# ERECTILE FUNCTION AND ASSOCIATED FACTORS AMONG KIDNEY TRANSPLANT RECIPIENT MEN BEFORE AND AFTER TRANSPLANTATION AT MUHIMBILI NATIONAL HOSPITAL: A CROSS-SECTIONAL STUDY

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**Department of Surgery**

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**By**

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**A Dissertation Submitted In (Partial) Fulfillment of the Requirements for the Degree of Master of Medicine (Urology) of**

**Muhimbili University of Health and Allied Sciences**

**October, 2024**

## CERTIFICATION

The undersigned certifies they have read and hereby recommend for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled: **"Erectile function and associated factors among kidney transplant recipient men before and after transplantation at Muhimbili National Hospital: a cross-sectional study",** in (partial) fulfillment of the requirements for the Master of Medicine (Urology) of the Muhimbili University of Health and Allied Sciences.

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Date: _____

## DECLARATION AND COPYRIGHT

I, **Denis Daudi Kanyika** declare that, this **dissertation** is my original work and that it has not been presented and will not be presented to any other University for a similar or any other degree award.

**Signature**……..... **Date**……

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## DEDICATION

This dissertation work is dedicated to the following:

My parents, the Late father **Daudi Menas Kanyika**, and the Late Mother **Dr. Hellen Daudi Kanyika** for their unconditional devotion, guidance, and support in my academic journey during their lifetime. **“May your soul rest in peace”**

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## ABSTRACT

**Background**: The impact of kidney transplants specifically on improving erectile function is still a controversial research outcome globally.

**Objective**: This study aims to assess the erectile function and associated factors among male kidney transplant recipients (KTRs) before and after transplantation at Muhimbili National Hospital (MNH), Dar es Salaam, Tanzania.

**Methodology**: A hospital-based cross-sectional study was conducted on kidney transplant recipient men at MNH from January 2024 to May 2024. The IIEF-5 tool was used to assess erectile function before and after transplantation. The study utilized bivariate and multivariate ordinal logistic regression analysis employing a generalized estimating equation technique for repeated measures to explore associated factors

**Results:** A total of 67 adult male kidney transplant recipients (KTRs) with a mean age of 46.9 years, and an age range from 30 years to 72 years were available for analysis. Prevalence of erectile dysfunction (ED) before and after transplantation was 88.1% and 97% respectively. The overall severity status of erectile dysfunction among KTRs revealed that after kidney transplantation 14% had improved severity of ED, 46% had unchanged severity of ED and 40% had a worsened ED. Depression (aOR=0.4, 95% CI=0.12-0.82, p-value =0.012) and iterative transplantation (aOR=5.07, 95% CI=1.87-13.73, p-value 0.001) were independently found to have significant association with erectile dysfunction and its severity.

**Conclusion**: The prevalence of ED among KTRs is high before and even higher after kidney transplantation. Depression and iterative transplantation were independently found to have significant association with erectile dysfunction and its severity.

***Keywords:*** *Prevalence, severity, associated factors, Erectile dysfunction, Kidney transplant, Tanzania, Sub-Saharan Africa*

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## LIST OF ABBREVIATIONS

| | |
|---|---|
| BMI | Body mass index |
| BPH | Benign prostatic hyperplasia |
| CKD | Chronic kidney disease |
| CNI | Calcineurin inhibitor |
| CsA | Cyclosporine A |
| DM | Diabetes mellitus |
| ED | Erectile dysfunction |
| EF | Erectile function |
| eNOS | Endothelial nitric oxide synthase |
| ESRD | End stage renal disease |
| FSH | Follicle stimulating hormone |
| HTN | Hypertension |
| HPG-axis | Hypothalamic pituitary gonadal |
| IIEF-5 | International index of erectile function-5 |
| IRB | Institutional review board |
| KTRs | Kidney transplant recipients |
| LiSWT | Low intensity shockwave therapy |
| LH | Luteinizing hormone |

| | |
|---|---|
| MNH | Muhimbili National Hospital |
| mTOR | mammalian target of rapamycin |
| MUHAS | Muhimbili university of health and allied science |
| NO | Nitic oxide |
| NOS | nitric oxide synthase |
| nNOS | Neuronal nitric oxide synthase |
| PDE5i | Phosphodiesterase 5 inhibitor |
| PGE | Prostaglandin E |

## DEFINITION OF TERMS

**Erectile function (EF),** refers to a normal or abnormal erection which can be assessed through the International Index of Erectile Function scores.

**Erectile dysfunction (ED)** refers to the inability to achieve or maintain an erection sufficient for satisfactory sexual performance. This definition was proposed by the National Institute of Health (NIH) Consensus Development Conference.

**Sexual dysfunction** refers to persistent physical and psychological problems that prevent someone from engaging in sexual activities. It can affect any phase of the sexual function cycle, from arousal to orgasm.

**Sexual function** refers to the ability of an individual to react sexually or to experience pleasure sexually.

**Human sexual response cycle** is a four-stage model of physiological response to sexual stimulation. In order of their occurrence the four stages are the excitement, plateau, orgasmic and resolution phase (stages of male sexual function)

**Individual with graft loss** refers to kidney transplant recipients with kidney transplant rejection and return back to dialysis.

# CHAPTER ONE

## 1.0 INTRODUCTION

### 1.1 Background

Kidney transplantation has been widely recognized as the most effective treatment for ESRD. The Survival benefits and quality of life are significantly improved after successful kidney transplantation with renal allograft function(1). Despite the proven benefits of kidney transplantation in ESRD patients, its impact in improving erectile function is still of controversial research outcome globally(2).

Erectile dysfunction (ED), is the inability to achieve or maintain an erection sufficient for satisfactory sexual performance (3). This is a common condition and a significant concern for males with chronic kidney disease (CKD) and those who have undergone a kidney transplant. Kidney transplant recipients (KTRs) often suffer from erectile dysfunction. This condition typically begins during the early phase of chronic kidney disease (CKD) and worsens as renal function deteriorates (2).

Several factors can cause erectile dysfunction (ED) in individuals who have undergone kidney transplantation. These include long-term effect of uremia, The presence of comorbidities like HTN and DM, ongoing abnormalities in sex hormones (such as decreased testosterone and increased levels of LH, FSH, and prolactin), changes in the arteries of the penis due to the anastomosis between the iliac and graft renal arteries, the use of immunosuppressive drugs, and a high prevalence of anxiety and depression (4).

Most male KTRs have problems with their sexual health because of erectile dysfunction (ED) which contribute to several marital conflicts and ongoing psycho-social disturbances, and ultimately affect their overall quality of life (5)

Diagnosing this condition is challenging. It is often underestimated and overlooked as many individuals feel stigmatized for disclosing their reduced erectile function. Additionally, the absence of clinically validated tools for assessing erectile function in these patients poses another challenge in diagnosing this condition during routine clinical consultations (6)

It is essential to evaluate kidney transplant recipients' (KTRs) erectile function to understand the magnitude, severity of the problem and identify potential associated variables affecting erectile function. This could assist clinicians in stratifying individuals who experienced erectile dysfunction and enable prompt implementation of appropriate treatment modalities such as phosphodiesterase 5-inhibitors (PDE5 inhibitor), hormone replacement therapy, psychosexual therapy, transurethral or intracavernosal therapy, vacuum constriction devices, low-intensity shockwave therapy (LiSWT) and penile prosthesis, depending on the underlying cause(s) (7)

These treatment options have the potential to significantly improve their sexual well-being and overall quality of life (4). This research also provided clinicians with a reliable and validated tool (IIEF-5) to assess and diagnose erectile dysfunction in kidney transplant recipients (KTRs) in addition to conventional laboratory parameters and sexual health history.

This manuscript aimed to provide findings of erectile function assessment before and after transplant as well as identify associated factors of erectile function among KTRs attending renal transplant clinic at Muhimbili National Hospital, Dar es salaam, Tanzania

## 1.2 Problem statement

Erectile dysfunction (ED) is a prevalent and relevant issue in men with chronic kidney disease (CKD) and those who have undergone a kidney transplant. The cause of this condition is complex and can be attributed to a combination of organic, non-organic, and mixed disorders. It has caused several marital conflicts and ongoing psychological and social disturbances.

Despite erectile dysfunction being common among kidney transplant recipients (KTRs) it is frequently underdiagnosed due to patient's stigma to disclose their impaired sexual function as well as the lack of a validated tool to assess their erectile function in clinical settings. This led to the unknown magnitude and severity of the problem among kidney transplant recipients (KTRs). Moreover, unidentified associated factors affect erectile function.

No study has been conducted in Tanzania trying to assess erectile function and associated factors among kidney transplant recipient men.

Therefore, it is crucial to assess the erectile function of kidney transplant recipients (KTRs) to understand the magnitude, and severity of the problem, identify factors that may affect erectile function, and hence the provision of a reliable validated tool to assess erectile function. This will facilitate diagnosis and help in determining the most suitable treatment options for individuals experiencing erectile dysfunction (ED), thereby improving their sexual health and overall quality of life.

## 1.3 Rationale

ED is a devastating condition associated with stigma and is often underdiagnosed in KTRs. To allow early implementation of appropriate interventions in kidney transplant recipients, it is important to identify the magnitude, severity, and factors associated with the worsening or improvement of this condition. A reliable diagnostic tool (IIEF-5) is important in properly identifying individuals with erectile dysfunction (ED) among these patients. Following successful kidney transplantation efforts to improve the sexual health of these patients desired to warrant benefits to the overall improvement of quality of life for the affected transplant recipients

## 1.4. Research questions

### 1.4.1 Overall research question.

How does the erectile function among male kidney transplant recipients (KTRs) behave before and at least 6 months after transplantation and what are their associated factors of erectile function at Muhimbili National Hospital (MNH)

### 1.4.2 Specific Research Questions

1. What is the prevalence of erectile dysfunction among male kidney transplant recipients before transplantation and at least 6 months after transplantation at Muhimbili National Hospital?
2. What is the severity of erectile dysfunction among male kidney transplant recipients before transplantation and at least 6 months after transplantation at Muhimbili National Hospital?
3. What are the associated factors of erectile function among male kidney transplant recipients before transplantation and at least 6 months after transplantation at Muhimbili National Hospital?

## 1.5. Research Objectives

### 1.5.1 Broad objective

To assess the erectile function and associated factors among male kidney transplant recipients (KTRs) before transplantation and at least 6 months after transplantation at Muhimbili National Hospital (MNH).

### 1.5.2 Specific objectives

1. To determine the prevalence of erectile dysfunction among male kidney transplant recipients before and at least 6 months after transplantation at Muhimbili National Hospital (MNH)
2. To determine the severity of erectile dysfunction among male kidney transplant recipients before and at least 6 months after transplantation at Muhimbili National Hospital (MNH)
3. To determine the associated factors of erectile function among male kidney transplant recipients before and at least 6 months after transplantation at Muhimbili National Hospital (MNH).

# CHAPTER TWO

## 2.0 LITERATURE REVIEW

This chapter provided a comprehensive overview of the existing literature on the erectile function of kidney transplant recipients (KTRs) both pre- and post-transplantation. The review includes studies conducted by researchers, authors, analysts, and academics from across the world. The purpose of this review is to identify gaps in the understanding of erectile dysfunction among kidney transplant recipients (KTRs) by investigating its prevalence, severity, and associated factors before and after transplantation. The aim is to justify the conduction of this study.

### 2.1 Prevalence of erectile dysfunction (ED) among kidney transplant recipients (KTRs) before and after transplantation.

The prevalence of erectile dysfunction (ED) in individuals with chronic kidney disease (CKD) was found to be 75%, but it fell to 59% in kidney transplantation recipients (KTRs). These findings indicate that improving the glomerular filtration rate (GFR) following transplantation could potentially enhance erectile function. However, the extent to which this reduces the severity and prevalence of erectile dysfunction (ED) may vary depending on the primary cause. The elevated prevalence of erectile dysfunction (ED) in kidney transplant recipients (KTRs) can be attributed to several factors, including chronic uremia, persistent imbalances in sex hormones (reduced testosterone and elevated levels of LH, FSH, and prolactin), alterations in the arteries of the penis due to ileorenal artery anastomosis, the use of immunosuppressive medications, and an increased incidence of anxiety and depression (17).

Several studies have been conducted globally to explore the prevalence of erectile dysfunction (ED) among individuals who have undergone kidney transplantation. Mekki O.M (2013) found a prevalence of 67.5% of erectile dysfunction (ED) among male renal transplant recipients in his study (18). Tian Y. and his colleague (2008) discovered a prevalence of 75.5% of erectile dysfunction (ED) among renal transplant recipients in their research. Shamsa A. (2006) discovered a prevalence of 46.66% of erectile dysfunction (ED)among renal transplant recipients (19). Russo D. (2004) found a prevalence of 53% of erectile dysfunction (ED) among male renal

transplant recipients (20). Espinoza R. (2006) found a prevalence of 48.9% of erectile dysfunction (ED) among renal transplant recipients(20). Malavaud B (2000) found the prevalence of 55.7% of erectile dysfunction (ED) among renal transplant recipients (21).

### 2.2 Severity of erectile dysfunction (ED) among kidney transplant recipients (KTRs) before and after transplantation.

The severity of erectile dysfunction (ED) can be assessed using a validated international index for erectile function (IIEF-5). The severity of erectile dysfunction (ED) can be determined based on a scoring system. The actual score for erectile dysfunction (ED) ranges from 5 to 25. A score of 5-10 corresponds to severe erectile dysfunction (ED), 11-15 corresponds to moderate erectile dysfunction (ED), 16-20 corresponds to mild erectile dysfunction (ED), and 21-25 corresponds to no erectile dysfunction (ED) (22).

Extensive global studies have been conducted to assess the severity of erectile dysfunction in kidney transplant recipients (KTRs), with diverse research findings. Jurgensen (2008) discovered Out of all the patients, only 21% did not experience erectile dysfunction (ED). Among the remaining patients, 18% had mild erectile dysfunction (ED), 31% had mild to moderate erectile dysfunction (ED), 21% had moderate erectile dysfunction (ED), and 9% had severe erectile dysfunction (ED), as determined by the International Index of Erectile Function-5 (IIEF-5) scores. 41% of patients noticed a subjective improvement in erectile dysfunction (ED) following the transplant, whereas 7% reported a reduction in sexual function compared to their pretransplant state. The remaining 51% did not observe any change (23).

In a study conducted by El-Bahnasawy (2004), it was discovered that erectile dysfunction (ED) was present in 35.8% of the entire group. Among the kidney transplant recipients (KTRs) studied, 44% noted an improvement in their current erectile function compared to their pretransplant state, while 12.5% experienced a deterioration, and 43.5% had no change (11).

Tian X (2007) discovered that there was no statistically significant difference in the occurrence of erectile dysfunction (ED) before and following renal transplantation, with rates of 53.8% and 44.3% respectively(24) . According to the International Index of Erectile Function (IIEF-5) score, 43.9% of kidney transplant recipients (KTRs) had an improvement in their erectile function, while it remained unchanged for 42.9% and worsened for 13.2% compared to their state before the transplantation. These results were obtained from the analysis of 84.8% of the individuals who underwent kidney transplants(24). Miron A (2023) discovered that 33.5% of subjects exhibited mild erectile dysfunction (ED), 20.6% had moderate erectile dysfunction (ED), and 10.6% had severe erectile dysfunction (ED) (25).

In addition, 30% of cases reported experiencing normal sexual function. In a study conducted by Espinoza R (2006), it was discovered that 18.1% of the participants had no sexual activity, 32.9% had normal sexual function, and 48.9% experienced erectile dysfunction (ED) based on the results of an International Index of Erectile Function-5 (IIEF-5) test, which indicated a mean score of 13.3. Categorization of erectile dysfunction (ED) severity was 32.5% of the patients experienced mild erectile dysfunction (ED), 50.5% experienced moderate erectile dysfunction (ED), and 16.8% experienced severe erectile dysfunction (ED) (26).

### 2.3 Factors Influencing erectile dysfunction (ED) in kidney transplant recipients (KTRs).

In kidney transplant recipients (KTRs), Erectile dysfunction (ED) has a complex origin, since it can be caused by a combination of organic, psychological, or combined abnormalities. Predisposing variables commonly encompass diseases or comorbidities associated with chronic kidney disease (CKD), which may not always be resolved with transplantation. The efficacy of kidney transplantation on erectile function remains a subject of debate, while some researchers have documented a decreasing incidence of erectile dysfunction (ED) in kidney transplant recipients (KTRs), others have highlighted a continued presence or new occurrence of erectile dysfunction (ED) (2).

Below are the influencing factors of erectile dysfunction (ED) in kidney transplant recipients (KTRs) according to literature review:

### 2.3.1 Chronic kidney disease (CKD) and erectile dysfunction (ED)

Individuals suffering from chronic kidney disease (CKD) may experience a range of molecular and structural abnormalities that can potentially harm the cavernous tissue and distal penile arteries. It is frequently observed that uremic patients exhibit persistent anatomical abnormalities in the penis (15).

These abnormalities primarily involve changes in the smooth muscle cells, characterized by a decrease in dense bodies in the cytoplasm, thickening of the basement membrane, interstitial fibrosis leading to reduced cell-to-cell contacts, thickening and layering of basement membranes of endothelial cells, and increased accumulation of collagen between nerve fibers (15).

Patients with chronic kidney disease (CKD), comorbidities, and undergoing hemodialysis have progressive and permanent systemic organic damage. This condition often does not improve with transplantation and can have a severe effect on the sexual function of kidney transplant recipients (KTRs) (27).

### 2.3.2 Hormonal disturbances and erectile dysfunction (ED)

Malfunctions of the hypothalamic-pituitary-gonadal (HPG) axis are vital in the development of erectile dysfunction (ED). Specifically, a lack of testosterone can have adverse effects on the structure, function, and blood flow of the penis, resulting in erectile dysfunction (ED). Furthermore, hormonal disturbances such as primary or secondary hypogonadism, hyperprolactinemia, and secondary hyperparathyroidism may either improve or continue to exist following transplantation causing various degrees of impairment of erectile function

Testosterone has a crucial role in the initiation of erectile function. Sirolimus is linked to reduced levels of total testosterone in male renal transplant recipients (28).

### 2.3.3 Metabolic syndrome/DM and erectile dysfunction (ED)

Metabolic syndrome and diabetes mellitus (DM) are frequently linked to decreased testosterone levels. Additionally, they can induce erectile dysfunction (ED) by causing damage to the endothelium and creating a complex prothrombotic condition, which ultimately leads to arteriopathy and neuropathy (2).

### 2.3.4 Anemia and erectile dysfunction (ED)

Anemia also contributes to penile morphological and functional impairments. The hemoglobin level was a significant determinant of erectile dysfunction in renal transplant recipients. Anemic individuals had a twofold increased likelihood of experiencing erectile dysfunction compared to nonanemic individuals. Anemia exacerbates the overall state and intensifies asthenia in those people. Concurrently, the lack of oxygen caused by anemia can reduce the functioning of NOs and promote the production of collagen, which ultimately hinders the relaxing of smooth muscle cells in the corpus cavernosum (2).

### 2.3.5 Age and erectile dysfunction (ED)

Age is a significant risk factor in the overall population, and it is also one of the most influential factors linked to erectile dysfunction (ED) among individuals who have received kidney transplants. Age in particular is a significant risk factor for both pre- and post-transplantation erectile dysfunction (ED) and it has a direct correlation with the severity of erectile dysfunction (2).

### 2.3.6 Education and erectile dysfunction (ED)

The fact that education has a negative link with erectile dysfunction (ED) may be because individuals with low levels of education pay less attention to sexuality, quality of life, and healthcare (27).

### 2.3.7 Voluptuous habits and erectile dysfunction (ED)

Uncertainty persists over the function of voluptuous habits, like as smoking and drinking. Smoking is known to have a negative impact on erectile function, however, several research have found no correlation between smoking and erectile dysfunction (ED) in kidney transplant recipients (KTRs). Feldman (1994) discovered

a slightly higher occurrence of erectile dysfunction (ED) in those who consume alcohol(29), however Akkus et al demonstrated a substantial correlation between alcohol consumption and a reduced prevalence of ED (30).

### 2.3.8 Duration of hemodialysis before kidney transplantation and erectile dysfunction (ED)

Another factor that plays a role in determining erectile function in kidney transplant recipients is the duration of hemodialysis prior to kidney transplantation. in kidney transplant recipients (KTRs) who were dialyzed for a period of six months exhibited an improvement in their erectile dysfunction (ED), however those who were dialyzed for a period of six to twenty-four months did not show any improvement in their erectile dysfunction (ED). It is possible that this is related to the effect that early transplantation has on preventing or rectifying penile morphological/functional abnormalities, as well as hemodynamic abnormalities, and hormonal dysfunctions (31).

### 2.3.9 Medications and erectile dysfunction (ED)

In KTRs, the onset of erectile dysfunction (ED) is associated with the use of medications such as immunosuppressants and antihypertensive drugs. In particular, calcineurin inhibitors (CNIs), which include cyclosporine, tacrolimus, mTOR inhibitors, as well as corticosteroids, may impact on the endothelial function and/or the testicular function/structure. Furthermore, the literature research recorded the consumption of medicines, including antiandrogens, antipsychotics, antidepressants, and recreational or addictive drugs, which have the potential to impair erectile function (32).

CsA can prevent the relaxation of smooth muscle cells in the corpus cavernosum that is induced by nitric oxide. CsA suppressed endothelial nitric-oxide synthase activation by modifying cholesterol levels in caveolae. In addition, CsA was discovered to enhance collagen synthesis in endothelial cells and stimulate the increased expression of transforming growth factor β1 (TGFβ1), which could potentially lead to fibrosis of the corpora cavernosa. Research has also discovered an increased occurrence of erectile dysfunction (ED) in individuals who have

undergone kidney transplants and are on immunosuppressive regimens that include CsA (31).

Tacrolimus therapy was linked to regular erectile function, according to the research by Rebollo et al. It is superior to cyclosporin in improving graft survival and preventing acute rejection after kidney transplantation, but increases post-transplant diabetes, neurological and gastrointestinal side effects (31).

### 2.3.10 Type of arterial anastomosis during transplantation and erectile dysfunction (ED)

During transplantation, surgical procedures that include interrupting the distal ends of the iliac artery might occasionally result in insufficient blood flow to the penis, which can contribute to erectile dysfunction (ED) The type of arterial anastomosis has varying effects on the prevalence of erectile dysfunction (ED) in kidney transplant recipients (KTRs) due to its influence on the hemodynamics of the cavernosal artery (33).

Studies indicate that kidney transplant recipients who undergo revascularization through end-to-end anastomosis to the internal iliac artery experience a higher incidence of erectile dysfunction (ED) compared to those who undergo end-to-side anastomosis to the external iliac artery. This suggests that the unilateral ligation of the internal iliac artery has a detrimental effect on erectile function after kidney transplantation. When the kidney graft is connected end-to-end to the internal iliac artery, the blood flow from the internal pudendal artery is redirected (34).

Nevertheless, the occurrence of erectile dysfunction (ED) remains elevated even in kidney transplant recipients (KTRs) who have undergone revascularization through anastomosis at the external iliac artery, resulting in a slight decrease in blood supply to the penis. Additionally, the combination of penile hypo afflux and erectile dysfunction (ED) might be exacerbated or triggered by iterative transplantation procedures, particularly when the internal iliac artery is utilized for end-to-side anastomosis (35).

### 2.3.11 Psychological influence and erectile dysfunction (ED)

Erectile functioning is typically influenced by psychological issues such as self-esteem, distorted body image perception, excessive worrying, anxiety, and depression, all of which are commonly associated with kidney disease and transplantation. Many symptoms in kidney transplant recipients (KTRs) may arise from both physical and psychological conditions that continue to exist after the surgery for a kidney transplant (27).

### 2.3.12 Other factors

Various factors may influence the onset of erectile dysfunction (ED) following transplantation, including vascular complications, techniques used during the transplant, iterative transplantation, interpersonal issues, and changes in body image perception. Additional variables encompass Erectile dysfunction (ED) in kidney transplant recipients (KTRs) can be influenced by various factors such as reduced diastolic blood pressure, peripheral arteriopathy, autonomic nervous system disruptions, peripheral neuropathy, cardiovascular issues, endothelial dysfunctions, pelvic or perineal trauma, spinal cord injury, rectal surgery, and genitourinary or pelvic radiotherapy (27).

El-Bahnasawy (2004) discovered that age, hemoglobin level, diabetes mellitus, and/or peripheral neuropathy have a distinct and separate influence on erectile function (27). According to Wang X (2009), the main risk factors for erectile function include age, length of hemodialysis, type of anastomosis, and CsA-based immunosuppressive medication (36). Tian Y (2008) identified age, education level, interruption of the internal iliac artery, concerns about transplanted kidney function, and the use of a CsA-based immunosuppressive regimen as the primary factors influencing erectile dysfunction (ED) in renal transplant recipients(18).

In a study conducted by Mekki (2013), it was discovered that age and diabetes mellitus (DM) were factors that were connected with erectile function in individuals who had undergone kidney transplant surgery (27). Tian x (2007) identified age, diabetes mellitus and/or peripheral neuropathy, hemoglobin level, and iterative transplantation as the primary factors influencing erectile functionality

(24). In a study conducted by Miron in 2023, it was discovered that both age and the use of antihypertensive medications, specifically beta blockers and 75mg aspirin, are linked to the instance of erectile dysfunction (ED) (37). Sadasukhi (2021) identified advanced age, prolonged dialysis, diabetes mellitus (DM), and smoking as significant risk factors for erectile dysfunction (ED) (7).

# CHAPTER THREE

## 3.0 METHODOLOGY

### 3.1 Study area description

This study was conducted at Muhimbili National Hospital (MNH)- renal transplant clinic. The clinic is under the nephrology unit in the Department of Internal Medicine. MNH is a tertiary hospital in the country and serves as a teaching hospital for Muhimbili University of Health and Allied Sciences (MUHAS) students. It is located on Upanga Street, within the Ilala District neighborhood of Dar es Salaam. The hospital provides specialized medical care to patients nationwide, including those from Zanzibar. This hospital is a tertiary national referral center with approximately 1,500 beds. The facility can accommodate 1,000–1,200 inpatients weekly and serves around 1,500 outpatients daily.

MNH is a hospital in Tanzania that evaluates potential kidney donors and provides medical care to both kidney donors and recipients of renal transplants. This includes individuals who have undergone surgery within the country and those from other countries, mainly from India, since the renal transplant clinic was founded in 2009. The clinic is open every day for emergencies. The post-transplant clinic operates twice a week on Mondays and Fridays, attending around 25 patients each day. Patients' follow-up schedule is individualized. During the first year after a transplant, patients are initially seen weekly, then at least monthly, with the frequency of visits decreasing as time post-transplant progresses. Patients should get an annual checkup regardless of their stability.

During each visit, patients undergo renal function testing through the assessment of serum creatinine and urea levels. Hematological monitoring is also conducted, including a full blood count to detect signs of infections. Additionally, urinalysis is performed to check for protein in the urine and signs of infections. They also monitor blood pressure, blood glucose levels, and body weight because elevations in these factors might impact the kidney’s function.

### 3.2 Study design

This was a hospital-based cross-sectional study designed to assess erectile function and associated factors among kidney transplant recipient men before and at least 6 months after transplantation at MNH renal transplant clinic conducted from February 2024 to May 2024. We have selected this design because the majority of the study participants (88.1%) had the outcome at the baseline of the study.

### 3.3 Study population

#### 3.3.1 Target population

Men with ESRD who underwent renal transplantation.

#### 3.3.2 Accessible population

Men with ESRD who underwent renal transplantation and attended clinic at Muhimbili National Hospital-renal transplant clinic.

#### 3.3.3 Study sample

All adult kidney transplant recipient men with inclusion criteria who attended the renal transplant clinic at MNH and who consented to participate in the study. This involved a total of 67 male kidney transplant recipients (KTRs) who were assessed for erectile function and associated factors before kidney transplant and at least 6 months after kidney transplant from February 2024 to May 2024.

### 3.4 Sample size calculation

The sample size was calculated from the Manik formula for a finite population as below.

$$SampleSize = \frac{\frac{z^2 \cdot p(1-p)}{e^2}}{1 + \frac{z^2 \cdot p(1-p)}{e^2 N}}$$

n= sample size

N=population size =80

Z= z statistics that correspond to the confidence interval that you use, which is 95%. Therefore

z=1.96 ($Z^2$=$1.96^2$)

P=proportion or previous prevalence of erectile dysfunction set in decimals.

**P=59% / 0.59 (Perri et al (2020)** (2)

d= precision, which is 5% (i.e., 0.05)

The 5% precision is used if prevalence is not very small, that is, it is not less than 10%. When

It is less than 10%, d= 1/5 of that prevalence.

$$n=-\frac{\frac{1.96^2 \text{ x}0.59(1-0.59)}{0.05^2}}{1 \ +\frac{1.96^2 \text{ x}0.59(1-0.59)}{0.05^2 \text{ x}80}} \quad =\frac{371.72}{5.65}$$

n =66

Therefore, by examining a group of 66 kidney transplant recipient men at Muhimbili National Hospital (MNH), we will be able to assess the erectile function and associated factors among kidney transplant recipients (KTRs). This evaluation will be conducted with a precision of 59%, a statistical power of 80%, a type one error rate of less than 5%, and a type two error rate of at least 2%. This power will be enhanced when we successfully recruit all 80 patients who underwent kidney transplants.

### 3.5 Inclusion Criteria and Exclusion Criteria

#### 3.5.1 Inclusion criteria

All male patients who underwent kidney transplants for at least 6 months with functioning grafts and who had active sexual lives in the past 6 months, attended the renal transplant clinic at Muhimbili National Hospital (MNH) during a study period between February 2024 and May 2024,

### 3.5. 2 Exclusion Criteria

Kidney transplant recipients experienced graft loss, lost follow-up kidney transplant recipients (KTRs), and those who did not give consent to participate in the study.

### 3.6 Sampling technique

This study employed a prospective consecutive sampling technique of renal transplant recipient adult men with inclusion criteria who attended the renal transplant clinic at Muhimbili National Hospital and who consented to be enrolled in the study between February 2024 and May 2024.

### 3.7 Data collection tool

This study employed a structured questionnaire (appendix 1) to address the research questions. This questionnaire was reviewed by consultants in the fields of urology, nephrology, and epidemiology to ensure that it gathered sufficient information that answered the specific objectives of this study. The questionnaire was available in English and Swahili versions and During translation from English to Swahili The original meaning was preserved ensuring that the two languages' linguistic versions were identical.

The questionnaire encompassed socio-demographic information, clinical characteristics, psychosocial factors, and the validated International Index of Erectile Function-5 (IIEF-5). The IIEF-5 index was employed in our study to evaluate the erectile function of kidney transplant recipients (KTRs) before and after transplantation. The sections of the investigation tool are described below.

**First Section**: Social Demographic information of participants. The demographic checklist includes questions that record participant’s age, marital status, education level, and social economic status questions. Information in this section provided data for answering objective number three of the study.

**Second Section**: Information on risk factors including history of hypertension, diabetes, hyperlipidemia, cigarette, alcohol consumption, immunosuppressive drugs (cyclosporine (CsA) or rapamune (sirolimus), Betablocker use, allograft duration, hemoglobin, pretransplant hemodialysis, and hemodialysis duration.

The questions focused on the identification of factors associated with erectile function. This section aimed to answer objective number three of the study.

**Third Section**: Psychosocial factors. We employed patient health questionnaire-9 (PHQ-9) to assess the impact of depression on erectile function. This section aimed to answer objective number three of the study.

**Fourth section**: Kidney transplant surgical details and profile of immunosuppressive agents after transplantation. This section involved reviewing post-operative details as well as reviewing follow-up medications. Information about kidney transplant surgical details was obtained from post post-operative discharge summary from the renal transplant archive and a profile of immunosuppressive agents after transplantation was obtained from the patient himself and counterchecked in the renal transplant clinic book. This section aimed to answer objective number three of the study. (This section is absent in pre-transplant details)

**Fifth Section:** Erectile function assessment, we employ the IIEF-5 tool to assess the erectile function of the participant with inclusion criteria before and after transplantation. In the International Index of Erectile-5 (IIEF-5), the score can range from 5-25. Severity categorization of Erectile dysfunction (ED): Score 5-10 severe Erectile dysfunction (ED); Score 11-15 moderate Erectile dysfunction (ED), Score 16-20 mild Erectile dysfunction (ED); Score 21-25 no Erectile dysfunction (ED). This section aimed to answer objectives number one and two of the study.

**Sixth section**: contained measurement of biometric data and laboratory results obtained from Jeeva

### 3.7.1 Pretesting of the tool

The investigation tool was pre-tested by 10 respondents who were not among the study participants. The data collection tool was revised after pretested to make sure that the questions capture all required and reliable information. additionally, the tool was rectified to improve quality and clarity before the implementation of the study. We used the revised data collection tool to collect data.

### 3.7.2 Data collection

Data collection commenced after receiving a permission letter from the Muhas Research and Ethics Committee as well as Muhimbili National Hospital's teaching, research, and consultancy unit. The data collection permit was also approved by the Head of the Internal Medicine Department at MNH. Data were collected from renal transplant recipient men with inclusion criteria who attended renal transplant clinic. These individuals gave verbal and written consent to participate in the study.

### 3.7.3 Administration of Questionnaires

The questionnaires were administered in a private area at the renal transplant clinic. Every participant was requested to provide both verbal and written consent. The individuals who provided consent were enrolled in the study. The purpose of the study was explained to each eligible individual. Issues of confidentiality and identity were also explained to consented eligible individuals. At the end of each interview, raised questions related to the study were responded accordingly.

### 3.7.4 Data Quality Control

The data obtained was coded, edited, and cleaned before any statistical analysis was carried out on the data. Additional internal documentation such as variable and value labels was added and any necessary additional variables were created through algebraic or logical expressions. The data capture sheet was pre-tested to improve consistency. Data was double-checked while entering the statistical software before data analysis to control for errors.

### 3.8 Data management and analysis

All secondary data obtained was stored in the principal investigator’s locked cabinet with limited access. Statistical Package for Social Science (SPSS) application version 25 was utilized to handle and analyze the data. The reliability of the information was checked, sorted, coded, and uploaded into the software every day.

Data was presented and interpreted using single variable tables, two-way tables, bar charts, and pie charts as per each specific objective.

We evaluated cross-tabulations between independent variables and outcome of interest, for contingency tables, proportions were compared using the chi-squared test. logistic regression analysis, both bivariate as well as multivariate analysis was utilized to explore the association between the independent variable and dependent variable with variables found to be significant in bivariate analysis (P<0.2) entered into the multivariate analysis to determine the associated factors of erectile function among KTRs repeated measure and P value <0.05 was considered statistically significant in multivariate analysis.

### 3.8.1 Data Analysis Plan

Analysis plan for each objective: Analysis was done according to the study objectives. The dependent variable was erectile function. The study looked at associated factors of erectile function as independent variables grouped into 3 main categories (demographic factors, social-related factors, and clinical data).

Objective 1: The prevalence of erectile dysfunction among male kidney transplant recipients before and at least 6 months after transplantation at Muhimbili National Hospital (MNH): Assessment and comparison of data were made between the prevalence of erectile dysfunction before and after transplantation. Descriptive results from this analysis were presented on tables and figures in terms of frequencies and percentages.

Objective 2: The severity of erectile dysfunction among male kidney transplant recipients before and at least 6 months after transplantation at Muhimbili National Hospital (MNH): Severity categorization of Erectile dysfunction (ED): Score 5-10 severe Erectile dysfunction (ED); Score 11-15 moderate Erectile dysfunction (ED), Score 16-20 mild Erectile dysfunction (ED); Score 21-25 no Erectile dysfunction (ED)

Assessment and comparison of data were made between the severity of erectile dysfunction before and after transplantation. Descriptive results from this analysis were presented in tables and figures in terms of frequencies and percentages.

Objective 3: The associated factors of erectile function among male kidney transplant recipients before and 6 months after transplantation at Muhimbili National Hospital (MNH). This included age, education, history of hypertension, diabetes, hyperlipidemia, cigarette, alcohol consumption, immunosuppressive drugs (cyclosporine (CsA) or rapamune (sirolimus), Betablocker use, allograft duration, hemoglobin, pretransplant hemodialysis, and hemodialysis duration. We employed bivariate and multivariate logistic regression analysis to explore the associated factors of erectile function for these variables among KTRs before and after transplantation and results are presented in tables in terms of proportions.

**Table 1: Analysis plan per specific objective**

| Specific objective | Analysis plan |
|---|---|
| 1. To determine the prevalence of erectile dysfunction among male kidney transplant recipients before and at least 6 months after transplantation at Muhimbili National Hospital (MNH) | Frequency and percentage. |
| 2. To determine the severity of erectile dysfunction among male kidney transplant recipients before and at least 6 months after transplantation at Muhimbili National Hospital (MNH): | Frequency and percentage. |
| 3. To determine the associated factors of erectile function among male kidney transplant recipients before and at least 6 months after transplantation at Muhimbili National Hospital (MNH). | Proportion. |

**Note:**

1. The Chi-square test and Odds Ratio were used to determine associations and strength of associations between independent variables and outcome of interest which is erectile function.
2. In controlling for confounders multiple logistic regression was used. Crude odds ratio, adjusted OR and 95% confidence interval were examined.
3. Descriptive statistics were examined for all associated factors Then findings/results from the study were presented in tables and figures in relation to the research objectives and variables.

### 3.9 Variables in the study

#### 3.9.1 Independent variables:

**Socio-demographic characteristics:** Age, Education, Smoking cigarette, Alcohol consumption

**Clinical characteristics:** DM, HTN, dyslipidemia, Duration of hemodialysis, Anemia, Depression, type of arterial anastomosis, CsA drugs, Iterative transplantation

#### 3.9.2 Dependent variables:

Erectile Function

### 3.10 Study limitations

1. The small sample size restricted the ability to generalize the findings to the entire population.

2. The varied study designs of the many references we reviewed in this research posed a challenge in conducting a fair comparison between our findings and those of other researchers.

3. The variability in the timing of evaluating postoperative erectile function may affect outcomes due to the influence of different confounding factors. Evaluating executive function (EF) shortly after a postoperative follow-up may result in the inaccurately high prevalence of erectile dysfunction (ED) due to graft malfunction and changes in patient's perception of their bodies. However, evaluating executive function (EF) throughout a lengthy

postoperative monitoring period could also impact results because of the effects of possible confounding variables.

4. The absence of assessment of hormonal factors that could affect erectile function may serve as a confounding variable and potentially bias the results of the study.
5. It is important to point out that the study was conducted only at a single medical institution.
6. This study design was observational and is particularly susceptible to bias and confounding factors.

**3.11 Mitigation of the Limitations**

1. We require extensive, well-executed research involving a large number of participants to confirm and enhance the credibility of our discoveries.

2. A standardized, long-term, multicenter cohort study could provide a more comprehensive evaluation of erectile function in patients with end-stage renal disease (ESRD). This study would assess erectile function in the same patients before they start dialysis, at various timepoints during dialysis, and after they receive a kidney transplant. The aim of this study would be to gain a deeper understanding of the underlying causes of erectile dysfunction (ED) in patients with ESRD.

3. To account for any factors that may affect the results, it is crucial to evaluate erectile function at various time intervals after the surgery and document any complications that occurred during the surgery or related to the graft.

4. Further research should incorporate an evaluation of hormonal characteristics that may impact erectile function (EF) to account for any variables that might affect the results.

### 3.12. Ethical clearance

Ethical clearance to conduct the study was sought from the Muhas Research and Ethics Committee. Permission to collect data was obtained from Muhimbili National Hospital's teaching, research, and consultancy unit. The data collection permit was also approved by the Head of the Internal Medicine Department at MNH. The Hospital Administration was well-informed about the purpose of the study. All renal transplant recipient men with inclusion criteria were enrolled after signing an informed consent form. The data were coded to hide the patient's identity and kept strictly confidential. The data were stored in protected computer files and paper records were stored in locked cabinets with limited access to the information.

No identities were recorded in this study. Patient confidentiality was considered during and after the study. No manipulation is intended to occur in the data that was used in the study. In developing this research work proper citation had been considered to avoid plagiarism. Ethical clearance No. DA.282/298/01.C

### 3.13 Dissemination of study findings

The results of this study were disseminated to the teaching, research and consultancy unit of MNH for implementation.

The research report was presented at MUHAS surgery department and was used to produce a dissertation for Mmed degree award and thereafter disseminated to the dean school of medicine and the director of postgraduate studies.

# CHAPTER FOUR

## 4.0 RESULTS

This chapter presented the findings of the socio-demographic and clinical characteristics of the kidney transplant recipient study participants. Subsequently, data obtained from the IIEF-5 tool was analyzed to determine the prevalence and severity of erectile dysfunction among kidney transplant recipient study participants before and after transplantation. The last part of this chapter utilized Bivariate and multivariate logistic regression employing the generalized estimating equation for repeated measures to explore the association between independent variables and our outcome of interest.

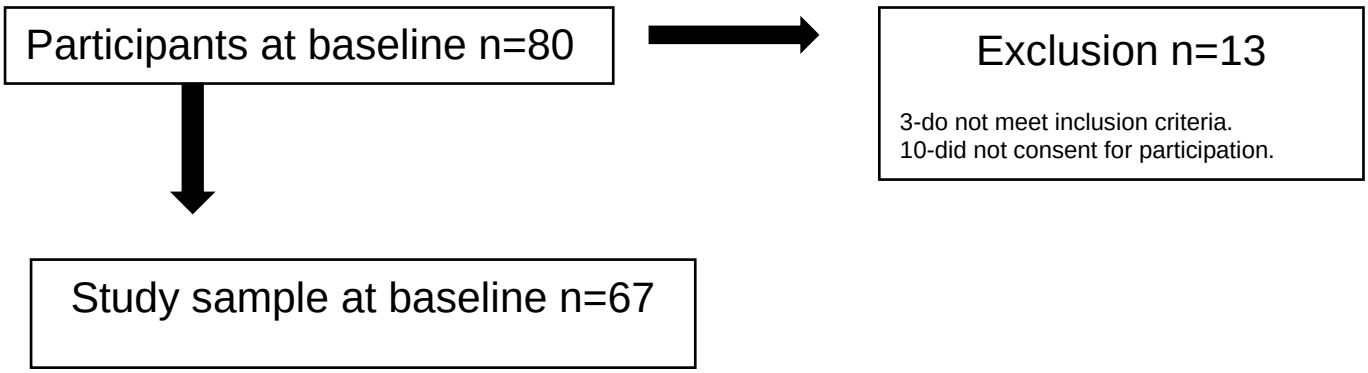
The results of this study were primarily obtained from the data collected from patients 'self-administered questionnaire containing the IIEF-5 tool as well as from renal transplant registry books and renal transplant file archives

## 4.1 Description of study participants

A total of 80 male post-kidney transplant recipients were identified from the renal transplant clinic registry book. However, 13 individuals did not fulfill the inclusion criteria and were excluded from the study (as illustrated in Figure 1). The remaining 67 adult male patients, represented a response rate of 83.8% of the anticipated sample size, met the inclusion criteria, and consented to participate in the study. These were the patients who had undergone renal transplantation between 2007 and 2023, with an average allograft duration of 79.76 months and a standard deviation of 41.42 months.

The data collection was conducted from February 2024 to May 2024 during which the study consented participants were instructed to fill out and complete the questionnaire containing the IIEF-5 tool, which is used to assess their erectile function.

**Figure 1: Flowchart of study participants' selection**




### 4.2 Socio-demographic features of study participants

All 67 participants were male due to the nature of the study, The mean age of study participants was 46.8 years, with a standard deviation of 11.15 years ranging from 30 to 72 years. On enrollment, the youngest age group comprised individuals below 30 years and had 1 patient which accounted for 1.5% of all the study participants, age group over 60 years old recorded a significant proportion of the study participants, comprising 20 individuals accounting for around 30% of total participants (Table 2).

**Table 2: Age distribution of study participants**

| Age group (years) | Male kidney transplant recipients | |
|---|---|---|
| | Frequency (n) | Percentage (%) |
| **Age on enrollment (years)** | | |
| ≤30 | 1 | 1.5 |
| 31-40 | 11 | 16.4 |
| 41-50 | 17 | 25.4 |
| 51-60 | 18 | 26.8 |
| >60 | 20 | 29.9 |
| **Total** | 67 | 100 |
| **Age at transplant (years)** | | |
| ≤30 | 6 | 9.0 |
| 31-40 | 18 | 26.9 |
| 41-50 | 16 | 23.8 |
| 51-60 | 23 | 34.3 |
| >60 | 4 | 6.0 |
| **Total** | 67 | 100 |

The study evaluated social-related factors of kidney transplant recipients who visited MNH renal transplant clinics. The social factors evaluated included marital status, history of cigarette smoking, history of alcohol intake, occupation, and educational level, The findings revealed that among the 67 participants,58 individuals (86.6%) were married, whereas 9 participants (13.4%) were cohabiting; In addition, out of the total number of 67 participants,11 participants (16.4%) had at most a primary level of education, 19 participants (28.4%) had secondary level of education and 37 participants (55.2%) had higher education level. The study further found that out of all the 67 participants, 10 individuals (14.9%) reported a past habit of smoking cigarettes and 40 participants (59.7%) had a prior history of alcohol intake.

Most of the study's participants were employed 26 (38.8%), 22 participants (32.8%) were self-employed, 16 participants (23.9%) were retired and 3 participants (4.5%) were unemployed (Table 2).

**Table 3: Socio-demographic characteristics of the study participants (n=67)**

| Variable | Before transplant | | After transplant | |
|---|---|---|---|---|
| | n | % | n | % |
| **Age (years)** | | | | |
| ≤45 | 25 | 37.3 | 19 | 28.4 |
| >45 | 42 | 62.7 | 48 | 71.6 |
| **Marital status** | | | | |
| Married | 62 | 92.5 | 58 | 86.6 |
| Cohabiting | 5 | 7.5 | 9 | 13.4 |
| **Education** | | | | |
| ≤Primary level | 11 | 16.4 | 11 | 16.4 |
| Secondary level | 19 | 28.4 | 19 | 28.4 |
| ≥College/university level | 37 | 55.2 | 37 | 55.2 |
| **Occupation** | | | | |
| Unemployed | 1 | 1.5 | 3 | 4.5 |
| Employed | 32 | 47.8 | 26 | 38.8 |
| Self-employed | 20 | 29.9 | 22 | 32.8 |
| Retired | 14 | 20.8 | 16 | 23.9 |
| **Smoking cigarette** | | | | |
| Yes | 10 | 14.9 | 10 | 14.9 |
| No | 57 | 86.1 | 57 | 86.1 |
| **Alcohol** | | | | |
| Yes | 40 | 59.7 | 40 | 59.7 |
| No | 27 | 40.3 | 27 | 40.3 |

*Key: n: frequency, %: percentage*

### 4.3 Clinical characteristics of study participants

The study revealed that all 67 individuals received hemodialysis before kidney transplantation, with no instances of peritoneal dialysis documented. The average length of hemodialysis was 17.78 months, with a standard deviation of 14 months, ranging from one month to 6 years. Out of the 67 participants, 14 individuals (20.9%) had undergone dialysis for less than 6 months, whereas 53 individuals (79.1%) had undergone dialysis for at least 6 months before their kidney transplantation.

The study revealed that among the 67 kidney transplant recipients,43 participants (64.2%) had hypertension as a primary comorbid condition whereas 24 participants (32.8%) had both hypertension and DM, 1 participant (1.5%) had only DM, 20 participants (29.9%) reported having a history of dyslipidemia, 2 participants (3%) had a neurological disease, 16 participants (23.9%) had urological manifestation, and 20 participants (33.3%) had cardiovascular disease The most prevalent cause of end-stage renal disease was hypertension as a primary comorbid condition comprising 42 patients (62.7%), followed by those with two comorbid combinations of HTN and DM represented by 24 patients (35.8%), and finally 1 patient (1.5%) who had a history of congenital solitary kidney with obstructive renal stone.

The study found that the prevalence of depression was 92.5% before transplantation and 82.1% after transplantation. Although there was a little reduction in depressive symptoms after the kidney transplant, still KTRs presented with the high level of depression enough to negatively affect erectile function.

The study found that the patient's biometric data varied from being underweight to being severely obese. The study analyzed the biometric data of the participants to determine their standard body mass index (BMI). The average BMI score of the participants was found to be 25.32kg/m2, with the lowest BMI recorded at 15.5 kg/m2 and the highest at 35.5 kg/m2. Out of the participants, 11 were classified as obese (16.4%), 23 were classified as overweight (34.3%), 30 had a normal BMI (44.8%), and 3 were classified as underweight (4.5%) (Table 4).

**Table 4: Clinical characteristics of the study participants (n=67)**

| Variables | Before transplant | | After transplant | |
|---|---|---|---|---|
| | n | % | n | % |
| **Erectile function** | | | | |
| No ED | 8 | 11.9 | 2 | 3.0 |
| Mild ED | 19 | 28.4 | 15 | 22.4 |
| Mild to moderate ED | 31 | 47.8 | 30 | 44.8 |
| Moderate ED | 7 | 10.4 | 17 | 25.4 |
| Severe ED | 2 | 1.5 | 3 | 4.5 |
| **Depression** | | | | |
| No | 5 | 7.46 | 12 | 17.9 |
| Mild | 20 | 29.85 | 45 | 67.1 |
| Moderate | 38 | 56.72 | 6 | 9.0 |
| Moderate severe | 3 | 4.48 | 4 | 6.0 |
| Severe | 1 | 1.49 | 0 | 0.0 |
| **BMI** | 4 | 6 | 3 | 4.5 |
| Underweight | 35 | 52.2 | 30 | 44.8 |
| Normal | 19 | 28.4 | 23 | 34.3 |
| Overweight | 9 | 13.4 | 11 | 16.4 |
| Obese | | | | |
| **Hemodialysis duration(months)** | 14 | 20.9 | 0 | 0 |
| ≤6 | 53 | 79.1 | 0 | 0 |
| >6 | | | | |
| **HTN and DM** | | | | |
| Yes | 17 | 25.4 | 24 | 35.8 |
| No | 50 | 75.6 | 43 | 64.2 |
| **HTN** | | | | |
| Yes | 49 | 73.1 | 43 | 64.2 |
| No | 18 | 26.9 | 25 | 35.8 |
| **DM** | | | | |
| Yes | 0 | 0 | 1 | 1.5 |
| No | 67 | 100 | 66 | 98.5 |
| **Congenital solitary kidney with obstructive stone** | | | | |
| Yes | 1 | 1.5 | 0 | 0 |
| No | 66 | 98.5 | 67 | 100 |
| **Dyslipidemia** | | | | |
| Yes | 20 | 29.9 | 20 | 29.9 |
| No | 47 | 70.1 | 47 | 70.1 |
| **Neurological disease** | | | | |
| Yes | 1 | 1.5 | 2 | 3 |
| No | 66 | 98.5 | 65 | 97 |

| | | | | |
|---|---|---|---|---|
| **Urological disease** | | | | |
| Yes | 11 | 16.4 | 16 | 23.9 |
| No | 55 | 83.6 | 51 | 76.1 |
| **Cardiovascular disease** | | | | |
| Yes | 12 | 17.9 | 20 | 29.9 |
| No | 55 | 82.1 | 47 | 70.1 |
| **Allograft duration (months)** | | | | |
| ≤72 | 0 | 0 | 34 | 50.7 |
| >72 | 0 | 0 | 33 | 49.3 |
| **Taking beta blocker** | | | | |
| Yes | 29 | 43.3 | 32 | 47.8 |
| No | 38 | 56.7 | 35 | 52.8 |
| **Taking glucocorticoid** | | | | |
| Yes | 0 | 0 | 61 | 91 |
| No | 0 | 0 | 6 | 9 |
| **Taking anti-androgens** | | | | |
| Yes | 11 | 16.6 | 26 | 38.8 |
| No | 56 | 83.4 | 40 | 61.2 |
| **Taking rapamune** | | | | |
| Yes | 0 | 0 | 1 | 1.5 |
| No | 0 | 0 | 66 | 98.5 |
| **CNIs** | | | | |
| Tacrolimus | 0 | 0 | 65 | 97 |
| CsA | 0 | 0 | 2 | 3 |

*Key: BMI: Body mass index, ED: Erectile dysfunction, DM: Diabetes mellitus, HTN: Hypertension, CNIs: Calcineurin inhibitors, CsA: Cyclosporin A*

### 4.4 Renal transplantation details

The study has found that a total of 41 respondents (61.2%) underwent kidney transplantation in India, 1 respondent (1.5%) underwent kidney transplantation in Thailand, and 25 respondents (37.3%) underwent kidney transplantation in Tanzania, mainly at Muhimbili National Hospital.

Regarding the potential donors, the study revealed a record of a total of 67 living donors, of whom 61 (91%) were related to the patients and 6 living donors (9%) were not, and no provided documentation regarding the use of deceased donors during transplantation. It was also found that out of the 67 recipients, only 1 patient (1.5%) had a history of previous kidney transplantation (iterative transplantation).

The most common documented orientation and mode of anastomosis during the kidney transplantation procedure was end-to-end anastomosis of the graft renal artery to the recipient's internal iliac artery with interruption of its distal end; this was carried out in 55 patients (82.1%), while end-to-side anastomosis of the graft renal artery to the external iliac artery was done in 12 patients (17.9%). There was no record of an anastomosis to the common iliac artery

The study found that the majority of 66 patients (98.5%) had graft renal vein anastomosis to the recipient's vessel through the external iliac vein end-to-side orientation and Only 1 patient (1.5%) had graft renal vein anastomosis to the distal inferior vena cava end-to-side orientation; no unilateral or bilateral ligation of the spermatic cords was documented among study participant's post-operative details. The study found that the mean allograft duration among study participants was 79.79 months with a standard deviation of 41.56 months ranging from 7 months to 17 years, with no reported history of any study participants returning to dialysis or history of blood transfusion after kidney transplantation (Table 5).

**Table 5: Renal transplantation details of the study participants (n=67)**

| Variables | Frequency (n) | Percentage (%) |
|---|---|---|
| **Country done transplantation** | | |
| Tanzania | | |
| India | 25 | 37.3 |
| Thailand | 41 | 61.2 |
| | 1 | 1.5 |
| **Allograft duration (months)** | | |
| ≤72 months | | |
| >72 months | 34 | 50.7 |
| | 33 | 49.3 |
| **Donor type** | | |
| Living related | 61 | 91% |
| Living unrelated | 6 | 9% |
| **Orientation of graft renal artery anastomosis to receptor vessels** | | |
| E-E | | |
| E-S | 55 | 82.1 |
| | 12 | 17.9 |
| **Mode of graft renal artery anastomosis to receptor vessels** | | |
| Internal iliac artery | | |
| External iliac artery | 55 | 82.1 |
| | 22 | 17.9 |

| | | |
|---|---|---|
| **Mode of graft renal vein anastomosis to receptor vessels** | | |
| External iliac vein | | |
| Distal inferior vena cava | 66 | 98.5 |
| | 1 | 1.5 |
| **Orientation of graft renal vein anastomosis to receptor vessels** | | |
| E-S | | |
| | 67 | 100 |
| **Interruption of internal iliac artery distal end** | | |
| Yes | 55 | 82.1 |
| No | 12 | 17.9 |
| **Iterative transplantation** | | |
| Yes | 1 | 1.5 |
| No | 66 | 98.5 |

*Key: E-E-end to end anastomosis, E-S-end to side anastomosis*

### 4.5 Profile of immunosuppressive agents

Participants were also assessed on their immunosuppressive drug refill and revealed that among 67 total participants, 59 patients (88.1%) received a Triple therapy of immunosuppressive agents (CNI, antimetabolites, and glucocorticoid) as the main standard of care model used among kidney transplant recipients for prevention of allograft rejection, 7 patients (10.4%) used a combination of two immunosuppressive drugs (CNI+ (antimetabolites or with mTOR-inhibitor), among CNI, tacrolimus was the most common drug prescribed in 65 patients (97%) compared to 2 patients (3%) who were prescribed cyclosporin A.

Glucocorticoid was prescribed to 61 patients (91%) while 6 patients (9%) stopped glucocorticoids due to various contraindications. Mycophenolate analogs were the most common antimetabolite drugs prescribed in 64 patients (95.5%) compared to azathioprine which was prescribed in 3 patients (4.5%) and 1 patient (1.5%) was on mTOR-inhibitor (everolimus) (Table 6)

The study found that 7 hypertensive patients (10.4%) developed DM after transplant and initiation of immunosuppressive agents, 1 patient (1.5%) with congenital solitary kidney with persistent obstructive uropathy as the only cause of end-stage renal disease developed hypertension after kidney transplant, and initiation of immunosuppressive drugs (Table 4)

**Table 6: Profile of immunosuppressive medications of study participants (n=67)**

| Variables | Frequency (n) | Percentage (%) |
|---|---|---|
| **Triple therapy (CNIs, antimetabolite/mTOR-inhibitor, glucocorticoid** | 60 | 89.6 |
| Yes | 7 | 10.4 |
| No | | |
| **CNIs** | | |
| Tacrolimus | 65 | 97 |
| Cyclosporin A | 2 | 3 |
| **Antimetabolite** | | |
| MPA analogues | 64 | 95.5 |
| AZA | 3 | 4.5 |
| **Glucocorticoid** | | |
| Yes | 61 | 91% |
| No | 6 | 9% |
| **mTOR-inhibitor** | | |
| **Yes** | 1 | 1.5 |
| **No** | 66 | 98.5 |

*Key: CNIs: Calcineurin inhibitors, mTOR-inhibitor: mechanistic target of rapamycin: MPA: Mycophenolic acid, AZA: Azathioprine*

### 4.6 Prevalence of erectile dysfunction among study participants before and after transplantation.

This study found that the prevalence of erectile dysfunction was high among study participants before and even higher after transplantation, it was discovered that a total of 59 patients (88.1%) of the overall 67 study participants reported having erectile dysfunction before transplantation and 65 patients (97%) of the overall 67 study participants reported erectile dysfunction after kidney transplantation (Table 7).

**Table 7**: **Distribution of study participants based on erectile function Before and after kidney transplantation (n=67)**

| Erectile function | Before kidney transplantation | | | After kidney transplantation | | |
|---|---|---|---|---|---|---|
| | Frequency (n) | Percentage (%) | 95% CI | Frequency (n) | Percentage (%) | 95% CI |
| Erectile dysfunction (ED) | 59 | 88.1 | 77.8-94.7 | 65 | 97 | 89.6-99.6 |
| No erectile dysfunction | 8 | 11.9 | 5.3-22.2 | 2 | 3 | 0.3-10.4 |

*Key: CI: confidence interval, ED: erectile dysfunction*

The study revealed that 6 out of 8 participants (75%) who had no erectile dysfunction before the kidney transplant turned to have erectile dysfunction after transplantation and only 2 out of 8 participants (25%) who had no erectile dysfunction before the kidney transplant remained with no erectile dysfunction after the kidney transplant. This is equivalent to an overall increase of 4% prevalence of new cases with erectile dysfunction after kidney transplantation relative to those with erectile dysfunction before kidney transplantation (P=0.031) (Table 7, Figure 2, and Figure 3).

**Figure 2 and 3. Distribution of study participants based on erectile function before and after kidney transplantation (n=67)**

**Figure 2.**

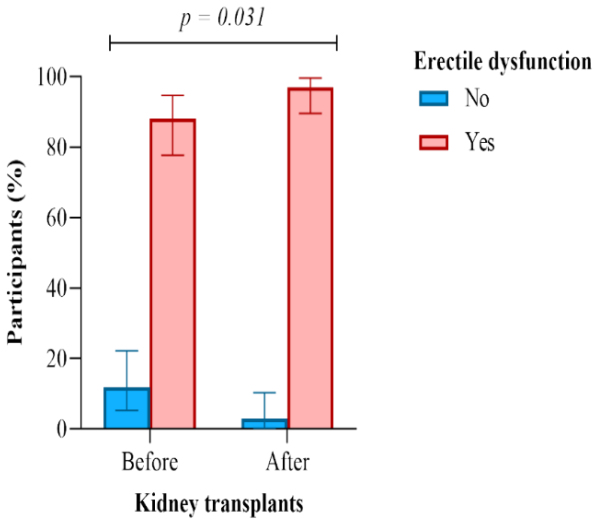
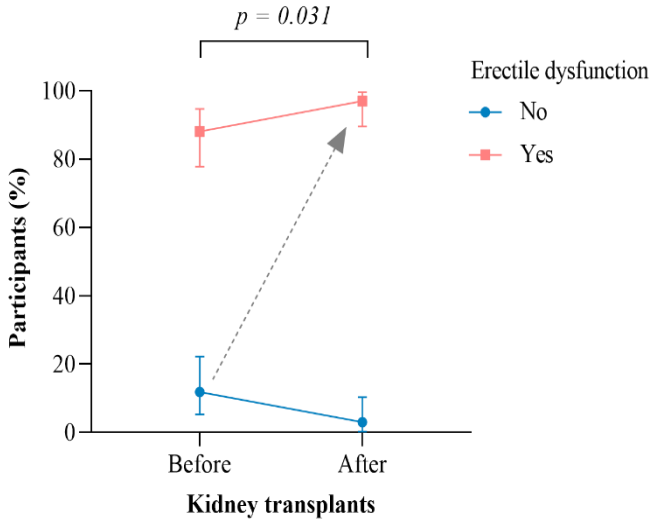



**Figure 3.**




### 4.7 Severity of erectile dysfunction among KTRs before and after transplantation

The study further assessed the severity of erectile dysfunction among kidney transplant recipient study participants before and after transplantation and found that before transplantation 8 participants (11.9%) had no ED, 19 participants (28.4%) had mild ED, 32 participants (47.8%) had mild to moderate ED, 7 participants (10.4%) had moderate ED and 1 participant (1.5%) had severe ED. Consecutively after transplantation, 2 participants (3%) had no ED, 16 participants (23.9%) had mild ED, 30 participants (44.8%) had mild to moderate ED, 16 participants (23.9%) had moderate ED and 3 participants (4.5%) had severe ED (Table 8 and figure 4)

The study found that out of 67 study participants, 65 participants (97%) had various degrees of severity of erectile dysfunction after kidney transplantation in comparison with 59 participants (88.1%) who had various degrees of severity of erectile dysfunction before the transplant (Table 10)

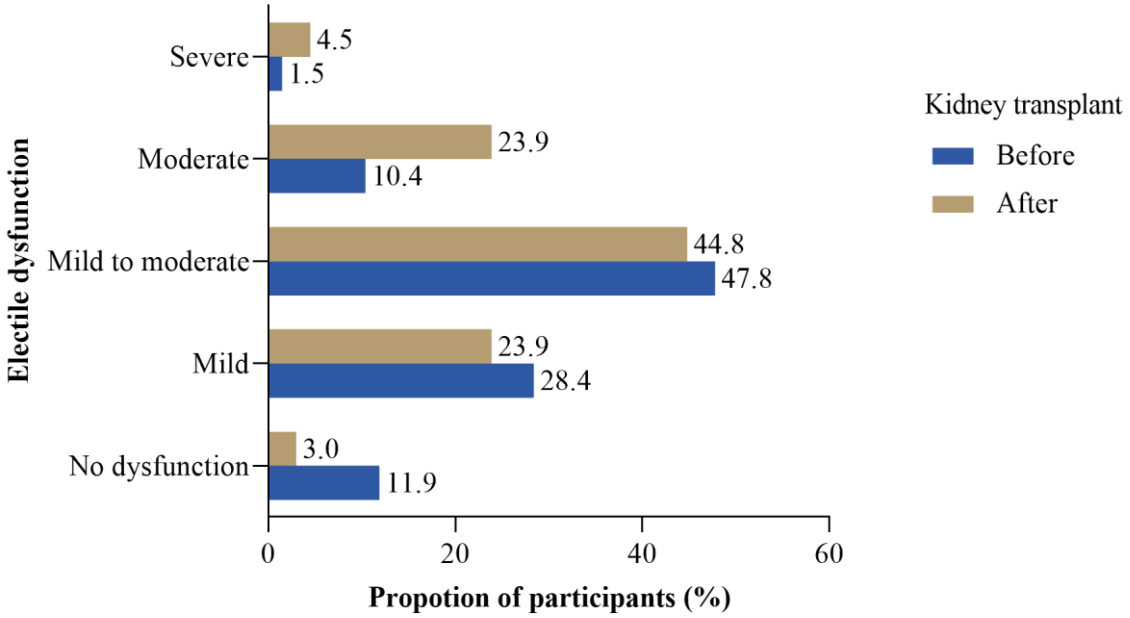
**Table 8: Proportion of study participants by the severity of erectile dysfunction before and after kidney transplant (n=67)**

| Severity of erectile function | IIEF-5 score before transplant | | IIEF-5 score after transplant | |
|---|---|---|---|---|
| | Frequency (n) | Percentage (%) | Frequency (n) | Percentage (%) |
| No erectile dysfunction | 8 | 11.9 | 2 | 2.9 |
| Mild erectile dysfunction | 19 | 28.4 | 15 | 22.4 |
| Mild to moderate erectile dysfunction | 31 | 46.3 | 30 | 44.8 |
| Moderate erectile dysfunction | 7 | 10.4 | 17 | 25.4 |
| Severe erectile dysfunction | 2 | 3 | 3 | 4.5 |

***Key: IIEF-5 – International index of erectile function***

The study observed that there was an increase in the number of individuals with less severe forms of ED and a decrease in the number of participants with severe forms of ED before transplantation in comparison to the decrease in the number of participants with less severe forms of ED and increase in the number of individuals with more severe form of ED after transplantation. This concluded that there is a shift of participants from less severe forms of ED before transplantation to more severe forms of ED after transplantation signifying worsening of erectile function after kidney transplantation (Figure 4).

**Figure 3: Distribution of study participants by the severity of erectile dysfunction before and after kidney transplantation (n=67)**



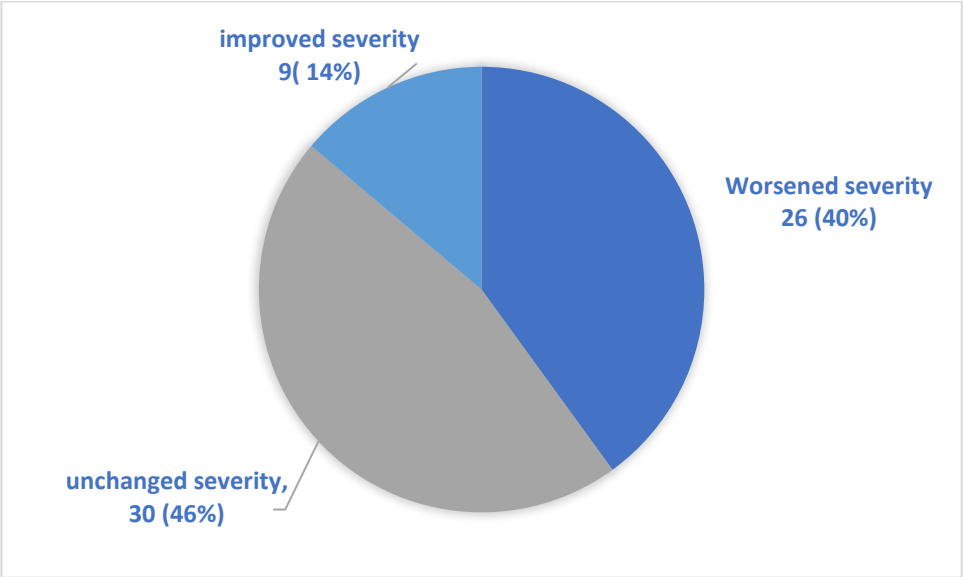

The study found that of all 65 participants with various degrees in the severity of erectile dysfunction after kidney transplantation, 26 participants (40%) had worsened the severity of erectile dysfunction after kidney transplantation, and 30 participants (46%) had unchanged severity of erectile dysfunction after transplantation. Only 9 participants (14%) had an improved severity of erectile dysfunction after kidney transplantation (Figure 5).

**Table 9: The Proportion of study participants by severity status of erectile dysfunction after transplantation (n=65)**

| Severity status of ED | Erectile dysfunction after transplantation | |
|---|---|---|
| | Frequency (n) | Percentage (%) |
| worsened | 26 | 40 |
| Unchanged | 30 | 46 |
| improved | 9 | 14 |

***Key: ED: erectile dysfunction***

**Figure 4: Distribution of study participants by the severity status after kidney transplantation (n=65)**




### 4.8 Associated factors of erectile function among study participants

We conducted a bivariate and multivariate ordinal logistic regression analysis using the generalized estimating equation (GEE) technique for analysis of factors associated with the severity of erectile dysfunction among kidney transplant recipient study participants before and after transplantation (repeated measure n=134).

We have chosen this model because it is more suitable for repeated measures furthermore, we have selected the severity of erectile dysfunction to be our outcome of interest due to the high prevalence of erectile dysfunction after transplantation (97%) which makes binary logistic regression model to be invalid for exploration of associated factors among study participants.

We have chosen an ordinal logistic regression analysis due to the polychotomous nature of the outcome which was the categories of erectile dysfunction severity (No ED, mild ED, mild to moderate ED, moderate ED, severe ED). Hence, we explored

the association between the independent variable and the possibility of having a more severe form of erectile dysfunction.

The independent variables selected were the ones obtained from the literature review of the most studied factors impacting the erectile function of particularly kidney transplant recipients, additionally, we have added other clinical characteristics of the study participants from the current study to assess their significance in impacting the erectile function.

### 4.8.1 Bivariate Analysis

A bivariate analysis results revealed a correlation between the severity of erectile dysfunction in kidney transplant recipients (KTRs) and increasing age. Specifically, males over the age of 45 were shown to be twice as likely to experience a severe type of erectile dysfunction compared to those under the age of 45. The statistical significance of this finding was established with a p-value of 0.12 (cOR=1.7, 95% CI 0.863-3.365)

The likelihood of developing a more severe form of erectile dysfunction (ED) among kidney transplant recipient males who had a prior habit of smoking cigarettes was twice as high as those who did not smoke cigarettes (cOR=2.07, 95% CI 0.966-4.238, P <0.06)

Furthermore, the presence of depression showed a statistically significant correlation with the severity of erectile dysfunction in a bivariate analysis. Specifically, men with depression had a 3 times higher likelihood of developing a severe type of erectile dysfunction compared to those without depression. (cOR=2.5 ,95% CI =1.202-5.189, P <0.04)

In the bivariate analysis, a significant association was also observed between the severity of erectile dysfunction in men who had undergone kidney transplantation and diabetes mellitus (DM). Specifically, Kidney transplant recipient men with DM were shown to have twice the likelihood of experiencing a severe form of erectile dysfunction compared to those without DM. (cOR=1.7, 95% CI 0.901-3.082, P <0.1,)

A bivariate study revealed a correlation between the severity of erectile dysfunction in men who have had kidney transplantation and hypertension. Men who have undergone kidney transplantation and have hypertension are 10 times more likely to develop a severe form of erectile dysfunction compared to those without hypertension (cOR=9.5, 95% CI 0.496-4182.43, P <0.14).

A correlation was found between the severity of erectile dysfunction in male kidney transplant recipients (KTRs) and the duration of hemodialysis before transplantation. In the bivariate analysis, it was observed that KTRs who underwent hemodialysis for more than 6 months had a higher likelihood of experiencing severe erectile dysfunction compared to those who underwent hemodialysis for less than 6 months. (cOR=0.5, 95% CI 0.228-0.991, P <0.5,)

Bivariate analysis revealed a correlation between the severity of erectile dysfunction in men who have undergone kidney transplantation and the number of previous transplantations (iterative transplantation). Men who had a history of multiple kidney transplantations were four times more likely to develop a severe form of erectile dysfunction compared to those who had only undergone a single transplantation. (P <0.001, 95% CI 2.829-6.019, cOR=4.13)

The findings of a bivariate analysis indicated that there was no statistically significant correlation seen between education level, alcohol intake, dyslipidemia, interruption of the distal end of the internal iliac artery, cyclosporine A usage, anemia, and the severity of erectile dysfunction.

### 4.8.2 Multivariate Analysis

The factor with p-value < 1.2 in bivariate analysis entered the multivariate analysis to determine the confounder-free factor (s) associated with the severity of erectile dysfunction. When those factors were analyzed in multiple variables analysis, the study found two factors with significant statistical association with the severity of erectile dysfunction. These factors were depression (aOR=0.4, 95% CI 0.12-0.82, p-value 0.012,) and iterative kidney transplantation (aOR=5.07, 95% CI 1.87-13.73, P =0.01),

This indicating that depressed men and men with a history of multiple kidney transplants were more likely to experience a severe form of erectile dysfunction compared to those who were not depressed and have only had one transplant. There was no statistically significant evidence to support the association between increasing age, cigarette smoking, diabetes mellitus, hypertension, the duration of hemodialysis before kidney transplantation, allograft duration, and the severity of erectile dysfunction despite having statistical significance in bivariate analysis and higher odd ratio, this was possibly due to multiple potential confounding biases in demographic variables.

**Table 10: Bivariate and multivariate ordinal logistic regression using generalized estimating equation (GEE) technique for analysis of factors associated with erectile function among kidney transplant recipient study participants (n=134)**

| | | Bivariable analysis | | | Multivariable analysis | | |
|---|---|---|---|---|---|---|---|
| **Variable** | **Category** | **cOR** | **95% CI** | **p-value** | **aOR** | **95% CI** | **p-value** |
| Age group at enrollment (years) | >45 | 1.704 | 0.863-3.365 | 0.12 | 0.72 | 0.32-1.59 | 0.42 |
| | ≤45 | Ref | | | | | |
| Education level | ≤secondary | 1.039 | 0.559-1.932 | 0.90 | | | |
| | >secondary | Ref | | | | | |
| Smoking cigarette | | | | | | | |
| | Yes | 2.023 | 0.966-4.238 | 0.06 | 1.80 | 0.78-4.17 | 0.17 |
| | No | Ref | | | | | |
| Alcohol | | | | | | | |
| | Yes | 1.130 | 0.619-2.063 | 0.69 | | | |
| | No | Ref | | | | | |
| Depression | | | | | | | |
| | Yes | 2.498 | 1.202-5.189 | 0.04 | 0.40 | 0.12-0.82 | **0.012** |
| | No | Ref | | | | | |
| DM | | | | | | | |
| | Yes | 1.667 | 0.901-3.082 | 0.10 | 1.27 | 0.62-2.58 | 0.51 |
| | No | Ref | | | | | |
| HTN | | | | | | | |
| | Yes | 9.511 | 0.496-182.43 | 0.14 | 7.86 | 0.62-99.51 | 0.11 |
| | No | Ref | | | | | |
| Dyslipidemia | | | | | | | |
| | Yes | 1.419 | 0.742-2.715 | 0.29 | | | |
| | No | Ref | | | | | |
| Hemodialysis duration (months) | >6 | 0.476 | 0.228-0.991 | 0.05 | 1.861 | 0.78-4.17 | 0.11 |
| | ≤6 | Ref | | | | | |
| Interruption of internal iliac artery distal end | Yes | 0.965 | 0.550-1.692 | 0.90 | | | |
| | No | Ref | | | | | |
| Iterative transplantation | Yes | 4.127 | 2.829-6.019 | <0.001 | 5.07 | 1.87-13.73 | 0**.001** |
| | No | Ref | | | | | |
| Cyclosporin A (CsA) | Yes | 0.875 | 0.348-2.2 | 0.78 | | | |
| | No | Ref | | | | | |
| tacrolimus | Yes | 0.662 | 0.204-1.941 | 0.94 | | | |
| | No | Ref | | | | | |
| Hemoglobin level (g/dl) | <12 | 0.752 | 0.313-1.803 | 0.52 | | | |
| | ≥12 | Ref | | | | | |
| Allograft duration (months) | ≤72 | 0.612 | 0.251-1.664 | 0.67 | | | |
| | >72 | Ref | | | | | |
| Taking beta blocker | Yes | 2.321 | 1.112-4.019 | 0.72 | | | |
| | No | Ref | | | | | |
| Taking glucocorticoids | Yes | 0.231 | 0.174-0.886 | 0.94 | | | |
| | No | Ref | | | | | |
| Taking anti-androgens | Yes | 1.477 | 0.608-3.014 | 0.36 | | | |
| | No | Ref | | | | | |
| Taking rapamune | Yes | 0.527 | 0.431-0.992 | 0.58 | | | |
| | No | Ref | | | | | |

***Key**: cOR: crude odds Ratio, aOR: adjusted Odds Ratio, Ref: Reference group, DM: diabetes mellitus, HTN: hypertension, CsA: cyclosporin A, CI: confidence interval*

# CHAPTER FIVE

## 5.0 DISCUSSION

This chapter focused on a discussion of study findings of 67 kidney transplant study participants who were evaluated for prevalence and severity of erectile dysfunction before and after transplantation, Furthermore, the discussion included findings of Bivariate and multivariate logistic regression analysis that explored the associated factors of erectile function among study participants based on available global findings.

Erectile dysfunction is a common condition in CKD patients on dialysis and among KTRs. This was observed in several published studies (2). This condition is usually underestimated and overlooked in these patients however it is related to physical and psychosocial health which ultimately has a significant impact on the quality of life of the patients and their partners (16).

Kidney transplantation has been widely recognized as the most effective treatment for ESRD. The Survival benefits and quality of life are significantly improved after successful kidney transplantation with renal allograft function (16).

The role of kidney transplant in improving specifically erectile function has been a subject for discussion due to contradictory research outcomes globally (2), although improvement in erectile function has been reported after kidney transplantation, some studies have shown that this condition can persist even after successful transplantation with the appearance of new cases of erectile dysfunction (2).

Our study revealed a high prevalence of ED before transplantation (88.1%) and even higher after kidney transplantation (97%), These findings are similar to a study done in Italy by Mirone and colleagues (2009) who reported a high prevalence of ED before and after transplantation 87.2% and 91% respectively. Mirone et al. found that in people under the age of 45, renal transplant had no beneficial effects on erectile dysfunction and sometimes was even reported to worsen by the recipients (15). Malavaud and colleagues (2000) observed a notably higher prevalence of erectile dysfunction (55.7%) in individuals who underwent kidney transplantation,

despite their young age. These individuals also reported poor intercourse satisfaction. This frequency was shown to be considerably higher when compared to the control group (21).

Contrary to our results a study from China by Teng li and associates found A prevalence of 87.5% and 45.9% of ED before and after transplantation respectively (31). The difference in this study's findings is probably due to the difference in methodology as well as they used a smaller sample size which can be easily confounded by demographic variables. Another study done in Sudan by Mekki and colleagues reported a prevalence of ED before and after transplantation being 83% and 67% respectively (18). This difference with our study findings is due to a difference in methodology.

Our study also found a high proportion of study participants with worsened severity of erectile dysfunction after kidney transplant compared to those with improvement. The overall severity status of erectile dysfunction after kidney transplant discovered that 40% had a worsened severity of ED, 46% had unchanged severity of ED and Only 14% had an improved severity of ED after kidney transplantation. In response to available global findings, the severity of erectile dysfunction varied from one study to another. A study from Pakistan by Ahmad et al (2009) reported a 40% improvement in the severity of ED, 53.3% unchanged severity of ED, and 6.6% deterioration in the severity of ED among KTRs(38). A study from China by Xiao et al (2007) reported improved severity of ED among KTRs at 43.9%, remained unchanged at 42.9%, and deteriorated at 13.2% (24).

A study from Egypt by El-Bahnasawy et al (2004), discovered that in erectile dysfunction (ED) 44% noted an improvement in their current erectile function compared to their pretransplant state, while 12.5% experienced a deterioration, and 43.5% had no change (11). This difference in study findings is contributed by varied methodology and sample size which posed challenges of potential confounders

These differences in study findings are contributed by varied methodology and small sample size which posed challenges of potential confounders.

The overall results of our current study indicate a high prevalence of erectile dysfunction (ED) before kidney transplantation and even higher after kidney transplant, with a majority of patients experiencing a worsening in the severity of their ED compared to those who showed improvement. These findings were supported by the fact that the causes of ED among kidney transplant recipients (KTRs) are multifactorial, primarily organic which is related to the long-term effects of uremia (15).

Despite the restoration of glomerular filtration rate and hormonal abnormalities by kidney transplantation , the previous uremic environment can cause progressive and permanent systemic organ damage primarily persistent anatomical abnormalities in the cavernous tissue and distal penile arteries involving changes in the smooth muscle cells, characterized by a decrease in dense bodies in the cytoplasm, thickening of the basement membrane, interstitial fibrosis leading to reduced cell-to-cell contacts, thickening and layering of basement membranes of endothelial cells, and increased accumulation of collagen between nerve fibers. This condition often does not improve with transplantation and can have a severe effect on the erectile function of kidney transplant recipients (KTRs) (15,27).

Moreover, many KTRs have additional risk factors for ED, such as diabetes, hypertension, and the medications used to treat these conditions. It is important to note that kidney transplantation alone does not have any impact on these underlying risk factors, and therefore cannot eliminate all the predisposing and precipitating factors that affect erectile function (27).

Furthermore, kidney transplantation exacerbates erectile dysfunction (ED) by inducing vascular changes in the penile arteries through iliorenal artery anastomosis during transplantation procedure, introduction of aggressive immunosuppressive agents that can potentially disrupt the endocrine system, high level of depression and anxiety due to risk of infections, graft rejection possibilities, reduced physical activity, low self-esteem associated with transplantation, and changes in lifestyle such as dietary restrictions and polypharmacy all of which have an impact toward worsening of erectile function (2) .

This study identified iterative transplantation as a significant risk factor for erectile dysfunction (ED) in males who have undergone kidney transplantation (KTRs). The statistical significance of the data was demonstrated in both bivariate (aOR=4.127, 95%CI 2.829-6.019, p<0.001,) and multivariate analysis (aOR=5.07,95%CI 1.87-13.73, p=0.001), Men with a previous history of kidney transplantation have 5 times the chance of having a severe form of erectile dysfunction compared to those with one transplantation. This finding is consistent with research conducted in China, the USA and Italy (27,35,39).

Penile arteries are branches of the internal iliac artery, when the bilateral internal iliac artery is used for end-to-end anastomosis with the renal artery, can further lead to insufficient blood flow to the penile arteries which may worsen subsequent penile erection (39).

Studies indicate that kidney transplant recipients who undergo revascularization through end-to-end anastomosis to the internal iliac artery have a higher incidence of erectile dysfunction compared to those who undergo end-to-side anastomosis to the external iliac artery. This suggests that the unilateral ligation of the internal iliac artery negatively affects erectile function after kidney transplantation. When the kidney graft is connected end-to-end to the internal iliac artery, the blood flow from the internal pudendal artery is diverted (35).

Nevertheless, the prevalence of erectile dysfunction (ED) remains significant even in kidney transplant recipients (KTRs) who have had revascularization through anastomosis at the external iliac artery. This procedure only results in a slight reduction in blood supply to the penis (35).

The sequential ligation of both internal iliac arteries is a sufficient explanation for the high incidence of erectile dysfunction after a second kidney transplant. Furthermore, the combination of penile hypo afflux and erectile dysfunction (ED) can be exacerbated or even induced by repeated transplantation procedures, even when the internal iliac artery is utilized for end-to-side anastomosis. (35,39).

This study also found a significant association between depression and erectile dysfunction (ED) in both univariate (P <0.04, 95% CI =1.202-5.189) and multivariate analyses (P= 0.012, 95% CI 0.12-0.82). Research conducted in Europe, Malaysia, and Iran provided similar findings (2), demonstrating that men with depression are more prone to experiencing a more severe manifestation of erectile dysfunction compared to those without depression. Our study found that participants experienced a slight decrease in depression levels following transplanting (82.1%), in contrast to the elevated levels of depression observed before the transplant (92.5%).

Depression is the most common neuropsychiatric condition among kidney transplant recipients (KTRs), and it is the main cause of Psychogenic Erectile Dysfunction (ED). This is due to increased anxiety caused by the risk of infections and possibilities of graft rejection, decreased physical activity, low self-esteem related to transplantation, and lifestyle changes such as dietary restrictions and taking multiple drugs. These factors can lead to episodes of depression in KTRs. This can significantly disturb an individual's physical, physiological, psychological, and social well-being, leading to the occurrence of erectile dysfunction. (2,40).

Surprisingly this study found that Age, HTN, DM, Cigarette smoking, alcohol, CsA drugs, and interruption of internal iliac distal end, could not maintain their statistical significance on multivariate analysis despite having high crude odd ratio on bivariate analysis suggesting that they could have been confounded by other demographic variables

There is no statistical evidence correlated any medication to erectile dysfunction and its severity.

# CHAPTER SIX

## 6.0 CONCLUSION AND RECOMMENDATIONS

### 6.1 Conclusion

This study revealed that Erectile dysfunction is a common problem among kidney transplant recipient men. The prevalence of erectile dysfunction (ED) is significantly high before and even higher after a kidney transplant. Furthermore, the severity of ED tends to worsen in significant proportion of KTRs after kidney transplantation.

Depression and iterative transplantation were found to be statistically significant factors associated with erectile dysfunction (ED) and its severity.

### 6.2 Recommendations

1. IIEF-5 is an effective means to establish and diagnose the ED, it should be used during routine clinical evaluation of individuals with KTRs for possible prompt management plans for those found with ED
2. This study emphasizes the significance of giving particular consideration to psychological factors, including depression, which is also common among kidney transplant recipients (KTRs) before and after transplantation.
3. This study highlights the need to include concerns about erectile function (EF) among KTRs during routine post-renal transplant consultations.
4. This study emphasizes the need for timely referral to urology (andrology) and psychiatric clinics for further management of individuals who possess the affected variable (erectile dysfunction and depression respectively)
5. More studies with large sample sizes and standardized outcomes are needed to validate our findings.
6. Implementation of screening strategies and appropriate management are needed to reduce the burden of ED among KTRs.
7. Sexual function assessment of other domains, assessment of hormonal profile that can affect erectile function, and evaluation of the effectiveness of sildenafil treatment for erectile dysfunction among kidney transplant recipients is another area of research in our settings

## REFERENCES


1. Abecassis M, Bartlett ST, Collins AJ, Davis CL, Delmonico FL, Friedewald JJ, et al. Kidney transplantation as primary therapy for end-stage renal disease: A National Kidney Foundation/Kidney Disease Outcomes Quality Initiative (NKF/KDOQI$^{TM}$) conference. Clin J Am Soc Nephrol. 2008;3(2).
2. Perri A, Izzo G, Lofaro D, La Vignera S, Brunetti A, Calogero AE, et al. Erectile dysfunction after kidney transplantation. J Clin Med. 2020;9(6).
3. Caretta N, Foresta C. Clinical diagnostic approach to erectile dysfunction. Vol. 59, Minerva Ginecologica. 2007.
4. Fiuk J V., Tadros NN. Erectile dysfunction in renal failure and transplant patients. Vol. 8, Translational Andrology and Urology. 2019.
5. Gonçalves PRC, Loureiro LM, Fernandes MID. Sexual function of kidney transplant recipients. Rev Enferm Ref. 2019;2019(21).
6. Abarca-Durán X, Fernández-Medina IM, Jiménez-Lasserrotte MDM, Dobarrio-Sanz I, Martínez-Abarca AL, Fernández-Sola C. Sexuality in kidney transplant recipients: A qualitative study. Healthc. 2021;9(11).
7. Sadasukhi N, Patel K, Sadasukhi T, Gupta M, Gupta H, Sharma A, et al. Erectile dysfunction in renal transplant patient - A prospective observational study. Indian J Transplant. 2021;15(4).
8. Rebollo P, Ortega F, Valdés C, Fernández-Vega F, Ortega T, García-Mendoza M, et al. Influence of erectile dysfunction on health related quality of life of male kidney transplant patients. Int J Impot Res. 2004;16(3).
9. Riátiga D, Salgado Sánchez LE, Quiroz Y. Effect of kidney transplant in the perception of sexual function in patients with terminal renal failure. Urol Colomb. 2015;24(2).
10. Lehmann K, Eichlisberger R, Gasser TC. Lack of diagnostic tools to prove erectile dysfunction: Consequences for reimbursement? J Urol. 2000;163(1).
11. El-Bahnasawy MS, El-Assmy A, El-Sawy E, Ali-El Dein B, Shehab El-Dein AB, Refaie A, et al. Critical evaluation of the factors influencing erectile function after renal transplantation. Int J Impot Res. 2004;16(6).
12. A. S, S.M. M, B. A. Erectile function in end-stage renal disease before and

after renal transplantation. Transplant Proc. 2005;37(7).

13. P. P. Improvement of erectile dysfunction post renal transplantation: A systematic review and meta-analysis. Int J Urol. 2019;26(Supplement 2).
14. Nassir A. Sexual function in male patients undergoing treatment for renal failure: A prospective view. J Sex Med. 2009;6(12).
15. Mirone V, Longo N, Fusco F, Verze P, Creta M, Parazzini F, et al. Renal Transplantation Does Not Improve Erectile Function in Hemodialysed Patients. Eur Urol. 2009;56(6).
16. Rahman IA, Rasyid N, Birowo P, Atmoko W. Effects of renal transplantation on erectile dysfunction: a systematic review and meta-analysis. Int J Impot Res. 2022;34(5).
17. Steiner T, Wunderlich H, Ott U. Sexuality after kidney transplantation . Urol - Ausgabe A. 2009;48(12).
18. Mekki MO, El Hassan KA, El Mahdi EM, Haroun HH, Mohammed MA, Khamis KH, et al. Prevalence and associated risk factors of male erectile dysfunction among patients on hemodialysis and kidney transplant recipients: a cross-sectional survey from Sudan. Saudi J Kidney Dis Transpl. 2013;24(3).
19. Sharma RK, Prasad N, Gupta A, Kapoor R. Treatment of Erectile Dysfunction With Sildenafil Citrate in Renal Allograft Recipients: A Randomized, Double-Blind, Placebo-Controlled, Crossover Trial. Am J Kidney Dis. 2006;48(1).
20. Russo D, Musone D, Alteri V, Cindolo L, Lanzillo B, Federico S, et al. Erectile dysfunction in kidney transplanted patients: Efficacy of sildenafil. J Nephrol. 2004;17(2).
21. Malavaud B, Rostaing L, Rischmann P, Sarramon JP, Durand D. High prevalence of erectile dysfunction after renal transplantation. Transplantation. 2000;69(10).
22. Rosen RC, Cappelleri JC, Smith MD, Lipsky J, Peñ BM. Development and evaluation of an abridged, 5-item version of the International Index of Erectile Function (IIEF-5) as a diagnostic tool for erectile dysfunction. Int J Impot Res. 1999;11(6).
23. Jürgensen JS, Ulrich C, Hörstrup JH, Brenner MH, Frei U, Kahl A. Sexual Dysfunction After Simultaneous Pancreas-Kidney Transplantation.

Transplant Proc. 2008;40(4).

24. Tian X hui, Xue W jun, Li D qing, Tian P xun, Ding X ming, Pan X ming, et al. Impacts of kidney transplantation on erectile function and its contributing factors evaluation. Zhonghua Nan Ke Xue. 2007;13(5).
25. Miron A, Nistor I, Morosanu C, Siriteanu L, Covic A. Clinical Implications and Risk Factors for Erectile Dysfunction in Kidney Transplant: A Single-Center Assessment. Cureus. 2023;
26. Espinoza R, Gracida C, Cancino J, Ibarra A. Prevalence of Erectile Dysfunction in Kidney Transplant Recipients. Transplant Proc. 2006;38(3).
27. Tian Y, Ji ZG, Tang YW, Zhang L, Lü WC, Lin J, et al. Prevalence and influential factors of erectile dysfunction in male renal transplant recipients: A multiple center survey. Chin Med J (Engl). 2008;121(9).
28. Lee S, Coco M, Greenstein SM, Schechner RS, Tellis VA, Glicklich DG. The effect of sirolimus on sex hormone levels of male renal transplant recipients. Clin Transplant. 2005;19(2).
29. Feldman HA, Goldstein I, Hatzichristou DG, Krane RJ, McKinlay JB. Impotence and its medical and psychosocial correlates: Results of the Massachusetts Male Aging Study. J Urol. 1994;151(1).
30. Akkus E, Kadioglu A, Esen A, Doran S, Ergen A, Anafarta K, et al. Prevalence and correlates of erectile dysfunction in Turkey: A population-based study. Eur Urol. 2002;41(3).
31. Teng LC, Wang CX, Chen L. Improved erectile function and sex hormone profiles in male Chinese recipients of kidney transplantation. Clin Transplant. 2011;25(2).
32. Liao Z, Tang Y, Li X, Li D. The Relationship Between Hematologic Parameters and Erectile Dysfunction. Sex Med. 2021;9(4).
33. El-Bahnasawy MS, El-Assmy A, Dawood A, Abobieh E, Ali-El Dein B, Shehab El-Din AB, et al. Effect of the use of internal iliac artery for renal transplantation on penile vascularity and erectile function: A prospective study. J Urol. 2004;172(6 I).
34. Ji ZG, Tian Y, Tang YW, Guo HB, Zhang L, Lin J, et al. Influence of the interruption of arteria iliaca interna distal end on penile vascularity and erectile

function in male renal transplant recipients. Zhonghua Nan Ke Xue. 2010;16(4).

35. Gontero P, Oderda M, Filippini C, Fontana F, Lazzarich E, Stratta P, et al. Does kidney transplantation onto the external iliac artery affect the haemodynamic parameters of the cavernosal arteries? Asian J Androl. 2012;14(4).
36. Wang X, Huang J, Fu W, Qu L. Study on the related factors with erectile dysfunction of male patients after kidney transplantation. Chinese J Androl. 2009;23(12).
37. Miron A, Stefan AE, Nistor I, Kanbay M, Covic A, Morosanu C, et al. The impact of renal transplantation on sexual function in males with end-stage kidney disease: a systematic review and meta-analysis. Int Urol Nephrol. 2023;55(3).
38. Ahmad M, Rafiuddin Q, Hassan U, Ahmad A, Husain S. Impact of renal transplantation on erectile dysfunction due to chronic renal failure in male patients. J Ayub Med Coll Abbottabad. 2009;21(1).
39. Gittes RF, Waters WB. Sexual impotence: The overlooked complication of a second renal transplant. J Urol. 1979;121(6).
40. Lofaro D, Perri A, Aversa A, Aquino B, Bonofiglio M, La Russa A, et al. Testosterone in renal transplant patients: effect on body composition and clinical parameters. J Nephrol. 2018;31(5).

# APPENDICES

## Appendix I: Informed Consent Form (English Version)

**MUHIMBILIN UNIVERSITY OF HEALTH AND ALLIED SCIENCES DIRECTORATE OF RESEARCH AND PUBLICATIONS, MUHAS CONSENT FORM**

CODE NO ----------

CONSENT TO PARTICIPATE IN THE STUDY ON ASSESSMENT OF ERECTILE FUNCTION AMONG KIDNEY TRANSPLANT RECIPIENTS AT MUHIMBILI NATIONAL HOSPITAL.

Greetings,

My name is Dr. DENIS DAUDI KANYIKA

I am a postgraduate student in urology department at MUHAS,

**PURPOSE OF THE STUDY**: The study intends to assess erectile function and associated factors among kidney transplant recipients before and after transplantation at Muhimbili National Hospital.

**WHAT THE PARTICIPATION INVOLVES:** If you agree to take part in the study, you will be required to participate in an interview where a thorough clinical history of your illness will be obtained.

**CONFIDENTIALITY**: The information you provide in this research will be treated with utmost confidentiality. all information collected in questionnaires will be entered into a computer with an identification number.

The information will be exclusively utilized for this research.

**RIGHT TO WITHDRAW AND ALTERNATIVES**: Participating in this study is entirely voluntary. If you withdraw from the study, you will still receive all the standard services provided by the clinic.

**BENEFITS**: By consenting to participate in this study, individuals experiencing erectile dysfunction will be provided with expert guidance on the management of this condition. Our goal is to improve sexual-related quality of life among kidney transplant recipients by using the data from this study will help clinicians to stratify patients and subsequent implementation of appropriate treatment regimens. The use of patient's information for this study is not accompanied by any financial benefit

**RISK**: Participating in this study has no risks. In any case, the research won't alter the details of the patient's case notes; instead, it will only pay attention to the connections between the listed components

**DECLARATION**

I ……. have read the consent form.

My questions have been answered. I agree/disagree to participate in this study

Signature of participant …….

Signature of witness……

Date of signs consent ……

**Who to contact:**

If you have any inquiries regarding the study, please reach out to Dr. Denis Daudi Kanyika a urology resident in the department of surgery at Muhimbili University of Health and Allied Sciences (MUHAS), is the principal investigator for the study, with any questions you may have about it. contact: P.O Box 65001, Dar es Salaam, mobile +255757666623, +255675311877

Email: dr.kanyika@gmail.com

**Appendix II**: **Study Questionnaire (English Version)**

**PRE-TRANSPLANT QUESTIONNAIRE**

PLEASE COMPLETE ALL QUESTIONS BY TICKING THE RELEVANT OPTION (S) OR FILL IN /ANSWERS IN BLANK BLOCKS

**A: DEMOGRAPHIC DETAILS**

The following questions are general:

Study number: ----------

Date of interview----------

Residence: ----------

Mobile phone ----------

## First section: Socio-demographic characteristics

| No | Question | Coding categories | Response |
|---|---|---|---|
| 1. | How old are you? | Age (years)…… | |
| 2. | Marital status? | 1. Married<br>2. Divorced<br>3. Cohabiting<br>4. Widowed | ( ) |
| 3. | What is your education level? | 1. Not educated<br>2. Primary<br>3. Secondary<br>4. College/ university | ( ) |
| 4. | Current occupation? | 1. Employed<br>2. Unemployed<br>3. Self-employed<br>4. Retired | ( ) |

**Second section: Risk factors**

| | | | |
|---|---|---|---|
| 5 | How long has it been since you were diagnosed with end-stage renal disease? | 1. ≤ 6 months<br>2. > 6 months | ( ) |
| 6 | Have you been on dialysis before a kidney transplant? | 1. Yes<br>2. No | ( ) |
| 7 | Which type of dialysis were you on? | 1. Hemodialysis<br>2. peritoneal | ( ) |
| 8 | How long have you ever been on dialysis before kidney transplant (months) | 1. ≤ 6 months<br>2. > months | ( ) |
| 10 | Have you ever smoked cigarettes? | 1. Yes<br>2. No | ( ) |
| 11 | Have you ever drunk alcohol? | 1. Yes<br>2. No | ( ) |
| 12 | Did you suffer from diabetes mellitus | 1. Yes<br>2. No | ( ) |
| 13 | Did you suffer from high blood pressure (Hypertension) | 1. Yes<br>2. No | ( ) |
| 14 | Did you suffer from urological diseases | 1. Yes<br>2. No | ( ) |
| 15 | Have you suffered from lower urinary tract symptoms? | 1. Yes<br>2. No | |
| 16 | Did you suffer from cardiac diseases | 1. Yes<br>2. No | ( ) |
| 17 | Did you have a history of high cholesterol level | 1. Yes<br>2. No | |
| 18 | Are you being treated for any of the above? | 1. Yes<br>2. No | ( ) |
| 19 | If yes mention the medications, you were using.<br>…… | | |

**Third section: Depression Assessment**

20 How often were you bothered by the below symptoms?

1. Little interest or pleasure in doing things ( )
2. Feeling down, depressed, or hopeless ( )
3. Trouble falling or staying asleep, or sleeping too much ( )
4. Feeling tired or having little energy ( )
5. Poor appetite or overeating ( )
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down ( )
7. Trouble concentrating on things, such as reading the newspaper or watching television ( )
8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual ( )
9. Thoughts that you would be better off dead or hurting yourself in some way ( )

TOTAL SCORE……

| Answers | | | |
|---|---|---|---|
| Not at all | Several days | More than half the days | Nearly every day |
| 0 | 1 | 2 | 3 |

Reference score

0-4 no depression

5-9 mild depression

10-14 moderate depression

15-19 moderate severe

20-27 severe depression

**Fourth section: Erectile function assessment**

| | | | | | |
|---|---|---|---|---|---|
| 1. How do you rate your confidence that you could get and keep an erection? | Very low (1) | Low (2) | Moderate (3) | High (4) | Very high (5) |
| 2. When you had erections with sexual stimulation, how often were your erections hard enough for penetration? | Almost never/never (1) | A few times (2) | Sometimes (3) | Most times (4) | Almost always/always (5) |
| 3. During sexual intercourse, how often were you able to maintain your erection after you had penetrated (entered) your partner? | Almost never/never (1) | A few times (2) | Sometimes (3) | Most times (4) | Almost always/always (5) |
| 4. During sexual intercourse, how difficult was it to maintain your erection to completion of intercourse? | Extremely difficult (1) | Very difficult (2) | Difficult (3) | Slightly difficult (4) | Not difficult (5) |
| 5. When you attempted sexual intercourse, how often was it satisfactory for you? | Almost never/never (1) | A few times (2) | Sometimes (3) | Most times (4) | Almost always/always (5) |
| **IIEF-5 scoring:**<br>The IIEF-5 score is the sum of the ordinal responses to the 5 items.<br>22-25: No erectile dysfunction | | | | | |

17-21: Mild erectile dysfunction

12-16: Mild to moderate erectile dysfunction

8-11: Moderate erectile dysfunction

5-7: Severe erectile dysfunction **TOTAL SCORE _____**

The International Index of Erectile Function (IIEF-5) Questionnaire-**PRE-TRANSPLANT IIEF-5**

**Fifth section**: Biometric data and laboratory results

Weight……kg Height…….cm Hemoglobin level …. g/dl (countercheck from Jeeva)

**POST-TRANSPLANT QUESTIONNAIRE** (at least 6 months after transplantation)

**First section:** Socio-demographic characteristics

| No. | Question | Coding categories | Response |
|---|---|---|---|
| 1 | How old are you? | Age (years)…… | |
| 2 | Marital status? | 5. Married<br>6. Divorced<br>7. Cohabiting<br>8. Widowed | ( ) |
| 3 | What is your education level? | 5. Not educated<br>6. Primary<br>7. Secondary<br>8. College/ university | ( ) |
| 4 | Current occupation? | 5. Employed<br>6. Unemployed<br>7. Self-employed<br>8. Retired | ( ) |

**Second section**: Risk factors

| | | | |
|---|---|---|---|
| 5 | How long has it been since you were diagnosed with end-stage renal disease? | 3. ≤ 6 months<br>4. > 6 months | ( ) |
| 6 | Have you been on dialysis before a kidney transplant? | 3. Yes<br>4. No | ( ) |
| 7 | Which type of dialysis were you on? | 3. Hemodialysis<br>4. peritoneal | ( ) |
| 8 | How long have you ever been on dialysis before kidney transplant (months) | 3. ≤ 6 months<br>4. > months | ( ) |
| 9 | Have you been on dialysis after a kidney transplant? | 1. No<br>2. Yes | ( ) |
| 10 | Have you ever smoked cigarettes? | 3. Yes<br>4. No | ( ) |
| 11 | Have you ever drunk alcohol? | 3. Yes<br>4. No | ( ) |
| 12 | Did you suffer from diabetes mellitus | 3. Yes<br>4. No | ( ) |
| 13 | Did you suffer from high blood pressure (Hypertension) | 3. Yes<br>4. No | ( ) |
| 14 | Did you suffer from urological diseases | 3. Yes<br>4. No | ( ) |
| 15 | Have you suffered from lower urinary tract symptoms? | 3. Yes<br>4. No | |
| 16 | Did you suffer from cardiac diseases | 3. Yes<br>4. No | ( ) |
| 17 | Did you have a history of high cholesterol level in the blood | 3. Yes<br>4. No | |
| 18 | Are you being treated for any of the above? | 3. Yes<br>4. No | ( ) |
| 19 | If yes mention the medications, you were using?<br>…… | | |

**Third section:** Depression assessment.

<table>
<tr>
<td>20</td>
<td>How often were you bothered by the below symptoms?<br><br>1. Little interest or pleasure in doing things ( )<br>2. Feeling down, depressed, or hopeless ( )<br>3. Trouble falling or staying asleep, or sleeping too much ( )<br>4. Feeling tired or having little energy ( )<br>5. Poor appetite or overeating ( )<br>6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down ( )<br>7. Trouble concentrating on things, such as reading the newspaper or watching television ( )<br>8. Moving or speaking so slowly that other people could have noticed? Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual ( )<br>9. Thoughts that you would be better off dead or hurting yourself in some way ( )<br>TOTAL<br><br>SCORE……<br><br>
<table>
<tr><td colspan="4">Answers</td></tr>
<tr><td>Not at all</td><td>Several days</td><td>More than half the days</td><td>Nearly every day</td></tr>
<tr><td>0</td><td>1</td><td>2</td><td>3</td></tr>
</table>
Reference score<br><br>0-4 no depression<br><br>5-9 mild depression<br><br>10-14 moderate depression<br><br>15-19 moderate severe<br><br>20-27 severe depression</td>
</tr>
</table>

**Fourth section**: Kidney transplant details

| | | |
|---|---|---|
| 21 | How long have you ever been transplanted? | ……(years/months) |
| 22 | How do you relate with your kidney donor? | 1. Related<br>2. Not related<br>3. Deceased |
| 23 | Which country did you do your kidney transplantation ……<br>If Tanzania, mention the name of hospital…… | |
| 24 | Have you done more than one kidney transplant? | . 1. Yes<br>2. No |
| 25 | What was the mode of arterial anastomosis during transplantation? (check surgical notes) | 1. End-to-end anastomosis<br>2. End to side anastomosis |
| 26 | Which recipient vessels do they use for anastomosis during transplantation? (check surgical notes) | 1. Internal iliac artery<br>2. External iliac artery<br>3. Common Iliac<br>4. Inferior vena cava |
| 27 | Have you ever been dialyzed after kidney transplantation | 1. Yes<br>2. No |
| 28 | Did you receive a blood transfusion after kidney transplantation | 1. Yes<br>2. No |
| 29 | Mention drugs you use after kidney transplant. (countercheck file/records)<br>……..<br>……..<br>…….. | |

**Fifth section: Erectile function assessment**

The International Index of Erectile Function (IIEF-5) Questionnaire-**POST-TRANSPLANT IIEF-5**

| | | | | | |
|---|---|---|---|---|---|
| 1. How do you rate your confidence that you could get and keep an erection? | Very low (1) | Low (2) | Moderate (3) | High (4) | Very high (5) |
| 2. When you had erections with sexual stimulation, how often were your erections hard enough for penetration? | Almost never/never (1) | A few times (2) | Sometimes (3) | Most times (4) | Almost always/always (5) |
| 3. During sexual intercourse, how often were you able to maintain your erection after you had penetrated (entered) your partner? | Almost never/never (1) | A few times (2) | Sometimes (3) | Most times (4) | Almost always/always (5) |
| 4. During sexual intercourse, how difficult was it to maintain your erection to completion of intercourse? | Extremely difficult (1) | Very difficult (2) | Difficult (3) | Slightly difficult (4) | Not difficult (5) |
| 5. When you attempted sexual intercourse, how often was it satisfactory for you? | Almost never/never (1) | A few times (2) | Sometimes (3) | Most times (4) | Almost always/always (5) |

**IIEF-5 scoring:**

The IIEF-5 score is the sum of the ordinal responses to the 5 items.

22-25: No erectile dysfunction

17-21: Mild erectile dysfunction

12-16: Mild to moderate erectile dysfunction

8-11: Moderate erectile dysfunction

5-7: Severe erectile dysfunction **TOTAL SCORE _____**

**Sixth section**: Biometric data and laboratory results

Weight……kg. Height…….cm Hemoglobin level …. g/dl (countercheck from Jeeva)

**Appendix III: Fomu Ya Idhini Ya Habari Na Dodoso La Utafiti (Toleo La Kiswahili)**

CHUO KIKUU CHA AFYA NA SAYANSI SHIRIKISHI CHA MUHIMBILI KURUGENZI YA TAFITI NA MACHAPISHO

NAMBA YA SIRI ……

KUKUBALI KUSHIRIKI KATIKA UTAFITI WA NGUVU ZA KIUME KWA WAGONJWA WALIOPANDIKIZWA FIGO KATIKA HOSPITALI YA TAIFA YA MUHIMBILI.

Habari,
Mimi naitwa Dr DENIS DAUDI KANYIKA.

Ni mwanafunzi wa uzamili katika idara ya upasuaji, chuo kikuu cha afya na sayansi shirikishi cha Muhimbili.

**MADHUMUNI YA UTAFITI** Kuchunguza tatizo la nguvu za kiume na mambo yanayohusiana kwa wagonjwa waliopandikizwa figo kabla na baada ya upandikizaji katika hospitali ya taifa ya Muhimbili

**JINSI YA KUSHIRIKI**. Kama unakubali kushiriki, utafanyiwa usaili na kuulizwa maswali kuhusu historia ya ugonjwa wako.

**USIRI.** Taarifa zote utakazotoa kwenye utafiti huu zitatunzwa kwa usiri mkubwa. Taarifa zitakazo kusanywa zitaingizwa kwenye tarakilishi, zikiwa na namba ya siri. Taarifa zitatumika kwa ajili ya utafiti 65abari.

**HAKI YA KUJITOA KWENYE UTAFITI.** Kushiriki kwenye utafiti ni hiari yako. Kama utachagua kutoshiriki, utaendelea kupata huduma za afya kutoka hospitalini kama awali.

**FAIDA.** Iwapo utakubali kushiriki katika utafiti huu na iwapo itagundulika una tatizo la upungufu wa nguvu za kiume, utaweza kupata ushauri wa kitaalamu jinsi ya kukabiliana na tatizo hili. Lengo letu ni kuboresha ubora wa 65abari unaohusiana na kujamiiana miongoni mwa wagonjwa waliopandikizwa figo, kwa kutumia taarifa za utafiti huu utasaidia wataalamu wa afya kugundua utekelezaji wa utaratibu sahihi wa matibabu. Matumizi ya 65abari za mgonjwa kwa utafiti huu haifuatani na faida yoyote ya kifedha

ATHARI. Hakuna athari zozote utakazozipata kutokana na ushiriki huu. Kwa hali yoyote, utafiti hautabadilisha maelezo ya faili za mgonjwa, badala yake, itazingatia tu uhusiano na vipengele vilivyoorodheshwa

**TAMKO** Mimi ……. Nimeelezwa /nimesoma maelezo haya. Maswali yangu yamejibiwa.

Nimekubali/Nimekataa kushiriki kwenye utafiti huu.

Sahihi ya mgonjwa …….

Sahihi ya ndugu /shahidi …….

Sahihi ya mtafiti …….

Tarehe …….

**NANI WA KUWASILIANA NAE?**

Endapo unahitaji kupata maelezo yoyote kuhusu utafiti, wasilliana na Dr Denis Daudi Kanyika, mwanafunzi wa uzamili kutoka idara ya upasuaji katika Chuo Kikuu

cha Afya na Sayansi shirikishi cha Muhimbili (MUHAS), ndiye mchunguzi mkuu wa utafiti huo, na maswali yoyote unayoweza kuwa nayo unaweza kumuuliza. Wasiliana: S.L.P. 65001, Dar es Salaam, simu +2557576623, +255675311877 Barua pepe: dr.kanyika@gmail.com

## Appendix IV: Dodoso La Utafiti (Toleo La Kiswahili)

**DODOSO LA KABLA YA UPANDIKIZAJI FIGO**

TAFADHALI KAMILISHA MASWALI YOTE KWA KUANDIKA CHAGUO HUSIKA AU JAZA MAJIBU KATIKA VITALU TUPU

**A:** TABIA ZA KIDEMOGRAFIA

Maswali yafuatayo ni ya jumla:

Nambari ya Utafiti: ----------

Tarehe ya mdahalo----------

Makazi ----------

Nambari ya simu ----------

**Sehemu ya kwanza:** tabia za kijamii na kidemografia

| Nambari | Swali | Kategoria za usimbaji | Jibu |
|---|---|---|---|
| 1. | Una miaka mingapi? | Umri (miaka)……. | |
| 2. | Hali ya ndoa? | 9. Kuolewa<br>10. Kuachika<br>11. Kuishi Pamoja bila ndoa<br>12. amefariki | ( ) |
| 3. | Una kiwango gani cha elimu? | 9. sijasoma<br>10. msingi<br>11. sekondari<br>12. Chuo | ( ) |
| 4. | Kazi? | 9. Kuajiriwa<br>10. Sina ajira<br>11. Nimejiajiri<br>12. Nimestaafu | ( ) |

**Second section: Risk factors**

| | | | |
|---|---|---|---|
| 5. | Ni muda gani umepita tangu ulipogunduliwa na ugonjwa wa figo ulio katika hatua ya mwisho? | 5. ≤ miezi 6<br>6. > miezi 6 | ( ) |
| 6. | Umewahi kupata tiba ya kuchuja sumu kwa mashine? | 5. Ndio<br>6. Hapana | ( ) |
| 7. | Ni aina gani ya kuchuja sumu? | 5. Kupitia mishipa ya damu<br>6. Kupitia tumboni | ( ) |
| 8. | Umechuja sumu kwa muda gani kabla ya kupandikizwa figo (miezi) | 5. ≤ miezi 6<br>6. > miezi 6 | ( ) |
| 9. | Umewahi kuvuta sigara? | 5. Ndio<br>6. Hapana | ( ) |
| 10. | Umewahi kunywa pombe? | 5. Ndio<br>6. Hapana | ( ) |
| 11. | Ulikua unasumbuliwa na kisukari | 1. Ndio<br>2. Hapana | ( ) |
| 12. | Ulikua unasumbuliwa na shinikizo la damu | 1. Ndio<br>Hapana | ( ) |
| 13. | Ulikua unasumbuliwa na matatizo ya mfumo wa mkojo na uzazi | 1. Ndio<br>Hapana | ( ) |
| 14. | Je Ulikua unasumbuliwa na dalili za mfumo wa mkojo? | 1. Ndio<br>Hapana | |
| 15. | Je Ulikua unasumbuliwa na magonjwa ya moyo? | 1. Ndio<br>Hapana | ( ) |
| 16 | Je ulikua na historia ya kuwa na kiwango kikubwa cha mafuta kwenye damu (cholesterol) | 1. Ndio<br>Hapana | |
| 17. | Umewahi kupata tiba ya magonjwa hayo hapo juu? | 5. Ndio<br>6. Hapana | ( ) |
| 18. | Kama ndio taja madawa ambayo ulikua unatumia.<br>…… | | |

**Sehemu ya tatu: Tathmini ya unyogovu (Depression)**

<table>
<tr>
<td>19</td>
<td>Ni mara ngapi ulisumbuliwa na dalili zifuatazo<br><br>10. Nia au raha kidogo katika kufanya mambo<br>11. Kujihisi kuwa chini, kuwa na huzuni au kutokua na matumaini ( )<br>12. Shida ya kulala, kupata usingizi au kulala sana kupitiliza ( )<br>13. Kujihisi mchovu au kuwa na nguvu kidogo ( )<br>14. Kukosa hamu ya kula au kula kupita kiasi ( )<br>15. Kujihisi vibaya au kwamba umeshindwa au umejiangusha mwenyewe au umeiangusha familia yako ( )<br>16. Shida ya kuzingatia mambo kama vile kusoma gazeti au kuangalia televisheni ( )<br>17. Kutembea au kuongea kwa taratibu sana hadi watu kuweza kutambua hayo mabadiliko uliyonayo. ( )<br>18. Mawazo kwamba bora ungekufa au kujiumiza kwa njia fulani ( )<br><br>Jumla ya alama……<br><br>
<table>
<tr><td colspan="4">MAJIBU</td></tr>
<tr><td>Hapana kabisa</td><td>Siku kadhaa</td><td>Zaidi ya nusu ya siku</td><td>Karibu kila siku</td></tr>
<tr><td>0</td><td>1</td><td>2</td><td>3</td></tr>
</table>
Marejeo ya alama<br><br>0-4 hakuna unyogovu<br><br>5-9 unyogovu mdogo<br><br>10-14 unyogovu mdogo hadi wa wastani<br><br>15-19 unyogovu wa wastani<br><br>20-27 unyogovu mkali</td>
</tr>
</table>

**Dodoso la Kimataifa la kupima nguvu za kiume (IIEF-5)-KABLA ya kupandikizwa figo.**

| | | | | | |
|---|---|---|---|---|---|
| 1. Je, unakadiriaje kujiamini kwako kwamba unaweza kusimamisha uume? | Chini sana (1) | Chini (2) | Wastani (3) | Juu(4) | Juu zaidi (5) |
| 2. Ulipopata kusimamisha uume baada ya msisimko wa kutaka kujamiiana, ni mara ngapi kusimamisha huko kulikua na ugumu wa kutosha kupenya? | Kamwe (1) | Mara chache (2) | Kuna nyakati (3) | Mara nyingi (4) | Karibu kila mara/Kila mara (5) |
| 3. Wakati wa kujamiiana, ni mara ngapi uliweza kuwa na uume endelevu uliosimama baada ya kupenya (kuingia) kwa mwenzi wako? | Kamwe (1) | Mara chache (2) | Kuna nyakati (3) | Mara nyingi (4) | Karibu kila mara/Kila mara (5) |
| 4. Wakati wa kujamiiana, ilikuwa vigumu kiasi gani kudumisha uume wako hadi kukamilika kwa tendo la kujamiiana? | Vigumu sana sana (1) | Vigumu sana (2) | Vigumu (3) | Kidogo ilikua vigumu (4) | Haijawahi kuwa vigumu (5) |
| 5. Ulipojaribu kujamiiana, ni mara ngapi tendo lilikuwa la kuridhisha kwako? | Kamwe (1) | Mara chache (2) | Kuna nyakati (3) | Mara nyingi (4) | Karibu kila mara/Kila mara (5) |

**Marejeo ya alama za dodoso:**

22-25: Hakuna ukosefu wa nguvu za kiume

17-21: Ukosemu wa nguvu za kiume mdogo

12-16: Ukosefu wa nguvu za kiume mdogo hadi wa kati

8-11: Ukosefu wa nguvu za kiume wa kati

5-7: Ukosefu mkali wa nguvu za kiume **Jumla ya alama**

_____

**Sehemu ya tano:** Vipimo vya biometrika na majibu ya maabara Uzito…….kg Urefu……cm Kiwango cha damu…….g/dl (majibu ya damu hakikisha kupitia mfumo wa jeeva wa hospitali)

**DODOSO LA BAADA YA UPANDIKIZAJI FIGO**

**Sehemu ya kwanza:** Tabia za kijamii na kidemografia

| Namba ya swali | Swali | Kategoria za usimbaji | Jibu |
|---|---|---|---|
| 1. | Una miaka mingapi? | umri (miaka)……. | |
| 2. | Hali ya ndoa? | 13. Kuolewa<br>14. Kuachika<br>15. Kuishi Pamoja bila ndoa<br>16. amefariki | ( ) |
| 3. | Una kiwango gani cha elimu? | 13. sijasoma<br>14. msingi<br>15. sekondari<br>16. Chuo | ( ) |
| 4. | Kazi? | 13. Kuajiriwa<br>14. Sina ajira<br>15. Nimejiajiri<br>16. Nimestaafu | ( ) |

**Sehemu ya pili: Mambo hatarishi**

| | | | |
|---|---|---|---|
| 5. | Ni muda gani umepita tangu ulipogunduliwa na ugonjwa wa figo ulio katika hatua ya mwisho? | 7. ≤ miezi 6<br>8. > miezi 6 | ( ) |
| 6. | Umewahi kupata tiba ya kuchuja sumu kwa mashine? | 7. Yes<br>8. No | ( ) |
| 7. | Ni aina gani ya kuchuja sumu? | 7. Kupitia mishipa ya damu<br>8. Kupitia tumboni | ( ) |
| 8. | Umechuja sumu kwa muda gani kabla ya kupandikizwa figo (miezi) | 7. ≤ miezi 6<br>8. > miezi 6 | ( ) |
| 9. | Umewahi kuvuta sigara? | 7. Ndio<br>8. Hapana | ( ) |
| 10. | Umewahi kunywa pombe? | 7. Ndio<br>8. Hapana | ( ) |
| 11. | Ulikua unasumbuliwa na kisukari | 3. Ndio<br>4. Hapana | ( ) |
| 12. | Ulikua unasumbuliwa na shinikizo la damu | 2. Ndio<br>Hapana | ( ) |
| .13 | Ulikua unasumbuliwa na matatizo ya mfumo wa mkojo na uzazi | 2. Ndio<br>Hapana | ( ) |
| 14. | Je Ulikua unasumbuliwa na dalili za mfumo wa mkojo? | 2. Ndio<br>Hapana | |
| 15. | Je Ulikua unasumbuliwa na magonjwa ya moyo? | 2. Ndio<br>Hapana | ( ) |
| 16. | Je uliwahi kuwa na historia ya kuwa na kiwango kikubwa cha mafuta kwenye damu (cholesterol) | 2. Ndio<br>Hapana | ( ) |
| 17 | Umewahi kupata tiba ya magonjwa hayo hapo juu? | 7. Ndio<br>8. Hapana | ( ) |
| 18 | Kama ndio taja madawa ambayo ulikua unatumia.<br>…… | | |

**Sehemu ya tatu: Tathmini ya unyogovu (Depression)**

Q19

Ni mara ngapi ulisumbuliwa na dalili zifuatazo

19. Nia au raha kidogo katika kufanya mambo
20. Kujihisi kuwa chini, kuwa na huzuni au kutokua na matumaini ( )
21. Shida ya kulala, kupata usingizi au kulala sana kupitiliza ( )
22. Kujihisi mchovu au kuwa na nguvu kidogo ( )
23. Kukosa hamu ya kula au kula kupita kiasi ( )
24. Kujihisi vibaya au kwamba umeshindwa au umejiangusha mwenyewe au umeiangusha familia yako ( )
25. Shida ya kuzingatia mambo kama vile kusoma gazeti au kuangalia televisheni ( )
26. Kutembea au kuongea kwa taratibu sana hadi watu kuweza kutambua hayo mabadiliko uliyonayo. ( )
27. Mawazo kwamba bora ungekufa au kujiumiza kwa njia fulani ( )

**Jumla ya alama**……

| MAJIBU | | | |
|---|---|---|---|
| Hapana kabisa | Siku kadhaa | Zaidi ya nusu ya siku | Karibu kila siku |
| 0 | 1 | 2 | 3 |

Marejeo ya alama

0-4 hakuna unyogovu

5-9 unyogovu mdogo

10-14 unyogovu mdogo hadi wa wastani

15-19 unyogovu wa wastani

20-27 unyogovu mkali

**Sehemu ya nne**: taarifa za upandikizaji figo

| | | |
|---|---|---|
| | Ni muda gani umepita tangu ulipopandikizwa figo | ……(miaka/miezi) |
| | Je mnauhusiana vipi na mtoaji wako wa figo? | 4. Tuna uhusiano<br>5. Hatuna uhusiano<br>6. Kutoka kwenye mtu aliyefariki |
| | Ulipandikiza figo yako nchi gani?……Kama ni Tanzania taja jina la hospitali hiyo…….. | |
| | Je umepandikiza figo zaidi ya moja | 1. Ndio<br>2. Hapana |
| | Je ni njia gani ilitumika kuunganisha mishipa ya ateri wakati wa kupandikiza? ( angalia maelezo ya upasuaji kutoka katika ruhusa ya mgonjwa) | 1. End to end anastomosis<br>2. End to side anastomosis |
| | Mshipa gani wa damu wa mgonjwa ulitumika kuunganisha na mishipa ya figo ya mtoaji? (angalia maelezo ya upasuaji kutoka katika ruhusa ya mgonjwa) | 1.Internal iliac artery<br>2.External iliac artery<br>3.Common Iliac<br>4.Inferior vena cava |
| | Je umewahi kuchuja sumu baada ya kupandikizwa figo | . 1.Ndio<br>2. Hapana |
| | Je uliwahi kuongezewa damu baada ya kupandikiwa figo | 1.Yes<br>2.No |
| | Taja dawa unazotumia baada ya kupandikizwa figo. (jiridhishe na taarifa kutoka kwenye faili au masijala)<br>……..<br>……..<br>…….. | |

| | | | | | |
|---|---|---|---|---|---|
| 1. Je, unakadiriaje kujiamini kwako kwamba unaweza kusimamisha uume? | Chini sana (1) | Chini (2) | Wastani (3) | Juu(4) | Juu zaidi (5) |
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**Marejeo ya alama za dodoso**

22-25: Hakuna ukosefu wa nguvu za kiume

17-21: Ukosemu wa nguvu za kiume mdogo

12-16: Ukosefu wa nguvu za kiume mdogo hadi wa kati

8-11: Ukosefu wa nguvu za kiume wa kati

5-7: Ukosefu mkali wa nguvu za kiume **Jumla ya alama** _____

**Dodoso la Kimataifa la kupima nguvu za kiume (IIEF-5)-BAADA ya kupandikizwa figo.**

**Sehemu ya sita:** Vipimo vya biometrika na majibu ya maabara

Uzito…….kg Urefu……cm Kiwango cha damu……..g/dl ( majibu ya damu hakikisha kupitia mfumo wa jeeva wa hospitali)

## Appendix V: Ethical Clearence

**UNITED REPUBLIC OF TANZANIA**
MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY
MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES
**OFFICE OF THE DIRECTOR – RESEARCH, PUBLICATIONS AND INNOVATIONS**

Ref. No.DA.282/298/01.C/ Date: 29/01/2024

MUHAS-REC-01-2024-2012
DR. DENIS D. KANYIKA
COLLEGE OF MEDICINE,
MUHAS.

**RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED: ERECTILE FUNCTION AND ASSOCIATED FACTORS AMONG KIDNEY TRANSPLANT RECIPIENT MEN BEFORE AND AFTER TRANSPLANTATION AT MUHIMBILI NATIONAL HOSPITAL: A CROSS-SECTIONAL STUDY**

Reference is made to the above heading.

I am pleased to inform you that the Chairman has on behalf of the University Senate, approved ethical clearance of the above-mentioned study, on recommendations of the Senate Research and Publications Committee meeting accordance with MUHAS research policy and Tanzania regulations governing human and animal subjects research.

APPROVAL DATE: 29/01/2024
EXPIRATION DATE OF APPROVAL: 29/01/2025

**STUDY DESCRIPTION:**
**Purpose:**
The purpose of this cross-sectional study is to assess erectile function and associated factors among kidney transplant recipient men before and six months after the transplant at Muhimbili National Hospital (MNH)

The approved protocol and procedures for this study is attached and stamped with this letter, and can be found in the link provided:

https://irb.muhas.ac.tz/storage/Certificates/Certificate%20-%2015235.pdf and in the MUHAS archives.

**The PI is required to:**

1. Submit bi-annual progress reports and final report upon completion of the study.
2. Report to the IRB any unanticipated problem involving risks to subjects or others including adverse events where applicable.
3. Apply for renewal of approval of ethical clearance one (1) month prior its expiration if the study is not completed at the end of this ethical approval. You may not continue with any research activity beyond the expiration date without the approval of the IRB. Failure to receive approval for continuation before the expiration date will result in automatic termination of the approval for this study on the expiration date.
4. Obtain IRB amendment (s) approval for any changes to any aspect of this study before they can be implemented.
5. Data security is ultimately the responsibility of the investigator.
6. Apply for and obtain Data Transfer Agreement (DTA) from NIMR if data will be transferred to a foreign country.
7. Apply for and obtain Material Transfer Agreement (MTA) from NIMR, if research materials (samples) will be shipped to a foreign country.
8. Apply for and obtain permission to publish the results from National Institute for Medical Research. The application should be before submitting to a publisher and not concurrently through the email publications@nimr.or.tz.
9. Any researcher, who contravenes or fail to comply with these conditions, shall be guilty of an offence and shall be liable on conviction to a fine as per NIMR Act No. 23 of 1979, PART III section 10 (2)
10. The PI is required to ensure that the findings of the study are disseminated to relevant stakeholders.
11. PI is required to be versed with necessary laws and regulatory policies that govern research in Tanzania. Some guidance is available on our website https://drp.muhas.ac.tz/.

Muhimbili University of Health and Allied Sciences
DIRECTOR
Research & Publications
Box 65001

Dr. Nahya Salim Masoud,
**Chairperson, MUHAS Research and Ethics Committee**

## Appendix VI. Introduction Letter

**UNITED REPUBLIC OF TANZANIA**

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

**OFFICE OF THE DIRECTOR – POSTGRADUATE STUDIES**

In reply quote;
Ref. No. HD/MUH/T.358/2020

1st February, 2024

THE EXECUTIVE DIRECTOR,
MUHIMBILI NATIONAL HOSPITAL,
P.O BOX 65000,
**DAR ES SALAAM.**

**RE: INTRODUCTION LETTER OF DENIS DAUDI KANYIKA**

We would like to inform you that the carrier of this letter is Denis Daudi Kanyika with registration number HD/MUH/T.358/2020 a student in the School of Clinical Medicine at Muhimbili University of Health and Allied Science (MUHAS), pursuing MMed. Urology.

As part of his studies, he will be doing an elective research titled **"ERECTILE FUNCTION AND ASSOCIATED FACTORS AMONG KIDNEY TRANSPLANT RECIPIENT MEN BEFORE AND AFTER TRANSPLANTATION AT MUHIMBILI NATIONAL HOSPITAL: A CROSS-SECTIONAL STUDY".**

He is being supervised by Prof. Obadia Nyongole from Surgery Department, School of Clinical Medicine at MUHAS and Dr. Victor Sensa from Surgery Department at Muhimbili National Hospital.

The Ethical Clearance for doing the said research has been given by the University.

Kindly request your assistance and cooperation to our student.

Yours Sincerely,

*Ms. Victoria Mwanilwa*
**For: DIRECTOR, POSTGRADUATE STUDIES**

cc: Denis Daudi Kanyika

9 United Nations Road; Upanga West; P.O. Box 65001, Dar Es Salaam: Tel. G/Line: +255-22-2150302/6; Ext. 1015; Direct Line:+255-22-2151378;Telefax:+255-22-2150465;E-mail:dpgs@muhas.ac.tz;Web:https://www.muhas.ac.tz

## Appendix VII: Permission Letter

THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF HEALTH

**MUHIMBILI NATIONAL HOSPITAL**

*In reply please quote:*

Ref. No.: MNH/CRTCU/Perm/2024/065 Date: 02nd February, 2024

Head of Department,
Internal Medicine
**Muhimbili National Hospital**

**RE: PERMISSION TO COLLECT DATA AT MNH**

| | |
|---|---|
| Name of Student | **Denis Daudi Kanyika** |
| Title | **"Erectile Function and Associated Factors Among Kidney Transplant Recipient Men Before and After Transplantation at MNH: A Cross-Sectional Study."** |
| Institution | Muhimbili University of Health and Allied Sciences |
| Supervisor | Prof. Obadia Nyongole (MUHAS) |
| Co – supervisor | Dr. Victor Sensa (MNH) |
| Period | 02nd February 2024 to 31st March, 2024 |

Approval has been granted to the above principal investigators to collect data at MNH. Dissemination of study findings at MNH shall be overseen by **Dr. Victor Sensa** (MNH) supervisor.

Kindly ensure the named principal investigator abide to the ethical principles and other conditions of the research approval.

Sincerely,

**Dr. Charles K. Pallangyo**
**For: Head of Clinical Research, Training and Consultancy Unit**

HEAD, TEACHING, RESEARCH & CONSULTANCY UNIT * P. O. Box 65000 DAR-ES-SALAAM MUHIMBILI NATIONAL HOSPITAL *

c.c DMS
c.c Dr. Victor Sensa
c.c Denis Daudi Kanyika

Upanga West, Kalenga Street, Plot No. 10480/3, P.O. BOX 65000, Dar es Salaam, Tanzania.
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