (determined by history) and age-matched controls. The instrument sensitively and reliably differentiated these two groups on all domains of sexual functioning. It is psychometrically sound, easy to administer, and has demonstrated ability to discriminate between clinical and non-clinical populations. The questionnaire described was designed and validated for assessment of female sexual function and quality of life in clinical trials and community population of women or epidemiological studies.

An international, multi-disciplinary consensus development conference held in United states to develop a new classification to apply to all forms of sexual dysfunction regardless of etiology (International Consensus Development Conference On Female Sexual Dysfunctions and Classifications, in Press); the panel recommended maintaining four major categories of dysfunction (desire disorder, arousal disorders, orgasmic disorders and sexual pain disorders) as described in the DSM – IV and ICD 10(International Classification of Diseases) (World Health Organisation, 1992).

Rosen et al (2000), in the development of a brief, self-report measure of female sexual function, initial face validity testing of questionnaire items, identified by an expert panel was followed by a study aimed at further refining the questionnaire. It was administered to 131 normal controls and 128 age matched subjects with female sexual arousal disorder (FSAD) at five research centers. The objective of the study was to develop a brief, valid and reliable self-report measure of female sexual function, which could be easily administered to women across a wide age range, including post-menopausal women. The FSFI was developed in a series of stages, including panel selection of initial items, pre-testing with healthy volunteers followed by linguistic and conceptual validation with a panel of expert consultants. Based on factor analytic methods, five factors or domains of sexual function were identified: (a) desire and subjective arousal, (b) Lubrication, (c)

orgasm, (d) satisfaction, and (e) pain / discomfort. The factor loadings of these individual items fit the expected pattern, supporting the factorial validity of this instrument.

Based on clinical interpretations of a principal components analysis, a 6-domain structure was identified, which included desire, subjective arousal, lubrication, orgasm, satisfaction and pain. Overall test-retest reliability coefficients were high for each of the individual domains(r = 0.79 to o.86) and a high degree of internal consistency was observed (Cronbach's alpha values of 0.82 and higher).Good construct validity was demonstrated by highly significant mean difference scores between the FSAD and control groups for each of the domains ($p \leq 0.001$).

Additionally, divergent validity with a scale of marital satisfaction was observed. These results support the reliability and psychometric (as well as clinical) validity of the Female Sexual Function Index (FSFI) in assessment of key dimensions of Female Sexual Function in clinical and nonclinical samples. The findings also suggested important gender differences in the patterning of female sexual function in comparison with similar questionnaire studies in males.

3.7.2. International Index of Erectile Function (IIEF) (Rosen.R, RiIey.A.,Wagner.G et al., 1997).

The IIEF addresses the relevant domains of male function, is cross-culturally valid and psychometrically sound, and has been linguistically validated in multiple languages. This questionnaire is readily self-administered in research or clinical settings.

Dimension(s) covered by the questionnaire: Erectile function (6 items), Orgasmic function (2 items), Sexual desire (2 items), Intercourse satisfaction (3 items),and Overall satisfaction (2 items)

The International Index of Erectile Function (IIEF) is a widely used, multi-dimensional self-report instrument for the evaluation of male sexual function. It is has been recommended as a primary endpoint for clinical trials of erectile dysfunction (ED) and for diagnostic evaluation of ED severity. The IIEF was developed in conjunction with the clinical trial program for sildenafil. The IIEF meets psychometric criteria for test reliability

and validity, has a high degree of sensitivity and specificity, and correlates well with other measures of treatment outcome. It has demonstrated consistent and robust treatment responsiveness in studies in USA, Europe and Asia, as well as in a wide range of etiological subgroups. A severity classification for ED has recently been developed, in addition to a brief screening version of the instrument.

Early in the development of sildenafil, Pfizer recognized the need for better efficacy instruments for erectile and sexual dysfunction. After developing an initial version of the questionnaire that was successfully used in early Phase II trials, the company elicited the help of an international panel of experts to further refine and validate the questionnaire. Accordingly, the International Index of Erectile Function (IIEF) was developed and validated in 1996 - 1997 as an adjunct to the sildenafil clinical trial program. Since then, it has been adopted as the 'gold standard' treatment outcome measure for clinical trials in ED, regardless of the type of treatment intervention or study population under investigation.

In 1999, the IIEF was recommended by the 1st International Consultation on Erectile Dysfunction, sponsored by the World Health Organization, as the efficacy endpoint of choice for clinical trials in ED. The instrument is widely accepted by both the regulatory agencies and scientific journals as a valid and reliable measure of sexual functioning in men.

The IIEF has served as a primary endpoint in all of the clinical trials with sildenafil to date. A highly consistent pattern of findings has emerged across these trials, regardless of the types of patients' enrolled and geographic location of the trial. Patients with different etiologies of ED, such as diabetes, spinal cord injury, heart disease, and depression, have shown a range of baseline and post-treatment IIEF scores, consistent with clinical prediction and the known mechanism of sildenafil in these different etiological groups. In addition, scores on the IIEF correlated well with other measures of treatment outcome, including global assessments of treatment efficacy and quality of life. These manifestations further strengthen, above and beyond the original validation study, the robustness of the IIEF for valid measurement of sexual functioning in clinical trials of ED.

A number of randomized clinical trials have been performed in which the IIEF has been used as a primary endpoint in assessing efficacy associated with various ED therapies. Although developed initially for use in conjunction with the sildenafil trials, the IIEF has demonstrated sensitivity to the effects of treatment with a broad range of ED therapies. Only one comparator trial has been performed to date, and the instrument showed a clear differentiation between two local therapies in this study. IIEF-based measures of treatment efficacy have also been highly correlated with other study outcomes, such as global efficacy and diary-based assessments, across a wide variety of patient populations and treatment interventions. The EF domain score, in particular, has been shown to be a highly sensitive indicator of efficacy across a range of treatment outcome studies.
Accordingly, it can also be recommended for initial screening or baseline assessment of patients with ED prior to treatment with oral agents or other treatment interventions.

In investigating the ability of EF domain to serve as a diagnostic tool to discriminate between men with and without ED as well as classify the degree of severity of the disorder a baseline patient data from four separate sildenafil trials were pooled for comparison with an age-matched control sample. A total of 1035 patients and 116 controls from the USA and UK were included in the analysis. A receiver operating characteristic (ROC) curve was constructed to assess the diagnostic precision of the EF domain in distinguishing men with ED from age-matched controls. The resulting ROC curve supported the EF domain as an excellent diagnostic tool, with high sensitivity and specificity.

The optimal cut-off score was found to be 25, with men scoring less than or equal to 25 classified as having ED and those scoring above 25 as not having ED (sensitivity=0.97; specificity=0.88).
Subsequently, among men in a stable relationship who attempted sexual activity and intercourse, severity of ED was classified into five diagnostic categories: no ED (EF score = 26 - 30); mild ED (EF score=22 - 25); mild to moderate (EF score=17 - 21); moderate (EF score=11 - 16); and severe (EF score= 6 - 10). (Rosen.R.C., Cappelleri.J.C, Giendrano III. (August, 2002))

3.8. Ethical Considerations

3.8.1. Ethical Approval

Once the proposal had been presented and approval obtained from the department of psychiatry, University of Nairobi, it was presented to the Kenyatta National Hospital - Research and Ethics Committee for review and approval. Once approved, the study did commence.

3.8.2. Informed consent form

Informed consent was obtained from the participants before the administration of the sociodemogrphic questionnaire and research instruments. This was on the basis of appropriate information given in the informed consent form / document and adequate time given to consider the information and ask questions. The consent was in written form with details on ethical considerations procedure of the study, confidentiality, benefits-personal and general, risks and the right not to participate or withdraw at any time.

3.8.3. Confidentiality

All information obtained was stored in a locker only accessible to the researcher to ensure confidentiality.

3.8.4. Risks

There were no anticipated risks in the study. However, those participating in the study and needed to be helped would be assisted accordingly.

3.8.5. Benefits

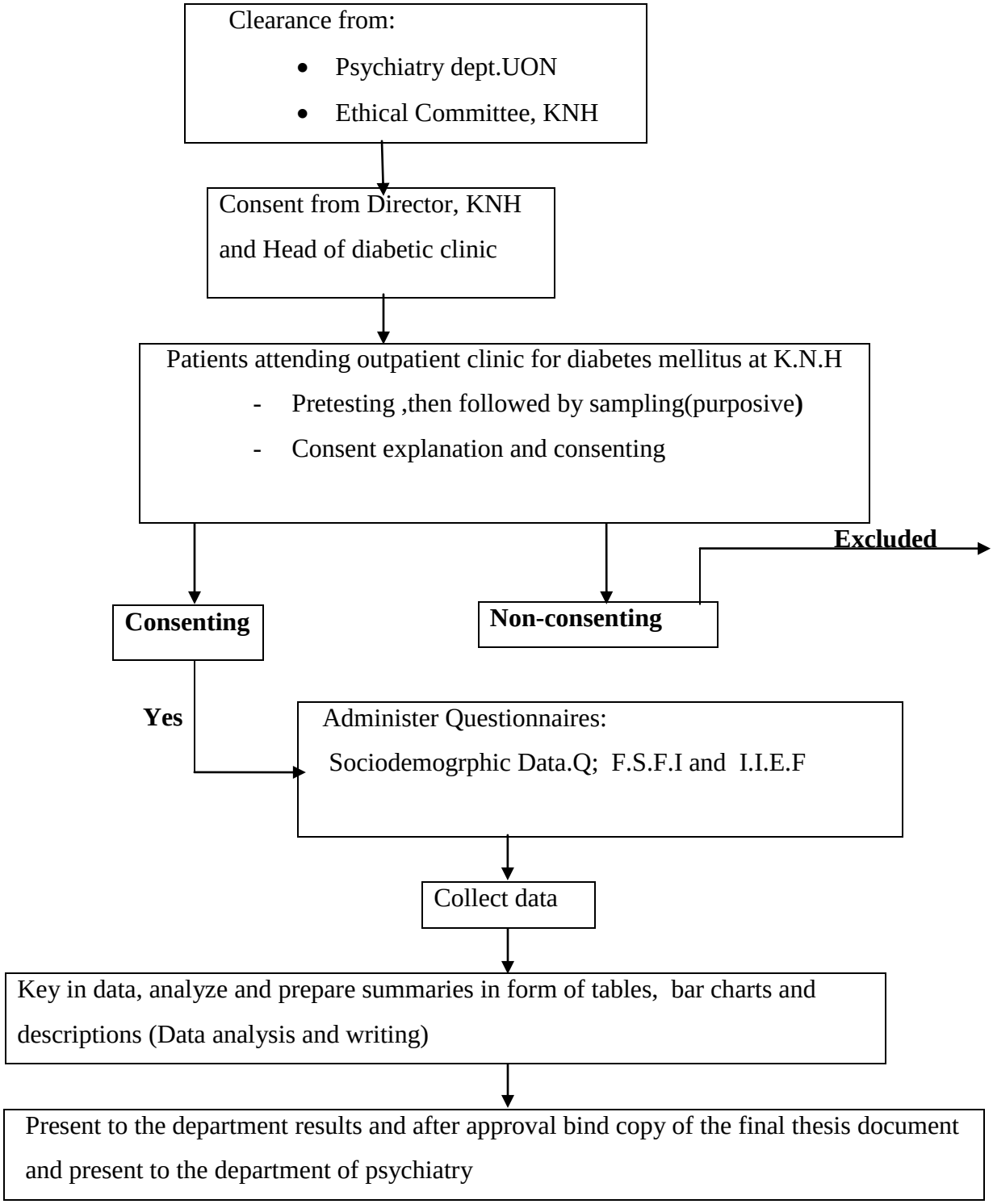
There were no direct immediate benefits to the participants. Although, the information obtained from the study would enable an understanding of the effects of diabetes mellitus in regard to sexual dysfunction and therefore the consequent psychological problems as a result. This would shade light on the best approaches required in managing patients with the conditions thereby improve their quality of life.

3.9. Data Processing

The data collected was edited to ensure conformity and keyed into a computer. The data would then be analyzed by a computer data base developed using statistical package for social sciences (SPSS). The results would be presented in descriptive and inferential form using frequency tables, bar charts and narratives. Statistical significance would be taken as

a p value less or equal to 0.05 at 95% confidence interval. Prevalence rates would be calculated and presented as percentages.

3.10 FLOW CHART



4.0. RESULTS

4.1. SOCIO-DEMOGRAPHIC VARIABLES

A total of 350 participants with diabetes mellitus aged 18 years and above were studied between the months of May and October 2010. There were 186 (53. 1%) males and 164 (46.9%) females.

Table 1: Socio-demographic variables of the study population

Variables	**Males (186) n (%)**	**Females (164) n (%)**	**P value**
Age, **mean (SD)**	50.4 (14.5)	44.6 (13.5)	**<0.001**
Age group			
18-27	12 (6.5)	22 (13.4)	**0.002**
28-37	26 (14.0)	30 (18.3)	
38-47	34 (18.3)	43 (26.2)	
48-57	62 (33.3)	36 (22.0)	
58-67	29 (15.6)	28 (17.1)	
>67	23 (12.4)	5 (3.0)	
Marital status			
Single	7 (3.8)	5 (3.05)	**0.003**
Married	168 (90.3)	130 (79.27)	
Cohabiting	11 (5.9)	29 (17.68)	
Highest Education level attained			
Nil	4 (2.15)	13 (7.93)	0.079
Primary	63 (33.87)	61 (37.20)	
Secondary	73 (39.25)	61 (37.20)	
College	33 (17.74)	21 (12.80)	
University	13 (6.99)	8 (4.88)	
Occupation			
Student	4 (2.2)	7 (4.3)	**<0.001**
Skilled personnel	162 (87.1)	104 (63.4)	
Unskilled personnel	20 (10.8)	53 (32.3)	
Religion			
Christians	179 (96.2)	156 (95.1)	0.709
Muslims	4 (2.2)	4 (2.4)	
Others	3 (1.6)	4 (2.4)	

As indicated in table 1 above, the male patients were a mean age of 50.4 years compared to females whose mean age was 44.6 years, (P<0.001), hence statistically significant. The age range was 18 - 74 years and 19 - 100 years for females and males respectively.

The majority of the patients were married in both male and female population. However, the proportion of married patients was significantly higher among the male (90.3%) as compared to the female population (79.3%). Also, the female population was more likely to be cohabiting (17.7%) compared to the males (5.9%), P=0.002.

The level of education was not significantly different between the two genders (P=0.079).

Occupation of the patients was statistically significant between the male and the female (P<0.001). Skilled personnel were higher among the male and female populations at (87.1%) and (63.4%) respectively.

Religion did not significantly differ between the male and female populations (P=0.709). In both male and female, Christians contributed to the largest proportion of 96.2% among the males and 95.1% in female.

4.2. MEDICAL HISTORY OUTCOMES / CLINICAL CHARACTERISTICS

Table 2: Clinical characteristics on diabetes mellitus

Variables	**Males n=186 Frequency (%)**	**Females n=164 Frequency (%)**	**P value**
Mean age at onset of diabetes (years)	43.4 (13.5)	38.2 (12.8)	**<0.001**
Median duration of diabetes in years	5.5 (IQR 2.0-11.0)	6.0 (IQR 2.0-11.0)	0.861
Duration of diabetes(years)			
1 - 5	93 (50.0)	80 (48.8)	0.631
6 - 10	40 (21.5)	42 (25.6)	
>10	53 (28.6)	42 (25.6)	
Treatment for diabetes			
Diet	8 (4.3)	4 (2.4)	0.538
Injectables	69 (37.1)	66 (40.24)	
Injectables and oral medications	41 (22.0)	42 (25.61)	
Oral medications	68 (36.6)	52 (31.7)	
Reported sexual problem			
Yes	121 (65.1)	76 (46.3)	**<0.001**
No	65 (35.0)	88 (53.7)	
Treatment sought for the sexual problem			
No treatment	176 (94.6)	164 (100.0)	**0.011**
Conventional	7 (3.8)	0	
Herbal	3 (1.6)	0	
Life affected by sexual problem			
Yes	67 (36.0)	34 (20.7)	**0.002**
No	119 (64.0)	130 (79.3)	

Diabetes was diagnosed at an older age among males (43.4 years) than the females (38.2 years), P<0.001. The median duration of illness with diabetes mellitus was 5.5 years for males and 6.0 years for females (P=0.861) as shown in table 2. Majority of the patients had had diabetes for 5 years or less. There was no statistically significant difference in the number of years since diagnosis of diabetes in both male and female patients (P=0.719).

Diabetic patients on treatment were either on diet 3 % (12) or drugs 97 % (338). The most common type of treatment for diabetes among male and female patients was injectables, used by 37.1% and 40.2% of the males and females respectively. The other treatment types reported were oral medications used by 36.6% of the males and 31.7% of the female patients. Use of both injectables and oral medications was also relatively common with 22% of the males and 25.6% of the females using the treatment. Those on controlled diet made up a proportion of 4.3% among the males and 2.4% of the female population. The type of treatment did not differ significantly between the male and female patients (P=0.538).

A high proportion of the patients had reported sexual problems in both genders. The male population (65.1%) had experienced sexual problems more in their lives than the female population (46.3%), P<0.001. Some of the male patients had sought treatment for sexual problem in the hospital (3.8%) and herbal (1.6%) while none of the female patients had sought any treatment (P=0.011). In addition, the male patients were more likely to report their lives having been affected by the sexual problem at 36% than the female patients at 20.7%, P=0.002. Some of the problems (ways in which life was affected) experienced by the participants were lack of satisfaction in their sexual relationship, conflict with partner and other psychological problems as noted in the table below.

Despite the respondents who reported sexual problems as shown in the table above, none of the female respondents sought treatment and the majority of the males (94.6%) did not seek treatment either.

Table 3: Sexual problems and duration as reported by the study participant

Reported sexual problem	**Males (n=121) Frequency (%)**	**Females (n=76) Frequency (%)**
Low libido and no erection	7 (5.79)	
No erection	15 (12.40)	
No erection and weak ejaculation	1 (0.83)	
Low libido	19 (15.70)	59 (77.63)
Low libido and no ejaculation	1 (0.83)	
Low libido and no erection	1 (0.83)	
Low libido and weak erections	25 (20.66)	
Low libido, weak erections and penile pain	1 (0.83)	
Pain on intercourse		10 (13.16)
Pain on intercourse and low libido		7 (9.21)
Poor sexual performance and getting tired quickly	8 (6.61)	
Weak ejaculation	1 (0.83)	
Weak erections	40 (33.06)	
Weak erections and no ejaculations	2 (1.65)	
Duration of sexual problem(years)		
Mean number of years	5.15	5.88
1 - 5	84 (70.0)	46 (61.3)
6 - 10	22 (18.3)	17 (22.7)
11 - 15	8 (6.7)	9 (12.0)
16 - 20	6 (5.0)	1 (1.3)
>20	3 (2.5)	2 (2.7)

The participants sexual problems were more varied among the male participants than the females. Among the males, low libido was highly prevalent either in isolation 19 (15.70 percent) or in conjunction with other problems such as lack of erection or ejaculation and weak erections. Weak erections was also highly prevalent either independently 40 (33.06 percent) or together with other problems. The prevalence rate for low libido among females was 59 (77.63 percent). This problem was followed by pain on intercourse 10 (13.16

percent) and then a combination of the two problems. The least reported sexual problems were no erection and weak ejaculation; low libido and no erection; low libido, weak erection and penile pain and weak ejaculation at 0.83% for each. While for females the least nature of sexual problem was pain on intercourse and low libido (9.21%). Most of the male and female respondents 70% and 61.3% respectively who reported having sexual problem had lived with the sexual problem for at most five years.

Table 4: Effects of sexual problem and the duration

Effect/problem in life	**Males n = 67 Frequency (%)**	**Females n = 34 Frequency (%)**
No satisfaction with sexual relationship	22 (11.83)	20 (12.20)
Conflict with partner	7 (3.76)	4 (2.15)
Low self-esteem	12 (6.45)	0
Negative attitude and low self esteem	2(1.08)	1(0.61)
Conflict and no satisfaction with sexual relationship	6(3.23)	9(5.49)
Low self-esteem and no satisfaction with sexual relationship	17(9.14)	0
Conflict and low self-esteem	1(0.54)	0
Years life affected with sexual problem		
Mean	3.43	5.35
1 - 5	53 (79.10)	22 (64.71)
6 - 10	13 (19.40)	9 (26.47)
11 - 15	0	1 (2.94)
16 - 20	1 (1.49)	1 (2.94)
21 - 25	0	0
26 – 30	0	1 (2.94)

Most of the male and female, 53 (79.10 percent) and 22 (64.71 percent) who had been affected by sexual problems had experienced these problems in the first five years as shown in table 4.

4.3. SEXUAL DYSFUNCTION IN DIABETES MELLITUS

4.3.1. Prevalence of sexual dysfunction among male participants

The male participants were assessed using the five domains of measuring sexual function which included erection, experience of orgasm, sexual desire, intercourse satisfaction and overall satisfaction to determine the prevalence of SD and of the types as well.

Table 5: Male Sexual Function

Category	Erectile function n (%)	Orgasmic function n (%)	Sexual desire n (%)	Intercourse satisfaction n (%)	Overall satisfaction n (%)
Dysfunction	128 (68.8)	90 (48.4)	152 (81.7)	161 (86.6)	127 (68.3)
No dysfunction	58 (31.2)	96 (51.6)	34 (18.3)	25 (13.4)	59 (31.7)

Dysfunction was found to be high in all the domains of sexual function as in table 5 and noted as; for erection (68.8%), orgasm (48.4%), sexual desire (81.7%), intercourse satisfaction (86.6%) and overall satisfaction (68.3%).

Figure 1: Sexual Function among Males

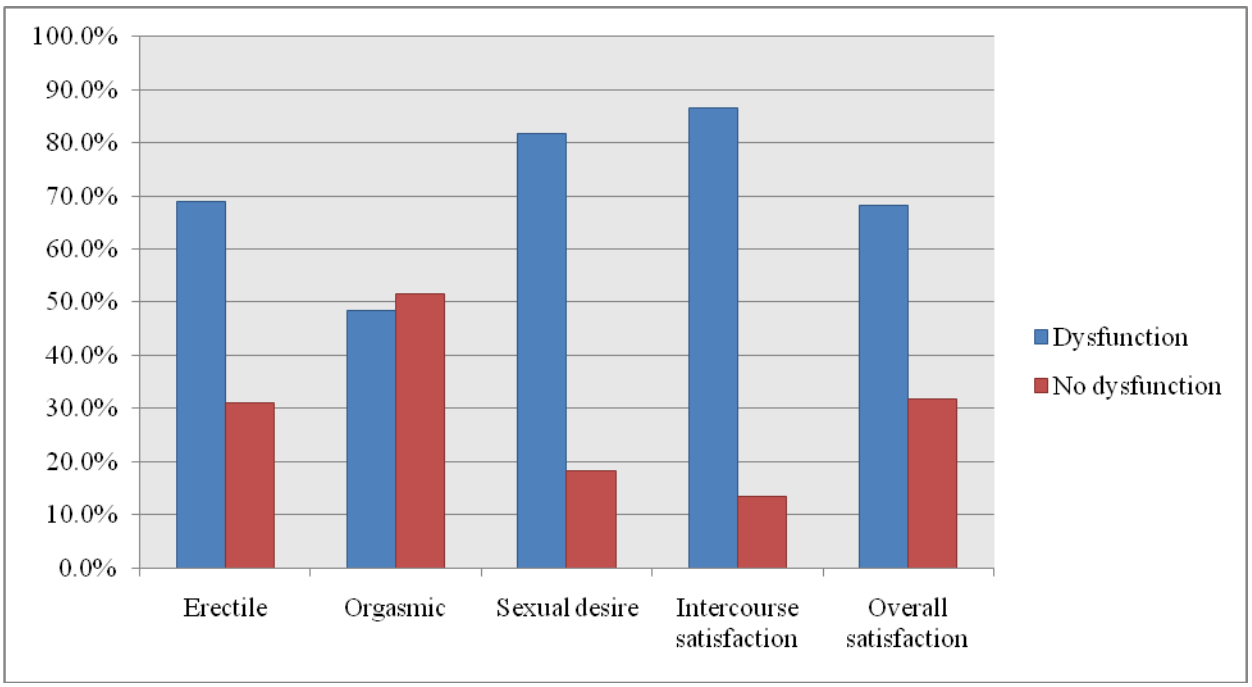
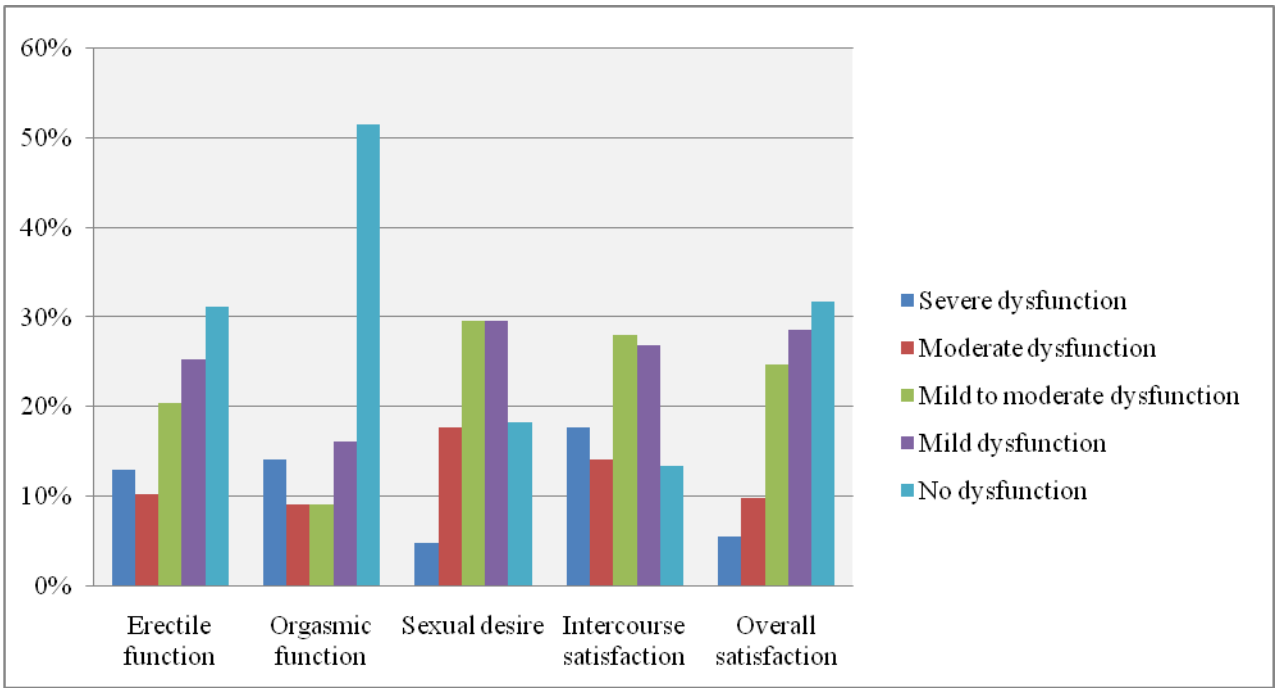


Table 6: Types/Severity of Male Sexual Function

Types/severity of dysfunction	Severe dysfunction	Moderate	Mild to moderate	Mild	No dysfunction
Erectile function, n (%)	24 (12.9)	19 (10.2)	38 (20.4)	47 (25.3)	58 (31.2)
Orgasmic function, n (%)	26 (14.0)	17 (9.1)	17 (9.1)	30 (16.1)	96 (51.6)
Sexual desire, n (%)	9 (4.8)	33 (17.7)	55 (29.6)	55 (29.6)	34 (18.3)
Intercourse satisfaction, n (%)	33 (17.7)	26 (14.0)	52 (28.0)	50 (26.9)	25 (13.4)
Overall satisfaction, n (%)	10 (5.4)	18 (9.7)	46 (24.7)	53 (28.5)	59 (31.7)

Although in all domains of types of sexual function as in table 6, the participants' experienced mostly mild dysfunctions, the most severe dysfunction was for intercourse satisfaction (17.7%) as compared to the other dysfunctions.

Figure 2: Extent of Sexual Function among Males



4.3.2. Prevalence of sexual dysfunction among female participants

Table 7: Female Sexual Function

Variables	Frequency (%)
Sexual dysfunction	
Yes	60 (36.6)
No	104 (63.4)
Degree of sexual dysfunction	
Severe FSD	2 (1.2)
Moderate FSD	30 (18.3)
Mild FSD	28 (17.1)
Normal	104 (63.4)

The prevalence of sexual dysfunction among the female diabetic patients was 36.6% as in table 7. Sexual dysfunction in females was mainly mild and moderate contributing to 17.1% and 18.3% respectively.

Figure 3: Extent of Sexual Function among Females

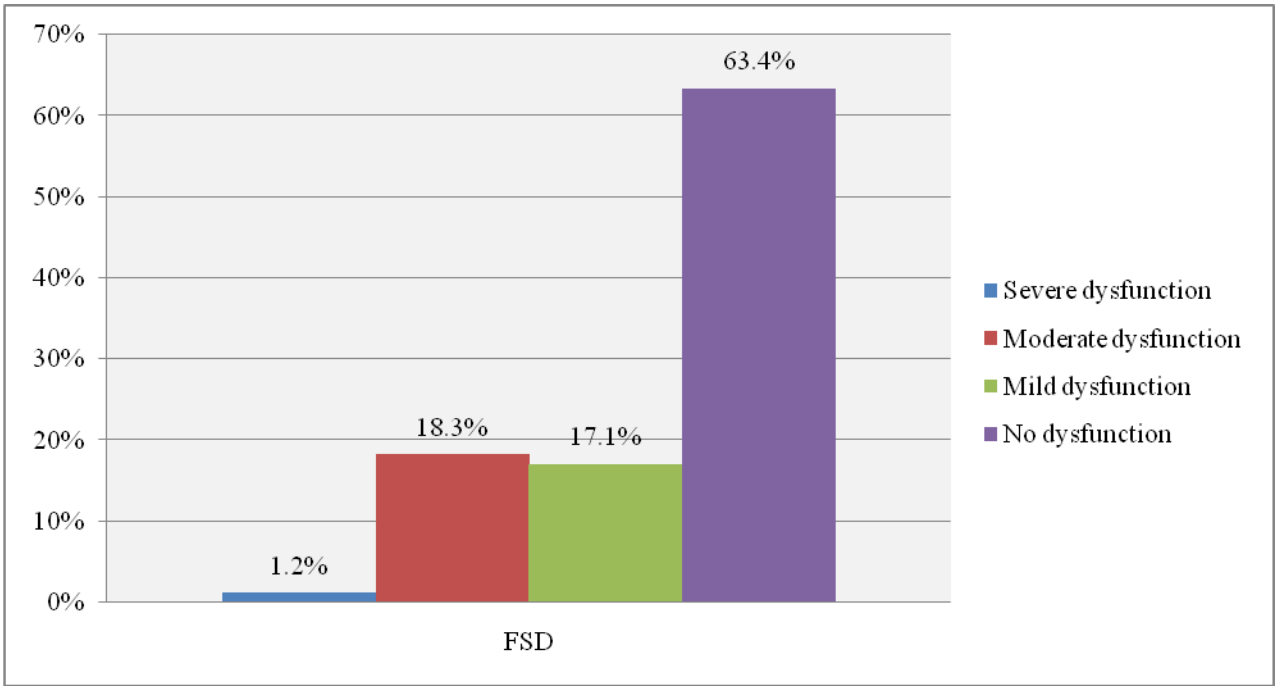
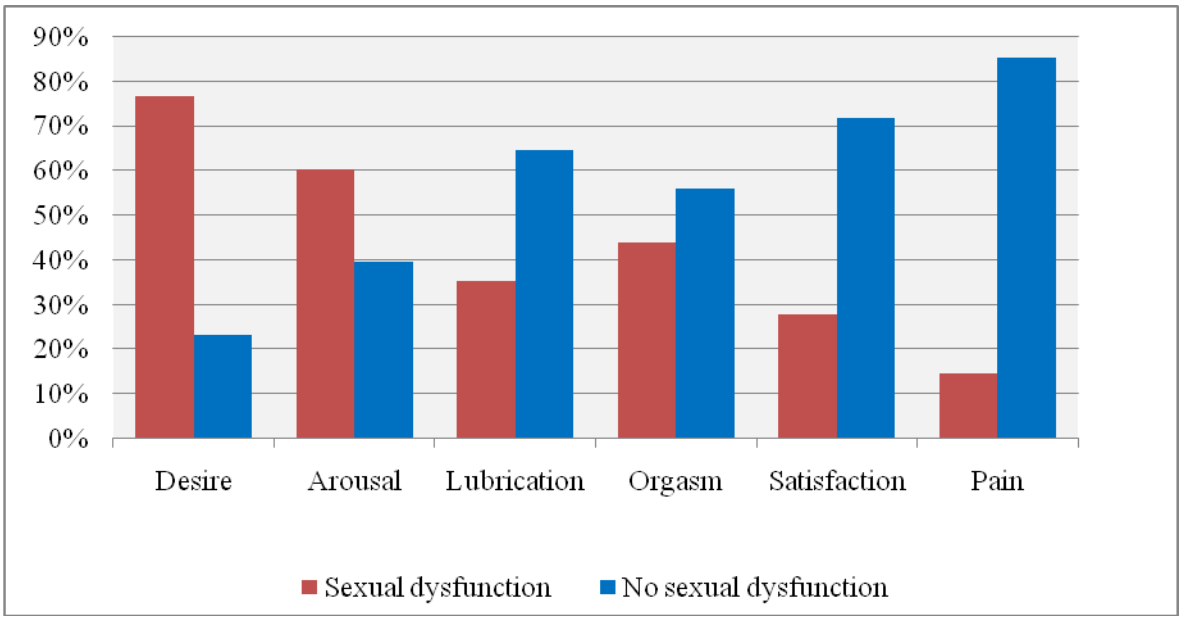


Table 8: Types of Female Sexual Function

Category	Desire n (%)	Arousal n (%)	Lubrication n (%)	Orgasm n (%)	Satisfaction n (%)	Pain n (%)
Dysfunction	126 (76.8)	99 (60.4)	58 (35.4)	72 (43.9)	46 (28.0)	24 (14.6)
No dysfunction	38 (23.2)	65 (39.6)	106 (64.6)	92 (56.1)	118 (72.0)	140 (85.4)

From table 8 above, the most prevalent dysfunctions among the females were desire at 76.8% and arousal at 60.4%. The other dysfunctions among female participants were lubrication (35.4%), orgasm (43.9%), satisfaction (28%) and pain (14.6%).

Figure 4: Extent of Sexual Function by Type among Females



4.4. TESTING FOR ASSOCIATION

The study examined the association between extents of the dysfunctions with each of the socio-demographic variables and also the past medical history outcomes or clinical characteristics. This was achieved though cross tabulations and the computed Chi-square or Fisher's exact statistics, t tests and odds ratios obtained from logistic regression analysis. Finally, a multivariate analysis was performed to identify the variables which were independently associated with sexual dysfunction in both male and female participants.

4.5. ASSOCIATED FACTORS FOR FEMALE SEXUAL FUNCTIONING

Table 9: Association between Female Sexual Function and socio-demographic factors

Variables	Female sexual function		OR (95% CI)	P value
	Dysfunction n=60, %	No dysfunction n=104,%		
Age, mean (SD)	52.1 (13.1)	40.2 (11.7)	-	**<0.001**
Age group				
18-27	3 (5.0%)	19 (18.3%)	1.0	
28-37	6 (10.0%)	24 (23.1%)	1.6 (0.3-7.2)	0.551
38-47	12 (20.0%)	31 (29.8%)	2.5 (0.6-9.8)	0.205
48-57	14 (23.3%)	22 (21.2%)	4.0 (1.0-16.2)	**0.049**
58-67	20 (33.3%)	8 (7.7%)	15.8 (3.6-68.7)	**<0.001**
>67	5 (8.3%)	0 (0.0%)	-	-
Marital status				
Married	51(85.0%)	79 (76.0%)	1.0	
Cohabiting	9 (15.0%)	20 (19.2%)	0.7 (0.3-1.7)	0.412
Single	0 (0.0%)	5 (4.8%)	-	
Education level				
Nil	9 (15.0%)	4 (3.8%)	1.0	
Primary	28 (46.7%)	33 (31.7%)	1.6 (0.2-17.5)	0.679
Secondary	18 (30.0%)	43 (41.3%)	15.8 (0.4-	0.125
College	4 (6.7%)	17 (16.3%)	174.2)	0.105
University	1 (1.7%)	7 (6.7%)	5.9 (0.7-51.2)	0.331
			2.9 (0.3-25.6)	
Occupation				
Student	1 (1.7%)	6 (5.8%)	0.1 (0.0-1.1)	0.056
Skilled personnel	28 (46.7%)	76 (73.1%)	0.3 (0.1-0.5)	**<0.001**
Unskilled Personnel	31 (51.7%)	22 (21.2%)	1.0	
Religion				
Christian	58 (96.7%)	98 (94.2%)	1.0	
Muslim	1 (1.7%)	3 (2.9%)	0.6 (0.1-5.5)	0.563
Others	1 (1.7%)	3 (2.9%)	0.6 (0.1-5.5)	0.563

As shown in table 9 above, diabetic patients with sexual dysfunction had a mean age of 52.1 years compared to those with normal sexual function with a mean age of 40.2 years and therefore noted to be statistically significant, P<0.001. The patients in the age group of 48-57 years and 59-67 years had a higher risk of developing sexual dysfunction; OR 4.0 (1.0-16.2), P=0.049 and OR 15.8 (3.6-68.7), P<0.001 respectively compared to those in 18-

27 year age group,. However, there was no difference in risk between the 18-27 year age group and those in 28-37 years and 38-47 years age groups.

Occupation was statistically significant when associated with sexual dysfunction. The skilled personnel and the student were found to be less likely to develop sexual dysfunction than the unskilled personnel; OR 0.3 (0.1-0.5), P<0.001 and OR 0.1 (0.0-1.1), P=0.056 respectively. Other factors such as marital status, education and religion did not significantly influence sexual dysfunction of the female patients.

Table 10: Female Sexual Function versus past medical history outcomes

Variables	**Female sexual function**		**OR (95% CI)**	**P value**
	Dysfunction n=60, %	**No dysfunction n=104, %**		
Duration of diabetes(years)				
<=5	26 (43.3%)	54 (51.9%)	1.0	
6-10	18 (30.0%)	24 (23.1%)	1.6 (0.7-3.4)	0.259
>10	16 (26.7%)	26 (24.9%)	1 .3 (0.6-2.8)	0.537
Treatment types for diabetes				
Diet	0 (0.0%)	4 (3.8%)	-	0.298
Drugs	60 (100.0%)	100 (96.2%)		
Reported Sexual problem				
Yes	45 (75.0%)	30 (28.8%)	7.4 (3.6-15.2)	**<0.001**
No	15 (25.0%)	74 (71.2%)	1.0	
If life affected due to sexual problem				
Yes	25 (41.7%)	9 (8.7%)	7.5 (3.2-17.7)	**<0.001**
No	35 (58.3%)	95 (91.3%)	1.0	

Past experience of sexual problems was significantly associated to the sexual function of the female patients. The patients who had reported sexual problem in the past were more likely to have sexual dysfunction (75%) than to have normal sexual function (28.8%), OR 7.4 (3.6-15.2), P<0.001. Also, the patients who reported that their lives had been affected by the sexual problems had reported a higher chance of having sexual dysfunction (41.7%) than having normal function (8.7%), OR 7.5 (3.2-17.7), P<0.001.Other medical history factors such as duration of diabetes and type of treatment of diabetes were not associated to sexual function of female patients. No female participant had sought treatment for sexual problem; therefore association was not tabulated.

4.5.1. Multivariate analysis of factors for female sexual functioning

Table 11: Independent factors associated with female sexual dysfunction

Variables	**OR (95% CI)**	**P value**
Age	1.08 (1.04-1.12)	**<0.001**
Occupation		
Student	1.8 (0.1-23.8)	0.649
Skilled personnel	0.4 (0.2-1.1)	0.064
Unskilled Personnel	1.0	
Reported Sexual problem		
Yes	7.7 (3.4-17.6)	**<0.001**
No	1.0	

Age and ever reporting sexual problems was found to be independently associated to female sexual dysfunction in diabetic patients. As age advanced among female patients, there was increased chance of having sexual dysfunction; OR 1.08 (1.04-1.12), P<0.001. Similarly, the patients who had reported sexual problems in the past were found to have a higher risk of sexual dysfunction, OR 7.7 (3.2-18.1), P<0.001. Occupation did not have any independent influence on sexual function of the female patients.

4.6. ASSOCIATED FACTORS FOR MALE SEXUAL FUNCTIONING

4.6.1. Male Erectile Function

Table 12: Male Erectile Function and socio-demographic factors

Variables	Male Erectile Sexual Function		OR (95%CI)	P Value
	Dysfunction n=128, %	**No dysfunction n=58, %**		
Mean age	53.3 (15.0)	43.8 (11.0)	-	**<0.001**
Age range				
18-27	6 (4.7%)	6 (10.3%)	1.0	
28-37	17 (13.3%)	9 (15.5%)	1.9 (0.5-7.6)	0.370
38-47	17 (13.3%)	17 (29.3%)	1.0 (0.3-3.7)	1.000
48-57	41 (32.0%)	21 (36.2%)	2.0 (0.6-6.8)	0.293
58-67	24 (18.8%)	5 (8.6%)	4.8 (1.1-22.2)	**0.039**
>67	23 (18.0%)	0 (0.0%)	-	-
Marital status				
Married	121 (94.5%)	51 (87.9%)	1.0	
Cohabiting	4 (3.1%)	5 (8.6%)	0.6 (0.1-4.2)	0.630
Single	3 (2.3%)	2 (3.4%)	1.8 (0.1-8.4)	0.443
Education level				
Nil	4 (3.1%)	0 (0.0%)	-	-
Primary	45 (35.2%)	18 (31.0%)	8.3 (2.1-33.8)	**<0.001**
Secondary	58 (45.3%)	15 (25.9%)	12.9 (3.1-52.8)	**0.003**
College	18 (14.1%)	15 (25.9%)	4.0 (0.9-17.2)	0.063
University	3 (2.3%)	10 (17.2%)	1.0	
Occupation				
Student	2 (3.4%)	2 (1.6%)	0.3 (0.0-2.4)	0.226
Skilled personnel	52 (89.7%)	110 (85.9%)	0.5 (0.2-1.7)	0.275
Unskilled personnel	4 (6.9%)	16 (12.5%)	1.0	
Religion				
Christian	124 (96.8%)	55 (94.9%)	1.0	
Muslim	2 (1.6%)	2 (3.4%)	0.4 (0.1-3.2)	0.422
Others	2 (1.6%)	1 (1.7%)	0.9 (0.1-10.0)	0.923

Male patients who had erectile sexual dysfunction had a significantly higher mean age (53.3 years) than the patients with normal erectile function (43.8 years), P<0.001. Though there was no difference in risk for patients of age up to 57 years, those in the 58-67 years age group were at a higher risk of reporting erectile sexual dysfunction compared to the lower age groups (18-27 to 48-57),OR 4.8 (1.1-22.2), P=0.039. Also, education was significantly associated to erectile function among the male patients with those with lower education having a higher chance of reporting erectile dysfunction. As compared to patients with university education, there was more risk among patients with primary education [OR

8.3 (2.1-33.8), P<0.001] and secondary [OR 12.9 (3.1-52.8), P=0.003]. There was no difference between patients with college level of education and those with university education. Marital status, occupation and religion were not significantly associated with erectile dysfunction.

Table 13: Male Erectile Sexual Function and past medical history outcomes

Variables	**Male Erectile Sexual Function**		**OR (95%CI)**	**P Value**
	Dysfunction n=128, %	**No dysfunction n=58, %**		
Duration of diabetes(years)				
1-5	54 (2.2%)	39 (67.2%)	1.0	
6-10	28 (21.9%)	12 (20.7%)	1.7 (0.8-3.7)	0 .196
>10	46 (35.9%)	7 (12.1%)	4.7 (1.9-11.6)	**0.001**
Treatment types for diabetes				
Diet	6 (4.7%)	2 (3.4%)	1.0	
Drugs	122 (95.3%)	56 (96.6%)	0.7 (0.1-3.7)	1.000
Reported sexual problem				
No (0)	24 (18.8%)	41 (70.7%)	1.0	
Yes (1)	104 (81.3%)	17 (29.3%)	10.5 (5.1-21.4)	**<0.001**
Treatment sought for the sexual problem				
No treatment	118(92.2%)	58 (100.0%)	-	**0.032**
Treatment	10 (7.8%)	0 (0.0%)		
If life affected due to sexual problem				
No	69(53.9%)	50 (86.2%)	1.0	
Yes	59 (46.1%)	8 (13.8%)	5.3 (2.3 -12.2)	**<0.001**

Longer duration of diabetes increased the chances of a patient experiencing erectile sexual dysfunction. As compared with patients who had been diagnosed for 5 or less than 5 years ago, there was a higher risk of erectile dysfunction among patients whose duration of illness was over 10 years; OR 4.7 (1.9-11.6), P=0.001.

Ever reporting sexual problem in the past was also found to be significantly associated with erectile dysfunction; OR 10.5 (5.1-21.4), P<0.001. In addition, 'if life had been affected by sexual problem' was significantly associated with erectile dysfunction; OR 5.3 (2.3-12.2), P<0.001.

4.6.2. Male Orgasmic Sexual Function

Table 14: Male Orgasmic Sexual Function and the socio-demographic variables

Variables	Male Orgasmic Sexual Function		OR (95% CI)	P Value
	Dysfunction n=90, %	**No dysfunction n=96, %**		
Mean age	55.0 (15.7)	46.1 (11.9)	-	**<0.001**
Age range				
18-27	4 (4.4%)	8 (8.3%)	1.0	
28-37	10 (11.1%)	16 (16.7%)	1.2 (0.3-5.30)	0.761
38-47	12 (13.3%)	22 (22.9%)	1.1 (0.3-4.4)	0.902
48-57	28 (31.1%)	34 (35.4%)	1.6 (0.4-6.0)	0.452
58-67	15 (16.7%)	14 (14.6%)	2.1 (0.5-8.7)	0.287
>67	21 (23.3%)	2 (2.1%)	21.0 (3.2-138.0)	**0.002**
Marital status				
Married	84 (93.3%)	88 (91.7%)	1.0	
Cohabiting	3 (3.3%)	6 (6.3%)	0.2 (0.0-1.2)	0.078
Single	3 (3.3%)	2 (2.1%)	0.3 (0.1-2.0)	0.257
Education level				
Nil	2 (2.2%)	2 (2.1%)	1.1 (0.3-4.5)	0.867
Primary	32 (35.6%)	31 (32.3%)	2.3 (0.2-22.1)	0.487
Secondary	41 (45.6%)	32 (33.3%)	2.3 (0.6-8.3)	0.196
College	11 (12.2%)	22 (22.9%)	2.8 (0.8-10.2)	0.101
University	4 (4.4%)	9 (9.4%)	1.0	
Occupation				
Student	2 (2.2%)	2 (2.1%)	1.0 (0.1-8.6)	1.000
Skilled personnel	78 (86.7%)	84 (87.5%)	0.9 (0.4-2.4)	0.876
Unskilled personnel	10 (11.1%)	10 (10.4%)	1.0	
Religion				
Christian	86 (95.5%)	93 (96.9%)	1.0	
Muslim	2 (2.2%)	2 (2.1%)	1.1 (0.1-7.8)	0.938
Others	2 (2.2%)	1 (1.0%)	2.2 (0.2-24.3)	0.532

Male orgasmic function was found to be associated to the age of the patients. The mean age of the patients with orgasmic dysfunction (55 years) was significantly higher than the normal patients (46.1 years), P<0.001. Patients aged above 67 years were at a higher risk of orgasmic dysfunction [OR 21.0 (3.2-138.0), P=0.002] compared to the 18-27 years age group. However, the patients in the age group below 67 years were not different in experiencing orgasmic dysfunction. Marital status, education, occupation and religion were found not to be associated with male orgasmic dysfunction.

Table 15: Male Orgasmic Sexual Function and past medical history outcomes

Variables	Male Orgasmic Sexual Function		OR (95% CI)	P Value
	Dysfunction n=90, %	No dysfunction n=96, %		
Duration of diabetes(years)				
1-5	38 (42.2%)	55 (57.3%)	1.0	
6-10	20 (22.2%)	20 (20.8%)	1.4 (0.7-3.0)	0.331
>10	32 (35.6%)	13 (21.9%)	2.2 (1.1-4.4)	**0.024**
Treatment types for diabetes				
Diet	4 (4.4%)	4 (4.2%)	1.0	
Drugs	92 (95.6%)	86 (95.8%)	0.9 (0.2-3.9)	1.000
Reported sexual problem				
No (0)	19 (21.1%)	46 (47.9%)	1.0	
Yes (1)	71 (78.9%)	50 (52.1%)	3.4 (1.8-6.6)	**<0.001**
Treatment sought for the sexual problem				
No treatment	84 (93.3%)	92 (95.8%)	0.6 (0.2-2.2)	0.627
Treatment	6 (6.7%)	4 (4.2%)	1.0	
If life affected due to sexual problem				
No	45 (50.0%)	74 (77.1%)	1.0	
Yes	45 (50.0%)	22 (22.9%)	3.4 (1.8 -6.3)	**<0.001**

Duration of diabetes was significantly associated with orgasmic function among male patients. Patients whose duration of diabetes had exceeded 10 years were at a higher risk of orgasmic dysfunction; OR 2.2 (1.1-4.4), P=0.024. Past experience of sexual problem increased the risk of orgasmic dysfunction among the male patients; 3.4 (1.8-6.6), P<0.001. In addition, the patients whose lives had been affected by the sexual problem were more likely to have orgasmic dysfunction; OR 3.4 (1.8-6.3), P<0.001. Type of treatments for diabetes and treatment sought for sexual problem was not significantly associated with orgasmic function of the male patients.

4.6.3. Male Sexual Desire Function

Table 16: Male Sexual Desire Function and the socio-demographic variables

Variables	Male Sexual Desire Function		OR (95% CI)	P Value
	Dysfunction n=152, %	No dysfunction n=34, %		
Mean age	52.9 (14.0)	39.2 (11.4)	-	**<0.001**
Age range				
18-27	5 (3.3%)	7 (20.6%)	1.0	
28-37	17 (11.2%)	9 (26.5%)	2.6 (0.7-10.8)	0.174
38-47	27 (17.8%)	7 (20.6%)	5.4 (1.3-22.3)	**0.020**
48-57	51 (33.6%)	11 (32.4%)	6.5 (1.7-24.3)	**0.005**
58-67	29 (19.1%)	0 (0.0%)	-	-
>67	23 (15.1%)	0 (0.0%)	-	-
Marital status				
Married	143 (94.1%)	29 (85.3%)	1.0	
Cohabiting	6 (3.9%)	3 (8.8%)	1.3 (0.2-9.1)	0.783
Single	3 (2.0%)	2 (5.9%)	3.9 (0.8-18.5)	0.085
Education level				
Nil	4 (2.6%)	0 (0.0%)	-	-
Primary	52 (34.2%)	11 (32.4%)	3.2 (0.8-12.6)	0.098
Secondary	63 (41.4%)	10 (29.4%)	4.1 (1.1-14.4)	**0.031**
College	26 (17.1%)	7 (20.6%)	5.4 (1.5-19.4)	**0.010**
University	7 (4.6%)	6 (17.6%)	1.0	
Occupation				
Student	2 (1.3%)	2 (5.9%)	0.2 (0.0-1.8)	0.142
Skilled personnel	133 (87.5%)	29 (85.3%)	0.8 (0.2-2.9)	0.748
Unskilled personnel	17 (11.2%)	3 (8.8%)	1.0	
Religion				
Christian	147 (96.7%)	32 (94.1%)	1.0	
Muslim	2 (1.3%)	2 (5.9%)	0.2 (0.0-1.6)	0.135
Others	3 (2.0%)	0 (0.0%)	-	-

Male patients with sexual desire dysfunction had a mean age of 52.9 years that was significantly higher than the patients with normal sexual desire function with a mean age of 39.2 years, P<0.001. The risk of having a dysfunction of sexual desire increased with age with high likelihood among patients in the age group of 38-47 years [OR 5.4 (1.3-22.3), P=0.020] and 48-57 years [OR 6.5 (1.7-24.3), P=0.005] than those in 18-27 years age group. Also, lower education increased the likelihood of experiencing sexual desire dysfunction with higher risk among those with secondary [OR 4.1 (1.1-14.4), P=0.031] and primary [OR 5.4 (1.5-19.4), P=0.010] compared to patients with university education.

Marital status, occupation and religion were not significantly associated with male sexual desire function.

Table 17: Male Sexual Desire Function and past medical history outcomes

Variables	**Male Sexual Desire Function**		**OR (95%CI)**	**P Value**
	Dysfunction n=152,%	**No dysfunction n=34, %**		
Duration of diabetes(years)				
1-5	72 (47.4%)	21 (61.8%)	1.0	
6-10	31 (20.4%)	9 (26.5%)	1.0 (0.4-2.4)	0.992
>10	49 (32.2%)	4 (11.7%)	3.6 (1.2-11.1)	**0.027**
Treatment types for diabetes				
Diet	7 (4.6%)	1 (2.9%)	1.0	
Drugs	145 (95.4%)	33 (97.1%)	0.6 (0.1-5.3)	1.000
Sexual problem				
No (0)	43 (28.3%)	22 (64.7%)	1.0	
Yes (1)	109 (71.7%)	12 (35.3%)	4.6 (2.1-10.2)	**<0.001**
Treatment sought for the sexual problem			-	0.212
No treatment	142 (93.4%)	34 (100.0%)		
Treatment	10(6.6%)	0 (0.0%)		
Life affected due to sexual problem				
No	91 (59.9%)	28 (82.4%)	1.0	
Yes	61 (40.1%)	6 (17.6%)	3.1 (1.2-8.0)	**0.014**

There was a statistically significant association between duration of diabetes and sexual desire, with patients who had had diabetes for a duration of more than 10 years having a higher risk of reporting sexual desire dysfunction; OR 3.6 (1.2-11.1), P=0.027. Past experience of sexual problem increased the risk of sexual desire dysfunction among the male patients; OR 4.6 (2.1-10.2), P<0.001. In addition, the patients whose lives had been affected by the sexual problem were more likely to have sexual desire dysfunction OR 3.1 (1.2-8.0), P<0.014.

4.6.4. Male Intercourse Satisfaction Function

Table 18: Male Intercourse Satisfaction Function versus the socio-demographic variables

Variables	Male Intercourse Satisfaction Function		OR (95% CI)	P Value
	Dysfunction n=161, %	No dysfunction n=25, %		
Mean age	51.9 (14.6)	40.8 (10.1)	-	**<0.001**
Age range				
18-27	9 (5.6%)	3 (12.0%)	1.0	
28-37	19 (11.8%)	7 (28.0%)	0.9 (0.2-4.3)	0.900
38-47	27 (16.8%)	7 (28.0%)	1.3 (0.3-6.1)	0.750
48-57	55 (34.2%)	7 (28.0%)	2.6 (0.6-12.0)	0.216
58-67	28 (17.4%)	1 (4.0%)	9.3 (0.9-101.3)	0.066
>67	23 (14.3%)	0 (0.0%)	-	-
Marital status				
Married	150 (93.2%)	22 (88.0%)	1.0	
Cohabiting	8 (5.0%)	1 (4.0%)	0.8 (0.1-10.2)	0.829
Single	3 (1.9%)	2 (8.0%)	1.1 (0.1-9.6)	0.927
Education level				
Nil	4 (2.5%)	0 (0.0%)	-	-
Primary	55 (34.2%)	8 (32.0%)	1.1 (0.2-5.2)	0.890
Secondary	66 (41.0%)	7 (28.0%)	2.1 (0.5-9.1)	0.340
College	26 (16.1%)	7 (28.0%)	2.8 (0.6-12.8)	0.176
University	10 (6.2%)	3 (12.0%)	1.0	
Occupation				
Student	3 (1.9%)	1 (4.0%)	0.5 (0.0-6.9)	0.628
Skilled personnel	141 (87.6%)	21 (84.0%)	1.2 (0.3-4.4)	0.800
Unskilled personnel	17 (10.6%)	3 (12.0%)	1.0	
Religion				
Christian	156 (96.9%)	23 (92.0%)	1.0	
Muslim	2 (1.2%)	2 (8.0%)	0.1 (0.0-1.1)	0.062
Others	3 (1.9%)	0 (0.0%)	-	-

Male patients who had intercourse satisfaction sexual dysfunction had a mean age of 51.9 years that was significantly higher than the patients with normal function with a mean age of 41.8 years, P<0.001.

Age was not significantly associated with intercourse satisfaction dysfunction. Other factors such as marital status, education, occupation and religion were not significantly associated with intercourse satisfaction function among the male patients.

Table 19: Male Intercourse Satisfaction Function and past medical history outcomes

Variables	Male Intercourse Satisfaction Function		OR (95%CI)	P Value
	Dysfunction n=161, %	No dysfunction n=25, %		
Duration of diabetes(years)				
1-5	78 (48.4%)	15 (60.0%)	1.0	
6-10	34 (21.1%)	6 (24.0%)	1.1 (0.4-3.0)	0.870
>10	49 (30.4%)	4 (16.0%)	2.4 (0.7-7.5)	0.147
Treatment types for diabetes				
Diet	8 (5.0%)	0 (0.0%)	-	0.600
Drugs	153 (95.0%)	25 (100.0%)		
Reported sexual problem				
No (0)	46 (28.6%)	19 (76.0%)	1.0	
Yes (1)	115 (71.4%)	6 (24.0%)	7.9 (3.0-21.1)	**<0.001**
Treatment sought for the sexual problem				
No treatment	151 (93.8%)	25 (100.0%)	-	0.363
Treatment	10 (6.2%)	0(0.0%)		
If life affected due to sexual problem				
No	97 (60.2%)	22 (88.0%)	1.0	
Yes	64 (39.8%)	3 (12.0%)	4.8 (1.4 -16.8)	**0.007**

Reporting sexual problem was statistically significantly associated with intercourse satisfaction dysfunction among the male patients; OR 7.9 (3.0-21.1), P<0.001. In addition, the patients whose lives had been affected by the sexual problem were more likely to have intercourse satisfaction dysfunction; OR 4.8 (1.4 -16.8), P<0.007.

4.6.5. Male Overall Sexual Satisfaction

Table 20: Male Overall Sexual Satisfaction and the socio-demographic variables

Variables	Overall sexual satisfaction		OR (95% CI)	P value
	Dysfunction n=127, %	No dysfunction n=59, %		
Age, mean (SD)	52.7 (14.7)	45.3 (12.9)	-	**0.001**
Age group				
18-27	6 (4.7%)	6 (10.2%)	1.0	
28-37	15 (11.8%)	11 (18.6%)	1.4 (0.3-5.4)	0.658
38-47	21 (16.5%)	13 (22.0%)	1.6 (0.4-6.1)	0.478
48-57	42 (33.1%)	20 (33.9%)	2.1 (0.6-7.3)	0.245
58-67	23 (18.1%)	6 (10.2%)	3.8 (0.9-16.3)	0.068
>67	20 (15.7%)	3 (5.1%)	6.7 (1.3-35.0)	**0.025**
Marital status				
Married	115 (90.6%)	53 (89.8%)	1.0	
Single	12 (9.4%)	6 (10.2%)	2.0 (0.3-14.8)	0.497
Cohabiting	8 (6.3%)	3 (5.1%)	1.6 (0.3-7.5)	0.533
Education level				
College	23 (18.1%)	10 (16.9%)	2.0 (0.5-7.4)	0.313
Nil	3 (2.4%)	1 (1.7%)	2.6 (0.2-31.7)	0.461
Primary	43 (33.9%)	20 (33.9%)	1.8 (0.5-6.2)	0.323
Secondary	51 (40.2%)	22 (37.3%)	2.0 (0.6-6.6)	0.262
University	7 (5.5%)	6 (10.2%)	1.0	
Occupation				
Student	1 (0.8%)	3 (5.1%)	0.1 (0.0-1.0)	0.053
Skilled personnel	110 (86.6%)	52 (88.1%)	0.5 (0.2-1.7)	0.275
Unskilled Personnel	16 (12.6%)	4 (6.8%)	1.0	
Religion				
Christian	124 (97.6%)	55 (93.2%)	1.0	
Muslim	2 (1.6%)	2 (3.4%)	0.4 (0.1-3.2)	0.422
Others	1 (0.8%)	2 (3.4%)	0.2 (0.0-2.5)	0.223

Male patients with overall sexual satisfaction had a mean age of 52.7 years that was significantly higher than the patients with normal function (45.3 years), P<0.001. There was high likelihood of patients aged above 67 years to experience a dysfunction of overall sexual satisfaction [OR 6.7 (1.3-35.0), P=0.025] than those in 18-27 years age group. Marital status, education, occupation and religion were not significantly associated with overall sexual satisfaction among male patients.

Table 21: Male Overall Satisfaction Function versus past medical history outcomes

Variables	Overall sexual satisfaction		OR (95% CI)	P value
	Dysfunction n=127, %	**No dysfunction n=59, %**		
Duration of diabetes(years)				
1-5	58 (45.7%)	35 (59.3%)	1.0	
6-10	25 (19.7%)	15 (25.4%)	1.0 (0.5-2.2)	0.988
>10	44 (34.7%)	9 (15.3%)	3.0 (1.3-6.8)	**0.011**
Treatment types for diabetes				
Diet	6 (4.7%)	2 (3.4%)	1.0	
Drugs	121 (95.3%)	57 (96.6%)	0.7 (0.1-3.6)	0.676
Reported sexual problem				
Yes	101 (79.5%)	20 (33.9%)	7.6 (3.8-15.1)	**<0.001**
No	26 (20.5%)	39 (66.1%)	1.0	
Treatment sought for the sexual problem				
Treatment	9 (7.1%)	1 (1.7%)	1.0	
No treatment	118 (92.9%)	58 (98.3%)	0.2 (0.0-1.8)	0.174
If life affected due to sexual problem				
Yes	57 (44.9%)	10 (16.9%)	4.0 (1.9-8.6)	**<0.001**
No	70 (55.1%)	49 (83.1%)	1.0	

Duration of diabetes was statistically significant for overall sexual satisfaction, with patients whose duration was more than 10 years having a higher risk of overall sexual satisfaction dysfunction; OR 3.0 (1.3-6.8), P=0.011. Patients who had history of sexual problems were more likely to have a dysfunction of overall sexual satisfaction (79.5%) compared to those with normal function (33.9%); OR 7.6 (3.8-15.1), P<0.001. Also, the patients who reported that their lives had been affected by sexual problem were more likely to experience overall sexual satisfaction dysfunction (44.9%) than normal function (16.9%); 4.0 (1.9-8.6), P<0.001.

Other factors such as type of treatment of diabetes and treatment sought for sexual problem were not significantly associated with overall sexual satisfaction.

4.6.6. Multivariate analysis of factors for male sexual dysfunction

Table 22: Independent factors associated with male sexual dysfunction

Type of sexual dysfunction	Variables	OR (95% CI)	P value
Erectile	Age	1.0 (1.0-1.1)	0.101
	Education		
	Nil	3.7 (0.7-21.2)	0.136
	Primary	-	-
	Secondary	6.3 (1.1-34.5)	**0.035**
	College	9.8 (1.8-53.8)	**0.008**
	University	1.0	
	Duration of diabetes(years)		
	1-5	1.0	
	6-10	1.8 (0.7-4.9)	0.247
	>10	2.8 (1.0-8.0)	**0.049**
	Sexual problem		
	Yes	7.8 (3.5-17.2)	**<0.001**
	No	1.0	
Orgasm	Age	1.04 (1.02-1.07)	**0.001**
	Sexual problem		
	Yes	2.8 (1.4-5.5)	**0.002**
	No	1.0	
	Duration of diabetes(years)		
	1-5	1.0	
	6-10	1.3 (0.6-2.8)	0.558
	>10	1.4 (0.6-2.9)	0.432
Sexual desire	Age	1.07 (1.04-1.11)	**<0.001**
	Education		
	Nil	2.1 (0.5-9.7)	0.338
	Primary	-	-
	Secondary	1.9 (0.4-7.9)	0.386
	College	2.3 (0.5-9.5)	0.270
	University	1.0	
	Sexual problem		
	Yes	3.4 (1.4-7.9)	**0.005**
	No	1.0	
	Duration of diabetes(years)		
	1-5	1.0	
	6-10	0.8 (0.3-2.4)	0.743
	>10	1.7 (0.5-6.0)	0.402
Intercourse satisfaction	Age	1.05 (1.01-1.09)	**0.007**
	Sexual problem		
	Yes	6.3 (2.3-17.3)	**<0.001**
	No	1.0	
Overall satisfaction	Age	1.030 (1.002-1.060)	**0.036**
	Sexual problem		
	Yes	6.7 (3.3-13.4)	**<0.001**
	No	1.0	
	Duration of diabetes(years)		
	1-5	1.0	
	6-10	0.7 (0.3-1.7)	0.500
	>10	1.7 (0.7-4.3)	0.268

Except for erectile function, age was a factor influencing sexual function with increased age increasing the likelihood of orgasmic, sexual desire, intercourse satisfaction and overall sexual satisfaction dysfunctions. Education level was uniquely associated with erectile function with those having secondary and college education more likely to have erectile dysfunction than their university level counterparts**.** Reporting sexual problems in the past was found to be independently associated with all types of male sexual dysfunction. A history of sexual problems was a risk to having erectile, orgasmic, sexual desire, intercourse satisfaction and overall sexual satisfaction dysfunctions.

5.0 DISCUSSION

Most studies done in the past discuss and emphasis female sexual dysfunction (FSD) and erectile dysfunction(ED). In most studies, the types of sexual dysfunctions are not given much attention. As noted in most studies done elsewhere the findings in this study do compare fairly well with the slight variations accounted for by the sample sizes and age exclusion criteria where in most previous studies the sample size was either high or low and the lower age limits were placed a little high respectively than in this particular study. Studies similar to this have not been conducted locally and therefore comparisons could not be made. Some western studies reported high prevalence rates whereas in Africa most studies reported low rates especially among the females where extremely few studies have been done as compared to males.

From the present study findings, prevalence rates of sexual dysfunction in general and also in most of the categories of sexual functioning were high, and do reflect findings in studies done elsewhere. As in a study done in Iran on sexual dysfunctions in patients with diabetes by Marzieh Ziaei – Rad et al., 2010, showed that sexual dysfunctions were widespread in both gender and 82.5% patients reported at least one sexual dysfunction and there were significant association between sexual dysfunctions and gender. This compares with dysfunctions of male sexual desire (81.7%) and intercourse satisfaction (86.6%) in the current study. Muniyappa.R. et al., 2005, documented that diabetes may affect desire, arousal and orgasm, but particularly arousal with decreased genital sensation and lubrication and that vaginal dryness and infection could lead to dysparuenia. Practitioners should therefore recognize the high prevalence of FSD (up to 50%) and potential increase in tandem with that of diabetes. On the types of FSD, it was noted by Zemishlang & Weizman, 2008 that a decrease in sexual desire at 76% prevalence was the most common sexual dysfunction in women; findings that support the study findings that place desire as a sexual dysfunction at 76.8% .

In regard to age; the study findings did show that as age increases so does the prevalence of sexual dysfunction for females and in all categories of sexual dysfunction for males except erectile function as noted on multivariate logistic regression analysis (table22). Prevalence

increased consistently with age for ED as noted on bivariate analysis (table12) and was highly prevalent among the illiterate. There was no association for education in regard to females while for males significant association was noted in erectile sexual function.
Age in regard to sexual performance inversely relate, with high performance in the younger than the old and this performance tend to decrease with age even in normal populations, but in the case of diseases such as diabetes the problem could get compounded and therefore result in low levels of sexual performance. The educational level enables appropriate evaluation and understanding of information about the disease for its better management, hence good control crucial and this goes well with higher levels of education in most cases.
Though most authors report association of erectile function with increasing age, few report no association. This is an expected observation scientifically in normal populations and also expected in diabetic patients, though other factors such as duration could have some influence in this regard especially when it comes to how appropriately diabetes as a disease is well under control. The effect of increased age on SD in patients with diabetes in both genders is well documented and several studies have shown that men with diabetes mellitus are at an increased risk of ED, that it occurs at an earlier age and that it is related to longer duration of diabetes (Enzlin et al., 2003). Roth et al., 2003 in a study noted that increasing age adversely affected erectile function and pointed out the fact that although a few authors did not consider age as an independent risk factor, the majority maintained that age had a negative impact on EF, even in healthy men. As in this study, Ziaei-Rad.M., Vahdaninia.M and Monazeri.A, 2010 did not find any significant statistical relationship between age and SD of which ED was one them and although higher age groups experienced elevated rates of SD, there were no significant differences among different age groups. Though not as in this study, Muniyappa.R. et al., 2005, noted that even among women, neither age nor duration of diabetes were predictors of SD. Similarly, a study in Turkey noted that no risk factors predicted SD in diabetic women. Therefore, although most research studies have reported age as a prognostic factor on prevalence of SD among diabetic patients, others, though few have reported otherwise.

Occupation was significantly associated with female sexual dysfunction. It is likely occupation tends to enable access to information in regard to the problem, hence those

employed and on the higher ladder were likely to understand and handle their problem more effectively than those on the lower ladder or not in any form of occupation as this does relate with educational level in most instances.

Duration with diabetes mellitus had no significant association in regard to sexual functioning for females, whereas for males there was significant association for erectile function only. This could be explained by the fact that with longer duration of diabetes, the more the damage that results from diabetes and more so when it is not well under control. Too, given the advancing age and also how the patients perceive their sexual performance in regard to the disease plays a big role in the sexual functioning especially for males whose ego in regard to virility tends to impact on them enormously, while females will tend to adjust to the problem realistically and concentrate on the core family issue of care. Therefore with longer duration of diabetes and its poor control, there is likelihood of sexual functioning; hence performance deteriorating and this aspect could be a critical factor even when it comes to age.

Though a variable not discussed in previous studies, experience of sexual problem as reported by participants was significantly associated with sexual functioning in both females and males. This meant that there was likelihood of having SD when measured objectively in those who complained about it and hence indicating that due attention should be paid to them at consultation time with the physicians. Infact, the doctors should endeavour as a routine to inquire about the problem when in contact with the patients.

The prevalence of sexual dysfunction being significantly associated with forms of treatment for sexual problem as noted in males erectile function only and of no treatment having been sought by any females concurs with Balde et al, 2006 findings that in Africa medical care for erectile dysfunction is underprovided, hence profoundly altering the quality of life of the patients. Rarely will diabetic patients broach the subject of sexual dysfunction at consultation as they feel embarrassed to talk about it, more so where privacy is not guaranteed and at times expect the doctors to know and prescribe some medication. Treatment of sexual problems being statistically significant for erectile function could be

due to the positive psychological effects on the affected persons in addition to the pharmacological benefits of the treatment agent, hence the appraised perception of improved sexual performance.

On the number of participants whose lives had been affected by the sexual problem, the study findings were significant on bivariate analysis indicating that the participants' lives were affected or had some kind of problem in one way or another such as no satisfaction with sexual relationship, conflict with partner or some form of a psychological problem. Indeed, most of the diabetic patients are frustrated by this fact and in particular males who feel that their manhood has been dealt a major blow. Females on the other hand mostly resign themselves to fate and preoccupy themselves with other social issues. With sexual dysfunction, there is likelihood of the lives of those affected with sexual dysfunction having problems, more so if there is poor understanding among couples and as such would end up with marital and psychosocial issues, what would impact on their lives negatively.

6.0. Conclusion

The study examined sexual dysfunctions using standard measures among diabetic patients and findings indicated that patients in both genders were greatly affected by sexual dysfunction. However, the prevalence of sexual dysfunction among males was higher than in the females.

Age and reported sexual problem were significantly associated, hence independent predictors in regard to sexual functioning. Additionally, reported presence of sexual problem is a pointer to evaluating a patient for sexual dysfunction. As for the female sexual function, age and reported sexual problem were significantly associated with FSD. In regard to male sexual functioning; age was associated significantly with most categories of sexual function except in male's erectile function while reported sexual problem was significantly associated in all categories of sexual functioning. Duration with diabetes and education were also associated with ED.

7.0. Recommendation

The study recommends that sexual dysfunction should be addressed more adequately in health care practice in Kenya.

This should encompass all the segments of the population, what would include both those in the general population and those with medical conditions, more so the chronic ailments. This would to a large extend bring to the attention of the health personnel the need to adequately address the sexual functioning that affect these patients and thereby improve on their quality of life in regard to sex life, hence their marital, family and societal life.

All patients with diabetes should be evaluated for sexual dysfunction, and then referred for management that would include psychotherapy, with emphasis on sex therapy and pharmacotherapy as essential components in diabetic management.

Sexual dysfunction in both men and women with diabetes deserves further research. Causes are many, and the neuroendocrinological background is complex. However, given that diabetes is the cause of this diabetes complication, the focus should be on the metabolic syndrome as such, as well as on its individual constituent parts.

8.0. Study limitations

1. The study was limited to those patients with diabetes mellitus only and therefore those with other chronic conditions like hypertension in addition to diabetes would not have the study results apply to them.
2. The population of study excluded those below 18 years of age; therefore those with sexual problems below this age would not benefit from the study outcomes.
3. The study only involved patients attending K.N.H, Nairobi and so the outcome of the study would have to be applied to those outside Nairobi with caution.

REFERENCE

Abdo.C.,Oliveira.W., Moreira.E., et al., (2004). Prevalence of sexual dysfunction and correlated conditions in a sample of Brazilian women - results of the Brazilian Study on Sexual Behavior (BSSB). ***International Journal of Impotence Research***.16: 160 - 166.

Ahmadi.K., Ranjebar-Shayan.H., & Raiisi. F., (2007). Sexual dysfunction and marital satisfaction among the chemically injured veterans. ***Indian Journal of Urology***. 23: 4, 377-382.

Bacon.C.G., Hu.F.B., Giovannucci.E.,et al.,(2003). A Study on Association of Type and Duration of Diabetes with ED in a large cohort of men done in Kenya. ***Diabetes Care***. 25: 1458-1463.

Balde.N.M, Diallo.A.B, Balde.M.C, et al., (2006). Erectile dysfunction and diabetes in Conakry (Guinea): Frequency and clinical characteristics from 187 diabetic patients. ***Ann Endocrinol*** (Paris). 67: 4, 338—42

Baldwin S., (2001). Depression and sexual dysfunction. ***British Medical Bulletin***; Oxford University Press.57: 1, 81-99.

Bener A., Al-Ansari A., Al- Hamaq et al.,(2007). The prevalence of erectile dysfunction, its severity , and other sexual function domains in hypertensive and not montensive Qatari men and to estimate the association between hypertension and predictors of erectile function: risk factors; Qataris population. ***Medicina(Kunas)***.43:11

Berrada S., Kadri.N., Mechakra-Tahiri S., et al., (2003). Prevalence of erectile dysfunction and its correlates: a population based study in Morocco. ***International journal of impotence research***.15: SUPI, (31 P.) (12 ret): PP S3-S7.

Böhm.M., Baumhakel.M., Probstfield. R.et al., (2007). ***American Heart Journal***. 154:

1, 94-107

Brant.W. O., Bella.A.J., & Lue. T.F., (2006). Sexual Dysfunction in Diahetes.***Endotext.com***. http: //www.endotext.org/diabetes37/diabetesFrame37.htm.

Brown.A.,& Lowry.K., (2008). Type 2 Diabetes Mellitus. An Evidence – Based Approach to Practical Management. ***Contemporary Endocrinology***.10:4,399-402. http://www.Springelnk.Com/Content/v44g272456723454/

Cooper. R., (2008). Sexual Dysfunction & Diabetes, ***yourtotalhealth***. (http://yourtotalhealth.ivillage.com / sexual) - dysfunction- diabetes.html

DeBusk.R., Drory.Y., Goldstein.I., Jackson.G. et al., (2000). Management of sexual dysfunctions in patients with cardiovascular Disease: Recommendations of the Princeton consensus panel. ***The American Journal of Cardiology***. 86:2,175-181.

Dereck. R., & Andrew.C., (2006). Sexual Dysfunctiion in women with diabetes mellitus. ***Health News- redOrbit*** .03.02CST. http://www.redorbit.com/news/health/345923/sexual_dysfunction_in_women_with_diabet.

"Diabetes Care" January 2010". http://care.diabetesjournals.org/content/33/Supplement_1/S3.full. Retrieved 2010-01-29.

Doruk. H., Akbay E., Cayan.S. et al., (2005). Effect of diabetes mellitus on female sexual function and risk factors. ***Systems Biology in reproductive medicine***.51: 1, 1- 6

Dunn K.M , Croft P.R , & Hackett G.I., (1999). Association of sexual problem with social, psychological and physical problems in Men and Women: a cross sectional population survey. ***Journal of Epidemiology and community Health***. 53: 3, 144-148.

Enzlin. P., Mathieu. C., Bruel. A., Vanderschueren.D. et al., (2003). Prevalence and predictors of sexual dysfunction in patients with type 1 diabetes. ***Diabetes Care***.26: 2, 409-414

Fedele. D., (2005). Therapy Insight: Sexual and Bladder Dysfunction Associated with Diabetes Mellitus. ***Nature Clinical Practice Urology***. 2: 6, 282-290.

GiuIiano.F.A., Leriche.A., Jaudinot.E.O., et al., (2004). Prevalence of erectile dysfunction among 7689 patients with diabetes or hypertension, or both. ***Urology***. 64: 6, 1196-1201.

Gray. P., & Campbell.B., (2005). Erectile Dysfunction and its correlates among the Ariaal of Northern Kenya**.** ***International journal of impotence Research***.17:5, 445-449

Harland. R., & Huws. R., (1997).Sexual problems in diabetes and the role of psychological intervention. ***Sexual and Relationship Therapy***. 2: 2, 147-157.

Heiman.R., (2001). Sexual Dysfunction: Overview of Prevalence, Etiological Factors, and Treatments. ***The Journal of Sex Research***.39: 1, 73-78.

lsHak.W, Mikhail.A, Amiri.R, et al., (2005). Clinical Synthesis. Sexual Dysfunction. ***Focus***. 3: 4, 520 - 525.

Kenyatta National Hospital (http: // wikimapia.org / 1016902 / Kenyatta- National - Hospital).

Kenyatta National Hospital-Wikipedia, the free encyclopedia (April 2009). http://en.wikipedia.org /wiki / Kenyatta_ National_ Hospital.

Laumann.E.O., Paik.A., & Rosen.R.C., (1999). Sexual Dysfunction in United States: Prevalence and Predictors.***JAMA***.1999; 281:537-544.

Levinson. P., Khalaf. I. ., Shaeer.K..,et al., (2003). Efficacy and safety of Sildenafil Citrate (Viagra) for treatment of erectile dysfunction in men in Egypt and South Africa. ***International journal of impotence Research***. 15: 1, 525 – 529. doi: 10. 1038 / sj. ijir. 3900970.

Lewis R.W., Fugi - Meyer K.S., Bosch. R. et al., (2004). Epidemiology / Risk Factors of Sexual Dysfunction. ***The Journal of sexual medicine***.1: 1, 35 -39.

Liane.L., Mindy.F., Warner.P., et al., (1991). Symptoms of sexual dysfunction and depression in diabetic women. ***Journal of Diabetic complications***. 5: 1, 38 - 41

Livshits.A., & Seidman.D., (2009). Fertility issues in women with diabetes: Sexual Dysfunction and Diabetes. ***Womens Health***. 5: 6, 701 – 707. http: // www.medscape. Com viewarticle / 7126928.

Manolis.A., & Doumas.M., (2008). Sexual dysfunction, the 'prima ballerina' of hypertension-related quality-of-life complications. ***Journal of Hypertension***. 26: 11, 2074-2084

Manolis.A., Dournas.M., Viigimaa.M et al., (2007). Hypertension and Sexual Dysfunction. **European Society of Hypertension** ***Scientific Newsletter: Update on Hypertension management***; 8:32

McCulloch.D.K., Nathan.D.M.,& Martin.K.A., (2009). Erectile dysfunction in diabetes Mellitus. ***UpToDate.*** (http://www.uptodate.com/patients/content/topic .do? topicKey = - dn4 I Q6Z.AILZHa).

Mezones - Holguin. E., Blumel.J.E., Hueza. M., et al.,(2008). Impact of diabetes on the sexuality of Peruvian postmenopausal. ***Gynecol Endocrinol***. 2: 8, 470- 4.

Monda.B., (2009).Sexual Dysfunction in women. http://www.eastandard.net/mag/Insidepage.php?id=1144006589&cid=300&

Mugenda.O., & Mugenda.A.,(1999). Research Methods: Quantitative and Qualitative Approaches. Acts press, Nairobi, Kenya.

Olarinoye.J., & Olarinoye.A., (2008). Determinants of Sexual Function among Women with Type 2 Diabetes in a Nigerian Population. ***Journal of sexual medicine***. 5:4, 878 - 886

Parazzini.F., Fabris.F., Bortolotti.A., et al., (2000). Frequency and Determinants of Erectile Dysfunction in Italy. ***European Urology***. 37: 1, 43-49

Perelman.M.A., (2003). Sex Coaching for physicians: Combination treatment for patient and partner. ***International journal of impotence Research (The journal of sexual medicine)***.15: 5, 67-74

Perttula.E., (1999). Physician attitudes and behavior regarding erectile dysfunction in at-risk patients from a rural community. ***Postgraduate Medical Journal***.75:83-85

Rees.P.J., & Williarns.D.G.,(1995). Principles of clinical medicine, The Bath Press Ltd, Avon, Great Britain.

Rosen.R.C., (2000). Prevalence and risk factors of sexual dysfunction in men and women. ***Current Psychiatry Reports***. 2: 3,189-195.

Rosen R., Brown C., Heiman J. et al., (2000).The Female Sexual Function Index (FSFI). A multidimensional Self Report Instrument for the assessment of Female Sexual Function. ***Journal of sex & Marital Therapy***.26: 191 - 208.

Rosen.R.., Cappelleri.J., & Giendrano III. (August 2002). The International Index of Erectile Function (IIEF): a state-of-the-science review. ***International Journal of impotence Research***. 14: 4, 226 -244. http: / ww.nature.com / ijir / journal / v / 4 / n4 / full / 3900857a.html.

Rosen R., Riley A., Wagner, G. et al., (1997). The international Index of erectile dysfunction (IIEF): A multidimensional scale for assessment of erectile dysfunction. ***Urology***. 49: 6, 822—830.

Roth. A., Kalter-Lftbovhx.O., & Kerbis.Y., (2006). Prevalence and risk factors for erectile dysfunction in men with diabetes, hypertension or both diseases: A community survey among 1,412 Israeli men. ***Clinical Cardiology***.26:1, 25-30.

Safarinejad.M., (2006). Female sexual dysfunction in a population-based study in Iran: prevalence and associated risk factors. ***International Journal of Impotence Research***. 18: 382-395.doi:10.1038/sj.ijir.3901440

Seftel.A.D., Sun.P., & Swindle.R., (2004). The prevalence of hypertension, hyperlipidemia, diabetes and depression in men with erectile dysfunction. ***Journal of Urology***.171: 6(1), 2341-2345.

Sexual dysfunction (2009). In Encyclopedia Britannica. http://www.britannica.com / EBchecked/topic/537l54/sexual - dysfunction.

Sexual dysfunction – Wikipedia, the Free encyclopedia. http: // en.wikipedia.org / wiki / Sexual_ dysfunction.

Shaeer.K.., Osegbe.D.N., Siddiqui.S., et al., (2003). Prevalence of erectile and its correlates among men attending primary care clinics in three countries: Pakistan, Egypt, and Nigeria. ***International Journal of Impotence Research***.15: 18—14.

Sietsema.W., Bruno.M., & Feller.M., (2005). From taboo to treatment? Female Sexual Dysfunction. ***Good Clinical Practice Journal***.12:1

The Sexual Function Questionnaire – j.c.u. http : //www.J.C.U.edu.au / research / excellence / JCUPRD _037285.html.

Unadike B C., Eregie A., & Ohwororiole A E., (2009).Prevalence and types of sexual dysfunction amongst female with diabetes mellitus.***Pak. J. Med Sci***. 25: 2, 257-260.

Wild. S., Roglic. G., Green .A., et al., (May 2004). "Global prevalence of diabetes: estimates for 2000 and projections for 2030". ***Diabetes Care***. 27: 5, 1047–53. doi:10.2337/diacare.27.5.1047. PMID 15111519

World Health Organisation. Department of Noncommunicable Disease Surveillance (1999). "Definition, Diagnosis and Classification of Diabetes Mellitus and its Complications" (PDF). http://whqlibdoc.who.int/hq/1999/WHO_NCD_NCS_99.2.pdf.

Zemel.P., (1988). Sexual dysfunction in the diabetic patient with hypertension. ***American Journal of Cardiology***. 61: 16, 27-33.

Zemishlany.Z., & Weizman.A., (2008). The Impact of Mental Illness on Sexual Dysfunction. Balon.R (ed): Sexual Dysfunction. The Brain Body Connection.Adv Psychosom Med. Basel, Karger. 29: 89—106.

Muniyappa.R.,et all(2005).Diabetes and female sexual dysfunction:moving beyond" benign neglect". Current Diabetes Report.5(3), 230-236.

Ziaei-Rad.M.,Valdanania.M.,Montazen.A (2010).Sexual dysfunctions in patients with diabetes: a study from Iran.Reprod Bio Endocrinal. http://www.ncbi.nlm.nih.gov/pmc/articles/pmc 2887879/.

APPENDICES

APPENDIX I

INFORMED CONSENT EXPLANATION FORM

Dear participant,

My names are Geoffrey M. Likata Ungaya, a Master of Science student in Clinical Psychology, in the Department of Psychiatry, University of Nairobi.

The consent explanation form to be read and questions answered in a language in which the patient is fluent. Your permission is being requested to participate in a study as noted below to be conducted at the diabetic outpatient clinics at Kenyatta National Hospital.

You should understand the following general principles which apply to all in medical research whether normal or patient volunteers:

(i) your agreement to enroll is entirely voluntary.

(ii) You may withdraw from the study at any time.

(iii) Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled.

(iv) After you have read or been taken through the explanation, please feel free to ask any question (s) that will allow you to understand clearly the nature of the study and only participate when you are ready

The study details include;

Title: The prevalence of sexual dysfunction among patients with diabetes mellitus attending outpatient diabetic clinic at Kenyatta National Hospital

Introduction: Diabetes is one of the chronic medical conditions that brings about sexual dysfunction as one of its complication whose psychological effects on the affected person could lead to impaired quality of life in terms of dissatisfaction with the partner, anxiety and low self esteem in life as a result of impaired sexual function / perfomance.The study therefore intends to establish the prevalence of sexual dysfunction in our set up ,thus bring to attention the need to be aware of its presence when dealing with diabetic patients for their better management.

Objectives of the study: To establish the prevalence of sexual dysfunction among patients with diabetes mellitus attending outpatient diabetic clinic at Kenyatta National Hospital.

The study will also determine the prevalence of types of sexual dysfunctions in female and male patients.

Procedure: The clinic attendance register and patients' medical files will assist to sample the patients, and on any of the given study day, any of the patients sampled will become the study participants. You will be asked to go through the consent explanation document. You will be allowed time to ask the researcher or his assistants any question that you may have. When you have understood and are willing to participate, you will be asked to sign the participant's informed consent form attached to this explanation document. Signing the informed consent form indicates that you have agreed to participate in the study, after which you will be required to fill out the questionnaires that will each take about 15 minutes to complete. No name will appear on the questionnaires. I will request for information from you concerning your health status. This will be in form of questionnaires. You have the right of asking questions where you do not understand.

Benefit: It is hoped that the outcome of the study will lead to awareness of the prevalence of sexual dysfunction in regard to this medical condition and hence enable or lead to greater understanding on how to manage the conditions. If you are found to have a sexual dysfunction you will be managed accordingly.

Risks: There are no anticipated risks in participating in this study. However, if there are any problems that may arise due to your participation, you will be assisted accordingly.

Confidentiality: Records will be kept confidential and your name will not he used in any resulting publications. Once filled the documents will be kept in a locker only accessible to the researcher.

Contact: If you have any questions regarding the study or participation in this study, you can call any of the supervisors:

Dr. Mary Wangari Kuria on Telephone No. 0722755681.

Dr. Fredrick. Owiti on Telephone No.0733610978.

You can also contact the researcher on Telephone No. 0736872248.

If you have any questions about your rights as a study participant, you should contact Professor. A. N. Guantai, the chair of the Kenyatta National Hospital Ethics Committee on Telephone No.2726300-9.

APPENDIX II

PARTICIPANT'S INFORMED CONSENT FORM

1, the undersigned do hereby volunteer to participate in the study whose nature and purpose has been explained to me fully. I do understand that all the information gathered will be used for purposes of the study only and will be handled in total confidence.

I have been given the opportunity to ask questions regarding the study and I have understood. I understand I can withdraw from the study and that I will not lose any benefits or my rights that I may have.

Participant's Name _____

Signature _____

Date_____

Researcher's Name _____

Signature _____

Date _____

APPENDIX Ill

SOCIO DEMOGRAPHIC DATA QUESTIONNAIRE

Study Number _____Op/No_____ Date:_____

Gender_____ Clinic: _____

Name _____ Date of birth_____

1. Marital status.

(i) Single (ii) Married (iii) Separated

(iv) Divorced (v) Widowed (iv) Cohabiting

2. Highest level of education

(i) Nil (ii) Primary (iii) Secondary

(iv) College (v) University

3. Occupation.

(i) Professional (ii) Business - Personnel

(iii) Technical Personnel (iv) Skilled personnel

(v) Unskilled Personnel (vi) Learner

4. Religion.

(i) Catholic (ii) Protestant (iii) Hindu

(iv) Muslim (v) African Traditional (vi) others

5. Personal medical history.

Diabetes mellitus

When were you diagnosed with diabetes mellitus? Year_____ Age_____

Are you on any treatment?

Yes ☐ No ☐

If yes, what treatment are you taking _____

_____

_____

6. Have you ever experienced any form of sexual problems?

Yes ☐ No ☐

If yes, describe the nature of sexual problem_____

_____

_____

7. When did you first experience the sexual problems? _____

8. Have you had any form of treatment for sexual problem?

Yes ☐ No ☐

If yes, what kind of treatment did you get?_____

_____

9. Have you ever experienced any problem or your life been affected in any way because of the sexual problem?

Yes ☐ No ☐

If yes, what kind of problems or in which way has your life been affected?

_____

_____

_____

10. For how long have you had these problems or your life been affected?

_____

_____

APPENDIX IV

Appendix A - Female Sexual Function Index (FSFI)

Question	Response Options
Q1: Over the past 4 weeks, how **often** did you feel sexual desire or interest?	5 = Almost always or always 4 = Most times (more than half the time) 3 = Sometimes (about half the time) 2 = A few times (less than half the time) 1 = Almost never or never
Q2: Over the past 4 weeks, how would you rate your **level** (degree) of sexual desire or Interest?	5 = Very high 4 = High 3 = Moderate 2 = Low 1 = Very low or none at all
Q3. Over the past 4 weeks, how **often** did you feel sexually aroused ("turned on") during sexual activity or intercourse?	0 = No sexual activity 5 = Almost always or always 4 = Most times (more than half the time) 3 = Sometimes (about half the time) 2 = A few times (less than half the time) 1 = Almost never or never
Q4. Over the past 4 weeks, how would you rate your **level** of sexual arousal ("turn on") during sexual activity or intercourse?	0 = No sexual activity 5 = Very high 4 = High 3 = Moderate 2 = Low 1 = Very low or none at all
Q5. Over the past 4 weeks, how **confident** were you about becoming sexually aroused during sexual activity or intercourse?	0 = No sexual activity 5 = Very high confidence 4 = High confidence 3 = Moderate confidence 2 = Low confidence 1 = Very low or no confidence
Q6. Over the past 4 weeks, how **often** have you been satisfied with your arousal (excitement) during sexual activity or intercourse?	0 = No sexual activity 5 = Almost always or always 4 = Most times (more than half the time) 3 = Sometimes (about half the time)

2 = A few times (less than half the time)
1 = Almost never or never

Q7: Over the past 4 weeks, how **often** did you become lubricated ("wet") during sexual activity or intercourse?

0 = No sexual activity
5 = Almost always or always
4 = Most times (more than half the time)
3 = Sometimes (about half the time)
2 = A few times (less than half the time)
1 = Almost never or never

Q8. Over the past 4 weeks, how **difficult** was it to become lubricated ("wet") during sexual activity or intercourse?

0 = No sexual activity
1 = Extremely difficult or impossible
2 = Very difficult
3 = Difficult
4 = Slightly difficult
5 = Not difficult

Q9: Over the past 4 weeks, how often did you **maintain** your lubrication ("wetness") until completion of sexual activity or intercourse?

0 = No sexual activity
5 = Almost always or always
4 = Most times (more than half the time)
3 = Sometimes (about half the time)
2 = A few times (less than half the time)
1 = Almost never or never

Q10: Over the past 4 weeks, how **difficult** was it to maintain your lubrication ("wetness") until completion of sexual activity or intercourse?

0 = No sexual activity
1 = Extremely difficult or impossible
2 = Very difficult
3 = Difficult
4 = Slightly difficult
5 = Not difficult

Q11. Over the past 4 weeks, when you had sexual stimulation or intercourse, how **often** did you reach orgasm (climax)?

0 = No sexual activity
5 = Almost always or always
4 = Most times (more than half the time)
3 = Sometimes (about half the time)
2 = A few times (less than half the time)
1 = Almost never or never

Q12: Over the past 4 weeks, when you had sexual stimulation or intercourse, how **difficult** was it for you to reach orgasm (climax)?

0 = No sexual activity
1 = Extremely difficult or impossible
2 = Very difficult
3 = Difficult
4 = Slightly difficult
5 = Not difficult

Q13: Over the past 4 weeks, how **satisfied** were you with your ability to reach orgasm (climax) during sexual activity or intercourse?

0 = No sexual activity

5 = Very satisfied 4
4 = moderately satisfied
3 = About equally satisfied and dissatisfied
2 = moderately dissatisfied
1 = Very dissatisfied

Q14: Over the past 4 weeks, how **satisfied** have you been with the amount of emotional closeness during sexual activity between you and your partner?

0 = No sexual activity
5 = Very satisfied
4 = Moderately satisfied
3 = About equally satisfied and dissatisfied
2 = Moderately dissatisfied
1 = Very dissatisfied

Q15: Over the past 4 weeks, how satisfied have you been with your sexual relationship with your partner?

5 = Very satisfied
4 = Moderately satisfied
3 = About equally satisfied and dissatisfied
2 = Moderately dissatisfied
1 = Very dissatisfied

Q16: Over the past 4 weeks, how **satisfied** have you been with your overall sexual life?

5 = Very satisfied
4 = Moderately satisfied
3 = About equally satisfied and dissatisfied
2 = Moderately dissatisfied
1 = Very dissatisfied

Q17: Over the past 4 weeks, how **often** did you experience discomfort or pain during vaginal penetration?

0 = Did not attempt intercourse
I = Almost always or always
2 = Most times (more than half the time)
3 = Sometimes (about half the time)
4 = A few times (less than half the time)
5 = Almost never or never

Q18: Over the past 4 weeks, how **often** did you experience discomfort or pain following vaginal penetration?

0 = Did not attempt intercourse
1 = Almost always or always
2 = Most times (more than half the time)
3 = Sometimes (about half the time)
4 = A few times (less than half the time)
5 = Almost never or never

Q19. Over the past 4 weeks, how would you rate your **level** (degree) of discomfort or pain during or following vaginal penetration?

0 = Did not attempt intercourse
1 = Very high
2 = High
3 = Moderate
4 = Low
5 = Very low or none at all

Appendix B—Scoring System

The individual domain scores and full scale score of the FSFI are derived by the computational formula outlined in the table below. Individual domain scores are obtained by adding the scores of the individual items that comprise the domain and multiplying the sum by the domain factor (see below).The full scale score is obtained by adding the six domain scores. It should be noted that within the individual domains, a domain score of zero indicates that no sexual activity was reported during the past month.

Domain	**Questions**	**Score Range**	**Factor**	**Minimum Score**	**Maximum Score**
Desire	1, 2	1–5	0.6	1.2	6.0
Arousal	3, 4, 5, 6	0–5	0.3	0	6.0
Lubrication	7, 8, 9, 10	0–5	0.3	0	6.0
Orgasm	11, 12, 13	0–5	0.4	0	6.0
Satisfaction	14, 15, 16	0 (or 1)–5	0.4	0	6.0
Pain	17, 18, 19	0–5	0.4	0	6.0
		Full Scale Score Range		2.0	36.0

A scoring algorithm was devised to assess each domain and a composite score, thus, generated. Score ranges for items 3 – 14 and 17 – 19 are 0 – 5, and for items 1, 2, 15 and 16, 1 – 5. By adding the scores of the individual items that comprise the domain and multiplying the sum by domain factor, individual domain scores were obtained. Factors were 0.6 for desire, 0.3 for arousal and lubrication, and 0.4 for orgasm, satisfaction and pain. Total score is obtained by adding the six domain scores. The full – scale score range is from 2.0 to 36.0, with higher scores associated with lesser degree of sexual dysfunction. Scores < 65% of maximum achievable score in each domain are considered as sexual dysfunction in that domain. Therefore, scores < 3.9 in all six domains are considered as sexual dysfunction. Female sexual function is further categorized as four groups: normal female sexual function (total score $\geq$ 23), mild FSD (total score 18 – 23), moderate FSD (total score 11 – 17), and severe FSD (total score $\leq$ 10) (Safarinejad, 2006).

APPENDIX V

Appendix A

International Index of Erectile Function Questionnaire (IIEF)
IIEF, International Index of **Erectile Function** Questionnaire

Investigator: _____

Date of Visit:_____

Please use an X where applicable and be sure to initial and date all corrections

Score 0 if not done Subject questionnaire Section 1

Instructions: These questions ask about the effects your **erection** problems have had on your sex life, over the past 4 weeks. Please answer the following questions as honestly and clearly as possible. In answering these questions, the following definitions apply:

Definitions:

Sexual activity includes intercourse, caressing, foreplay and masturbation

Sexual intercourse is defined as vaginal penetration of the partner (you entered the partner)

Sexual stimulation includes situations like foreplay with a partner, looking at erotic pictures, etc.

Ejaculate is defined as the ejection of semen from the penis (or the feeling of this)

Mark ONLY one circle per question:

1. Over the past 4 weeks, how often were you able to get an **erection** during sexual activity?

0 No sexual activity
0 Almost always or always
0 Most times (much more than half the time)
0 Sometimes (about half the time)
0 A few times (much less than half the time)
0 Almost never or never

2. Over the past 4 weeks, when you had **erections** with sexual stimulation, how often were your **erections** hard enough for penetration?

0 No sexual stimulation
0 Almost always or always
0 Most times (much more than half the time)
0 Sometimes (about half the time)
0 A few times (much less than half the time)
0 Almost never or never

Questions 3, 4 and 5 will ask about **erections** you may have had during sexual intercourse.

3. Over the past 4 weeks, when you attempted sexual intercourse, how often were you able to penetrate (enter) your partner?

0 Did not attempt intercourse
0 Almost always or always
0 Most times (much more than half the time)
0 Sometimes (about half the time)
0 A few times (much less than half the time)
0 Almost never or never

4. Over the past 4 weeks, during sexual intercourse, how often were you able to maintain your **erection** after you had penetrated (entered) your partner?

0 Did not attempt intercourse
0 Almost always or always
0 Most times (much more than half the time)
0 Sometimes (about half the time)
0 A few times (much less than half the time)
0 Almost never or never

5. Over the past 4 weeks, during sexual intercourse, how difficult was it to maintain your **erection** to completion of intercourse?

0 Did not attempt intercourse
0 Almost always or always
0 Most times (much more than half the time)
0 Sometimes (about half the time) 0 A few times (much less than half the time)
0 Almost never or never

6. Over the past 4 weeks, how many times have you attempted sexual intercourse?

0 No attempts
0 1-2 attempts
0 3-4 attempts
0 5-6 attempts
0 7-10 attempts
0 11 or more attempts

7. Over the past 4 weeks, when you attempted sexual intercourse how often was it satisfactory for you?

0 Did not attempt intercourse
0 Almost always or always
0 Most times (much more than half the time)
0 Sometimes (about half the time)
0 A few times (much less than half the time)
0 Almost never or never

8. Over the past 4 weeks, how much have you enjoyed sexual intercourse?

0 No intercourse
0 Very highly enjoyable
0 Highly enjoyable
0 Fairly enjoyable
0 Not very enjoyable
0 Not enjoyable

9. Over the past 4 weeks, when you had sexual stimulation or intercourse how often did you ejaculate?

0 Did not attempt intercourse
0 Almost always or always
0 Most times (more than half the time)
0 Sometimes (about half the time)
0 A few times (much less than half the time)
0 Almost never or never

10. Over the past 4 weeks, when you had sexual stimulation or intercourse how often did you have the feeling of orgasm or climax (with or without ejaculation)?

0 No sexual stimulation or intercourse
0 Almost always or always
0 Most times (much more than half the time)
0 Sometimes (about half the time)
0 A few times (much less than half the time)
0 Almost never or never

Questions 11 and 12 ask about sexual desire. Let's define sexual desire as a feeling that may include wanting to have a sexual experience (for example, masturbation or intercourse), thinking about having sex or feeling frustrated due to a lack of sex.

11. Over the past 4 weeks, how often have you felt sexual desire?

0 Almost always or always

0 Most times (much more than half the time)
0 Sometimes (about half the time)
0 A few times (much less than half the time)
0 Almost never or never

12. Over the past 4 weeks, how would you rate your level of sexual desire?

0 Very high
0 High
0 Moderate
0 Low
0 Very low or none at all

13. Over the past 4 weeks, how satisfied have you been with you overall sex life?

0 Very satisfied
0 Moderately satisfied
0 About equally satisfied and dissatisfied
0 Moderately dissatisfied
0 Very dissatisfied

14. Over the past 4 weeks, how satisfied have you been with your sexual relationship with your partner?

0 Very satisfied
0 Moderately satisfied
0 About equally satisfied and dissatisfied
0 Moderately dissatisfied
0 Very dissatisfied

15. Over the past 4 weeks, how do you rate your confidence that you can get and keep your **erection**?

0 Very high
0 High
0 Moderate
0 Low
0 Very low

Appendix B

Scoring Algorithm for IIEF

All items are scored in 5 domains as follows:

Domain	Items	Range	Score Max Score
Erectile Function	1, 2, 3, 4, 5, 15	0-5	30
Orgasmic Function	9, 10	0-5	10
Sexual Desire	11, 12	0-5	10
Intercourse Satisfaction	6, 7, 8	0-5	15
Overall Satisfaction	13, 14	0-5	10

Clinical Interpretation

I. Erectile function total scores can be interpreted as follows:

Score	Interpretation
0-6	Severe dysfunction
7-12	Moderate dysfunction
13-18	Mild to moderate dysfunction
19-24	Mild dysfunction
25-30	No dysfunction

II. Orgasmic function total scores can be interpreted as follows:

Score	Interpretation
0-2	Severe dysfunction
3-4	Moderate

	dysfunction
5-6	Mild to moderate dysfunction
7-8	Mild dysfunction
9-10	No dysfunction

III. Sexual desire total scores can be interpreted as follows:

Score	**Interpretation**
0-2	Severe dysfunction
3-4	Moderate dysfunction
5-6	Mild to moderate dysfunction
7-8	Mild dysfunction
9-10	No dysfunction

IV. Intercourse satisfaction total scores can be interpreted as follows:

Score	**Interpretation**
0-3	Severe dysfunction
4-6	Moderate dysfunction
7-9	Mild to moderate dysfunction

10-12	Mild dysfunction
13-15	No dysfunction

V. Overall satisfaction total scores can be interpreted as follows:

Score	**Interpretation**
0-2	Severe dysfunction
3-4	Moderate dysfunction
5-6	Mild to moderate dysfunction
7-8	Mild dysfunction
9-10	No dysfunction

APPENDIX VI

BUDGET

PROPOSAL WRITING	10,000
Typing / Typesetting	5000
Printing and photocopying	15,000
DATA COLLECTION	
Assistants	30,000
Data entry	40,000
DATA ANALYSIS	35,000
FINAL THESIS	20,000
TOTAL	155,000

APPENDIX VII

TIMELINE- SCHEDULE OF ACTIVITIES

	March-June,2009 Revised: June-November 2009	July-September,2009 Revised: April-June 2010 Revised: May-October 2010	October, 2009 Revised: July,2010 Revised: November2010-May 2011	November - December,2009 Revised: August 2010 Revised: June 2011
Proposal writing and presentation				
Data collection				
Data Analysis				
Report presentation				