**Health-Related Quality of Life and Associated Factors among Renal Transplant Recipients in the Largest Kenyan Public Hospital**

# **Abstract**

**Background:** Health related quality of life is an important indicator of the outcome of a major therapeutic intervention. Lack of health related quality of life data following renal transplantation in resource-constrained countries results in poor disease management.

**Study objective:** To assess the health-related quality of life and associated factors among renal transplant recipients at Kenyatta National Hospital.

**Methodology:** A cross-sectional descriptive study involving 80 sequentially sampled patients was carried out for three consecutive months at the renal transplant clinic within Kenyatta National Hospital. Health related quality of life data were collected using the globally accepted Kidney Transplant Questionnaire-25 and analyzed using Stata version 13 at p < 0.05. Associations were determined between patients’ clinical variables and health-related quality of life scores. Linear regression analysis determined the extent to which the clinical variables influenced health related quality of life scores.

**Results:** The mean age of the participants was 45.4(±14.7). The overall health related quality of life score was 5.19(±0.78). Forgetfulness (35.0%) was the most bothersome feature and 73.8% of the participants scored 7 on appearance domain while 30.0 % scored 5 on fatigue dimension. A third of the patients scored 5 on uncertainty dimension while 32.5% scored 6 on emotions domain. The highest mean score was in the appearance domain, 6.62(±0.60) and the lowest was on uncertainty domain, 4.28(±1.12). Patients with comorbid diabetes and hypertension had statistically significantly lower scores [4.79 (±0.82)] (p=0.017) and comorbidity with diabetes decreased the scores by 11.67 units {95% CI (-21.283, -2.064)}.

**Conclusions:** Health related quality of life among the renal transplant recipients was good. The low scores in uncertainty/fear and comorbid diabetes/hypertension reflect distress suggesting that clinicians should incorporate psychosocial care among renal transplant recipients. Future studies should correlate scores before and after transplantation to ascertain the impact of transplantation on quality of life.

**Key words:** Health Related Quality of Life, Kidney transplant, Renal transplant recipients, Health related quality of life scores.

**1.Introduction**

Health related quality of life (HRQoL) assesses various aspects of overall wellbeing, including physical, psychological and social functioning and the impact of disease and its management on aspects of wellbeing, from a patient’s perspective (Kaplan & Hays, 2022). When assessed using valid and reliable tools, HRQoL becomes a good indicator for monitoring interventions. Consequently, assessing HRQoL among patients helps inform treatment decisions and healthcare policies (Hernández-Segura et al., 2022).

HRQoL as a measure of health outcome, is gaining recognition as a valid tool in monitoring treatment outcomes, following renal transplantation (Papalois & Papalois, 2023). The advantages of renal transplantation(RT) on HRQoL are well established globally (Mousavi-Roknabadi et al., 2019; Wang et al., 2021). Compared to patients on peritoneal dialysis or hemodialysis, renal transplant recipients show improved mental, physical, and social functioning (Zaragoza-Fernández et al., 2025).

In the USA, improvement in HRQoL among patients after transplantation has been reported (Wang et al., 2021). African countries like Egypt report unsatisfactory overall quality of life (El Rasheed et al., 2020). Conversely, Ethiopia has documented good quality of life scores at 6.068 ± 0.79 among kidney transplant recipients (Siyoum et al., 2020). In Kenya, no study has been done to evaluate HRQoL outcomes and associated factors among renal transplant recipients. Furthermore, lack of HRQoL data hinders detection and management of problems that kidney transplant patients may be experience, resulting in poor disease management.

This study sought to assess health-related quality of life outcomes in renal transplant recipients and the domains of HRQoL mostly affected by transplantation. Additionally, the study sought to establish the sociodemographic and clinical variables that impacted on HRQoL. The study also sought to evaluate the potential areas that could be used to optimize HRQoL in the management of renal transplant recipients.

# **2. Methodology**

# **Study Design and Site**

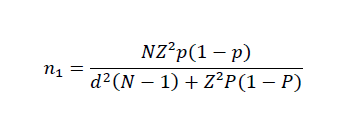
The research adopted a cross-sectional descriptive study design which involved determining exposure and outcome simultaneously. The study was conducted between 1st July 2021 and 30th September 2021at the renal transplant clinic, within the renal unit of Kenyatta National Hospital (KNH). This specialized clinic offers renal transplantation and post-transplant care to recipients on follow-up. KNH is the largest public health facility with a specialized renal transplant program in the country therefore capturing a good number of patients who may need pre and post-transplant services.

## **Study Population**

The target population was all adult renal transplant recipients in Kenya. Study population constituted adult patients who previously underwent renal transplant and are followed up at KNH. Patient with currently functioning grafts were eligible including those on follow up at renal transplant clinic KNH, or who had their transplant in other centers. In addition, patient must have undergone a kidney transplant at least 3 months prior to recruitment. This is because, after 3 months of transplantation, the patient is considered stable and may not be experiencing acute phase transplant reactions which may result in overly low health related quality of life reporting. Patient who were willing to participate in the study by written, informed consent were invited. The study excluded hospitalized patients who were too weak to participate and those with cognitive impairment because they may not have been in a capacity to give voluntary and informed consent. Additionally, they may have reported bias information in favor of very low HRQoL scores. Patients with other organ failure were left out because they would have acted as possible confounders.

## **Sample Size Estimation and sampling**

Sample size estimation was determined using the formula described by Naing, Winn and Rusli (2006) for finite population. This formula has been proposed for the sample size that is more than 5% target population (Naing et al., 2006) such as our study.



Where, n1 is sample size with finite population correction, N is population size of renal transplant patients on follow up at renal unit of Kenyatta National Hospital, which is 130, Z is z- statistic for 95% level of confidence in this study (1.96), p is the estimated proportion of patients with satisfactory overall health related quality of life, which has been reported to be approximately 70% from the previous studies (Vu et al., 2021) and, d is precision at 5% in our study. Substitution in the equation gave a minimum sample size of 84. However, a total of 92 renal transplant patients were screened for eligibility but 80 were eligible. Six were excluded because of repeat hospital visits,3 were hospitalized and were too weak to participate in the study while the other 3 patients declined consent. Consecutive sampling was used in selection of study participants. Files of patients on follow up were scrutinized for eligibility criteria. File numbers of patients who met eligibility criteria were recorded on a separate list to avoid confusion and duplication of data. This procedure was repeated until the required sample size was achieved.

## **Participants Recruitment and Consenting Process**

Eligible patients presenting for follow up at the renal transplant outpatient clinic were recruited before seeing their physician. Adequate oral and written information about the purpose, nature and possible risks and benefit of the study were provided. Patients were notified about the right to withdraw from the study without grim consequences.

## **Research Instruments and Data Collection**

The study used the worldwide established Kidney Transplant Questionnaire-25 (KTQ-25) to collect the health related quality of life data. In addition, a data collection form designed based on the research objectives, was used to obtain information on socio-demographics, comorbidities and serum creatinine levels, which could impact on HRQoL.

### **Data Analysis**

Data was analyzed using STATA Version 13.0. Normally distributed continuous variables were summarized as means and standard deviations. Abnormally distributed variables were summarized as median and interquartile ranges. To determine the impact of socio-demographic and clinical variables on HRQoL, univariate and multivariate analyses were performed. Associations between HRQoL scores and socio-demographic and clinical variables were determined using bivariate analysis. Linear regression was conducted to determine predictors of HRQoL among kidney transplant recipients. The level of significance was set at p ≤ 0.05. The results were presented in form of tables, charts and graphs.

**Ethical consideration**

Permission to carry out this study was granted by the KNH/UON Ethics and research committee (KNH/UON-ERC) vide approval reference number P70/02/2021. Oral and written consent was sought from eligible participants. Participant information was safeguarded using unique identifier codes throughout the study.

# **Results**

A total of 80 study participants were recruited into the study. Table 1 summarizes their sociodemographic and clinical characteristics.

Table 1: Participants’ sociodemographic and clinical characteristics

|  |  |  |
| --- | --- | --- |
| **Variable Characteristic** | **Frequency (n)** | **Percentage(%)** |
| **Sex** |  |  |
| Male | **56** | **70.0** |
| Female | 24 | 30.0 |
| **Marital status*)*** |  |  |
| Married | 64 | 80.0 |
| Single | 16 | 20.0 |
| **Highest education** |  |  |
| Primary | 6 | 7.5 |
| Secondary | **40** | **50.0** |
| Tertiary | 34 | 42.5 |
| **Employment** |  |  |
| Employed | 36 | **45.0** |
| Self-employed | 22 | 27.5 |
| Unemployed | 10 | 12.5 |
| Retired | 12 | 15.0 |
| **Denomination** |  |  |
| Christian | 76 | 95.0 |
| Muslim | 4 | 5.0 |
| **Comorbidity** |  |  |
| Diabetes | 4 | 5.0 |
| Diabetes and Hypertension | 20 | 25.0 |
| Hypertension | **48** | **60.0** |
| Hypertension and Thrombosis | 1 | 1.3 |
| **History of smoking** |  |  |
| Smoker | 9 | 11.3 |
| Non-smoker | **71** | **88.8** |
| **History of alcohol use** |  |  |
| Consumers | 15 | 18.8 |
| Non-consumers | **65** | **81.3** |
| **Kidney source** |  |  |
| Living donor – relative | 80 | 100.0 |
| **Dialysis type** |  |  |
| Haemodialysis | 80 | 100.0 |
| **Dialysis duration in months *(median, IQR)*** | 12.0 | 12.0 – 26.5 |
| **Creatinine in µmol/L*(median, IQR)*** | **105.0** | **98.0 – 120.0** |
| **Duration after transplant in months*(median, IQR)*** | **51.5** | **30.0 – 84.0** |
| **Patient’s age (mean, SD)**  **(median, IQR)** | 45.4  47.5 | 14.7  33.0-58.0 |

The population was largely constituted of males (n=56, 70.0%). The mean (SD) age of participants was 45.4 (14.7) years, where the youngest participant was 18.0 years, and the oldest was 72.0 years. Most of the patientswere married (n=64, 80.0%), had secondary education level (40, 50.0%) and employed (n= 36 ,45.9%). Over half the study participants (n=48, 60.0%) had hypertension while a quarter (20,25.0%) had both diabetes and hypertension. All the study participants received their kidney from living donor relative and the median duration post kidney transplantation was 51.5 (IQR 30, 84) months (**Table 1**).

## **Health related quality of life scores** **among the participants**

## **Physical symptoms experienced by participants**

Table 2 below illustrates patient specific physical symptoms identified as most bothersome during the previous four weeks of the study.

Table 2: Distribution of physical symptoms experienced among study participants

|  |  |  |
| --- | --- | --- |
|  | **Frequency** | **Percent of patients** |
| Forgetfulness | 28 | 35.0% |
| Aching, tired legs | 26 | 32.5% |
| Urinary tract infection | 23 | 28.7% |
| Decreased sexual ability | 20 | 25.0% |
| Headaches | 17 | 21.3% |
| Side-effects from medications | 16 | 20.0% |
| Trouble getting to sleep | 16 | 20.0% |
| Light-headedness or dizziness during daily activities | 16 | 20.0% |
| Aching bones | 15 | 18.8% |
| Constipation or diarrhoea | 15 | 18.8% |
| Very little strength | 14 | 17.5% |
| Increased appetite | 14 | 17.5% |
| Loss of weight and muscle | 13 | 16.3% |
| Itchy/dry skin | 12 | 15.0% |
| Coughing during day or night | 12 | 15.0% |
| Loss of appetite | 12 | 15.0% |
| Trouble getting a good night’s sleep | 11 | 13.8% |
| Waking up during the night | 10 | 12.5% |
| Excessive weight gain | 10 | 12.5% |
| Nausea or upset stomach | 9 | 11.3% |
| Need to rest frequently because of shortness of breath | 7 | 8.8% |
| Difficulty in concentrating | 6 | 7.5% |
| Acne | 6 | 7.5% |
| Muscle pain | 6 | 7.5% |
| Vomiting | 4 | 5.0% |
| Shortness of breath in daily activities | 4 | 5.0% |
| Confusion | 3 | 3.8% |
| Decreased mental ability | 2 | 2.5% |
| Embarrassment caused by appearance or access site | 2 | 2.5% |
| Regulating bowel movements | 2 | 2.5% |
| Difficulty focusing attention | 2 | 2.5% |
| Shivering | 1 | 1.3% |
| Palpitations | 1 | 1.3% |
| No patient specific physical symptom | 5 | 6.3% |

Generally, the most common and reported bothersome symptom experienced was forgetfulness (n=28,35%) followed by aching, tired legs (n=26,32.5%), urinary tract infections (n=23,28.7%), decreased sexual ability (n=20,25.0%) and headaches (n=17,21. 3%) (**Table 2**).

### **Appearance domain scores**

Figure 1 below gives information about appearance domain score. Majority of the patients had a score of 7 at 73.8%, demonstrating that most patients had no worries about their appearance.

Figure 1: KTQ Appearance score

### **Fatigue domain scores**

Figure 2 below presents information about fatigue domain. Majority of the study participants experienced moderate fatigue (30.0%) at a score of 5, while only 1.3% of the study participants scored 1 denoting severe fatigue.

Figure 2: Fatigue domain score among study participants

### **Uncertainty/Fear domain scores**

Figure 3 below provides information on uncertainty/fear domain.

Figure 3: Uncertainty/Fear score among study participants

Majority of the study participants experienced symptoms related to uncertainty /fear (33.5%) at a score of 5. A fairly large number had a score of 3 and 4 at 16.3% and 27.5 %, respectively indicating presence of fear /uncertainty. Only, 17.6% of study participants had a score ranging from 6 to 7 denoting no uncertainty and fear (**Figure 3**).

**Emotions domain scores**

Approximately, half 51.3% of the study participants had no trouble with emotional symptoms at a score of 6 and 7. However,48.7% of patients had severe to moderate trouble in emotions domain with scores ranging from 3 to 5 (**Figure 4**).

Figure 4: Emotions domain score among study participants

### **Health related quality of life summary score based on KTQ-25.**

The table below illustrates the distribution of health related quality of life summary scores as assessed by the kidney transplant questionnaire (Table 3). The overall mean health related quality of life score was 5.19(0.78). The highest score was obtained in appearance domain 6.62(0.60), followed by emotions 5.37(1.12), and fatigue 5.33(1.38). Physical symptoms and fear/uncertainty dimensions had the least score of 4.64(1.34) and 4.28(1.12), respectively.

Table 3: Health related quality of life summary score among study participants

|  |  |
| --- | --- |
| **Quality of Life** | **Mean score (SD)** |
| Appearance | **6.62(0.60)** |
| Emotions | 5.37(1.12) |
| Fatigue | 5.33(1.38) |
| Physical symptoms | 4.64 (1.34) |
| Fear/Uncertainty | **4.28 (1.12)** |
| KTQ-25 Total | **5.19 (0.78)** |

## **Association between demographic characteristics and health related quality of life scale scores**

As shown in Table 4, none of the sociodemographic variables had a significant effect on health related quality of life subscale domains.

Table 4: Association between demographic characteristics and mean HRQoL subscale score

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Mean scores** | | | | |
|  | **n** | **Physical symptoms** | **Fatigue** | **Fear/ Uncertainty** | **Appearance** | **Emotions** |
| **Age** |  |  |  |  |  |  |
| ≤25 | 6 | 4.11 (1.52) | 5.37 (1.04) | 4.29 (1.64) | 6.50 (0.79) | 5.67 (0.80) |
| 26-40 | 29 | 4.80 (1.26) | 5.31 (1.49) | 4.02 (1.30) | 6.71 (0.43) | 5.19 (1.29) |
| 41-65 | 39 | 4.59 (1.38) | 5.39 (1.35) | 4.46 (0.83) | 6.58 (0.68) | 5.49 (1.07) |
| >65 | 6 | 4.67(1.80) | 4.97(1.55) | 4.42(1.22) | 6.63(0.63) | 5.19(0.92) |
| p-value |  | p= 0.716 | p=0.922 | p=0.439 | p=0.805 | p=0.630 |
| **Gender** |  |  |  |  |  |  |
| Male | 56 | 4.67 (1.27) | 5.26 (1.23) | 4.25 (1.15) | 6.70 (0.44) | 5.26 (1.14) |
| Female | 24 | 4.55(1.60) | 5.48(1.69) | 4.38(1.05) | 6.43(0.84) | 5.63(1.08) |
| p-value |  | p=0.712 | p=0.512 | p=0.636 | p=0.051 | p=0.191 |
| **Education** |  |  |  |  |  |  |
| Primary | 6 | 3.97 (1.19) | 4.60 (1.99) | 4.29 (1.05) | 6.25 (0.95) | 4.94 (0.59) |
| Secondary | 40 | 4.74 (1.32) | 5.37 (1.34) | 4.43 (1.04) | 6.73 (0.46) | 5.57 (1.00) |
| Tertiary | 34 | 4.63(1.45) | 5.41(1.31) | 4.11(1.20) | 6.63(0.65) | 5.22(1.29) |
| p-value |  | p=0.445 | p=0.406 | p=0.471 | p=0.151 | p=0.252 |
| **Marital status** |  |  |  |  |  |  |
| Married | 64 | 4.55 (1.40) | 5.29 (1.46) | 4.31 (1.10) | 6.61 (0.60) | 5.39 (1.18) |
| Single | 16 | 4.96(1.22) | 5.47(1.03) | 4.17(1.20) | 6.66(0.60) | 5.31(0.91) |
| p-value |  | p=0.293 | p=0.635 | p=0.654 | p=0.816 | p=0.812 |
| **Employment** |  |  |  |  |  |  |
| Employed | 36 | 4.73 (1.30) | 5.66 (1.28) | 4.41 (1.10) | 6.63 (0.57) | 5.38 (1.20) |
| Self-employed | 22 | 4.78 (1.30) | 5.34 (1.15) | 4.19 (0.97) | 6.58 (0.78) | 5.34 (1.11) |
| Unemployed | 10 | 4.07 (1.85) | 4.76 (1.98) | 3.78 (1.69) | 6.80 (0.31) | 5.33 (1.20) |
| Retired | 12 | 4.57 (1.27) | 4.80 (1.34) | 4.50 (0.78) | 6.56 (0.49) | 5.46 (0.98) |
| p-value |  | p=0.544 | p=0.138 | p=0.374 | p=0.777 | p=0.992 |

## 

## **Association between socio-demographic characteristics and health related quality of life summary score**

As shown in Table 5, none of the sociodemographic variables had a statistically significant association with HRQoL summary scores. However, there was statistically significant association between comorbidity and health related quality of life (p = 0.017), with lower HRQoL score among study participants with diabetes and hypertensive comorbidity at 4.79 (0.82) (**Table 5**).

Table 5: Association between socio demographic and clinical characteristics with HRQoL score

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **HRQoL Mean (SD) Score** | | | **p-value** | | |
| **Age in years** |  | | |  | | |
| ≤25 | 5.15 (0.99) | | | 0.988 | | |
| 26-40 | 5.18 (0.87) | | |  | | |
| 41-65 | 5.22 (0.65) | | |  | | |
| >65 | 5.13 (1.07) | | |  | | |
| **Gender** |  | | |  | | |
| Male | 5.16 (0.68) | | | 0.586 | | |
| Female | 5.27 (0.99) | | |  | | |
| **Education** |  | | |  | | |
| Primary | 4.75 (0.64) | | | 0.165 | | |
| Secondary | 5.33 (0.79) | | |  | | |
| Tertiary | 5.11 (0.78) | | |  | | |
| **Marital status** |  | | |  | | |
| Married | 5.17 (0.81) | | | 0.574 | | |
| Single | 5.29 (0.67) | | |  | | |
| **Employment** |  | | |  | | |
| Employed | 5.28 (0.74) | | | 0.597 | | |
| Self-employed | 5.22 (0.71) | | |  | | |
| Unemployed | 4.90 (1.21) | | |  | | |
| Retired | 5.14 (0.62) | | |  | | |
| **Comorbidity** | |  |  | |  |
| Diabetes | | 5.50(0.80) |  | | **0.017** |
| Hypertension | | 5.24(0.69) |  | |  |
| Diabetes and Hypertension | | **4.79(0.82)** |  | |  |
| Hypertension and Thrombosis | | 5.28(-) |  | |  |

Multiple linear regression analysis was conducted to determine the independent predictors of HRQoL in the population under study.

Table 6: Independent predictors of HRQoL among study participants

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  | **95% CI for β** |  |
|  | **β** | **T** | **p-value** | **Lower** | **Upper** |
| **(Constant)** | 145.159 | 20.3 | 0.000 | 130.920 | 159.399 |
| Gender(Male) | -0.248 | -0.051 | 0.960 | -10.005 | 9.509 |
| Diabetes presence | -11.673 | -2.421 | **0.018** | -21.283 | -2.064 |
| High creatinine levels | -0.048 | -1.684 | 0.096 | -0.105 | 0.009 |
| Long-time post transplantation | 0.006 | 0.125 | 0.901 | -0.092 | 0.104 |

Male gender showed a reduction in the overall HRQoL by 0.248 points compared to female. Comorbidity with diabetes reduced the overall HRQoL score by 11.673 points compared to those without. Side effects of medications also had a negative effect on HRQoL reducing the quality of life by 7.004 units. Increasing level of serum creatinine by a unit had a minimal reduction HRQoL by 0.048, while a unit increase on duration of transplant increased HRQoL by a negligible amount of 0.006. The independent predictor that decreased the quality of life was the presence of diabetes(p=0.018) (**Table 6**).

# **Discussion**

The present study characterizes the health related quality of life among patients who had undergone renal transplantation in the largest referral and teaching hospital in East Africa. The overall mean HRQoL score for the study participants was 5.19(±0.78), which was comparable to studies conducted in Iran, Ethiopia, and Spain(Ganjali et al., 2019; Siyoum et al., 2020; Tayyebi et al., 2012) using the same questionnaire that reported means of 4.9(1.27), 6.06(0.79) and 5.9(1.18), respectively. This shows that the study patients had a good quality of life. However, renal transplant patients suffering from diabetes are likely to have low health related quality of life as has been demonstrated by a decrease in HRQoL score by 11.67 units. Furthermore, previous studies focusing on health related quality of life in kidney transplant recipients with diabetes have confirmed low scores in functional performance as well as the quality of life (Ali et al., 2021). Literature suggests that microvascular and macrovascular complications of diabetes are a cause of morbidity and low quality of life(Gebremedhin et al., 2019). This underscores the need to effectively manage diabetes mellitus, to improve the quality of life of renal transplant recipients.

The study found a statistically significant association between comorbidity and health related quality of life (p = 0.017), with a low HRQoL score among study participants with comorbid diabetes and hypertensive at mean score of 4.79 (SD 0.82). A possible reason would be that comorbidity requires patients to take multiple drugs for management of the illnesses thereby causing a pill burden to the already loaded regimen. Studies that have investigated comorbid conditions in renal transplant patients found that comorbidity has a negative effect on the quality of life. This is supported by previous researchers who demonstrated that comorbidity correlated with poor quality of life (Adeeb et al., 2021). Given this finding on comorbidity and the possibility of the complexity of medication regimen, it is important that medication reconciliation and counselling is conducted by healthcare providers to enhance effectiveness while preventing side effects.

The present study demonstrated a high score in appearance domain, 6.62(0.60), which is consistent with the Iran (Ganjali et al., 2019) which reported mean scores of 5.75(1.53) in that domain. The lowest score in this study was related to fear /uncertainty domain which corroborates findings from studies done in Palestine (Dweib et al., 2020). Our study demonstrated that fear and uncertainty about the future were the main concerns among the study participants. Consequently, there is a need for patient education on graft rejection and coping mechanisms post transplantation.

The mean age(SD) of the participants was 45.4(±14.7) years, which is comparable with a related study done in the same setting (Bagha et al., 2024) that reported a mean of 42.8 years. The congruity in mean age is explained by the fact that ESRD tends to affect the young and the middle aged individuals in sub-Saharan Africa. Conversely, a previous study in Germany showed the mean age to be greater than 55 years where the inclusion criteria involved adult participants with functioning kidney graft for more than 15 years (Neipp et al., 2006) and perhaps the higher mean age.

The study findings revealed that majority of the participants were male (70%) which corroborates what was reported by studies in Iran and Palestine that showed male predominance at 58.7% and 79.8%, respectively (Dweib et al., 2020; Mousavi-Roknabadi et al., 2019). The findings may reflect what related studies have found with regards to gender bias ,lack of social support systems and lower income among women pertaining to access to transplantation services (Ahmed & Vinson, 2023). Regarding the type of donor, all the study participants received their kidneys from living donor relatives. This finding concurs with a study conducted in Palestine that showed living donor relatives as main graft contributors (Dweib et al., 2020).In contrast, the study in Iran had the majority of participants receiving graft from non-relatives and cadavers (Mousavi-Roknabadi et al., 2019). This contrast may be due to difference in policies, laws and advocacy regarding organ donation across countries.

Participants in the present study reported a number of physical symptoms that may be attributed to the side effects of immunosuppressant medication and transplantation. Forgetfulness (35%) was the most common symptom experienced by participants. Although the cause of forgetfulness is complex, some studies have suggested tacrolimus might be among the possible culprits (Pflugrad et al., 2020; Vieira, 2024). Another study, however, reported aching tired legs as the most reported physical problem (Bossola et al., 2021). The reasons for the difference were not clear and the findings may require further investigation. However, forgetfulness may result in poor compliance to antirejection medication leading to graft loss. This finding underscores the need to have reminders as an intervention of enhancing compliance to antirejection medication.

Majority of the patients (73.8%) demonstrated that they had no worries about their appearance as portrayed by a finding of score 7. It seems that appearance related issues post-transplantation was not as distressing among our study participants. This however contradicts a study by Antje *et al* that revealed that change in appearance was a distressing symptom in women(Veltkamp et al., 2023). Studies have also indicated that distressing symptoms are subjective and are determined by individual and socio-cultural factors(Veltkamp et al., 2023). Comparable studies using the kidney transplant questionnaire have yielded similar results where the appearance domain had the highest score. For instance, Siyoum *et al* reported a mean(SD) score of 6.50 (0.98) while our study had a mean score of 6.62(0.60) in the appearance domain(Siyoum et al., 2020).

This study established that the majority of the patients (30%) had moderate fatigue, with nearly half (47.6%) of the remaining participants experiencing no fatigue at all. Only 22% of patients had severe fatigue. A systematic review and meta-analysis reported the prevalence of fatigue to be 40-50% among kidney transplant recipients(Bossola et al., 2021). Although our study did not differentiate between disease related fatigue from drug associated symptoms, we attribute fatigue to immunosuppressant medication such as tacrolimus.

We found that majority of the study participants (82.4%) experienced symptoms related to uncertainty /fear, while only, 17.6% of study participants experienced no uncertainty/fear. Uncertainty/fear domain scored the lowest, among the domains assessed by the kidney transplant questionnaire at a score of 4.28(1.12). These findings agree with studies conducted using the KTQ-25 in Iran and Ethiopia where uncertainty /fear scored the lowest at 4.53(1.82) and 4.18(1.80) respectively(Ganjali et al., 2019; Pflugrad et al., 2020). Related studies in Palestinealso found low score in the fear /uncertainty dimension of 3.36 ± 1.23(Dweib et al., 2020) . This finding may be reflective of fear regarding graft rejection and returning to dialysis. Uncertainty and fear of graft rejection may cause emotional distress and anxiety among kidney transplant patients, resulting in non-compliance to immunosuppressant medication.

Renal transplantation is considered the best treatment modality for end stage renal as it is cost effective, prolongs life, and improves HRQoL. Despite these benefits, literature shows that transplanted patients may suffer emotionally through depression and anxiety (Jones et al., 2020) due to fear of failing graft, the anxiety of regular medical checkup, strict immunosuppressive therapy as well as their side effects(Shetty et al., 2017).In our study, approximately half of the study participants (48.7%) had severe to moderate trouble with emotions. In contrast, a qualitative study in the UK reported that 25% of kidney transplant patients had emotional distress(Jones et al., 2020).The findings disagree with our findings because of the difference in study methodology. In the UK study, inclusion criteria required a patient to be categorized as mild to moderate using a distress thermometer. This may have introduced some sort of bias. Nevertheless, psychological and emotional distress appears to be a problem in kidney transplant patients that should be addressed. This finding underscores the need for routine psychological support before and after kidney transplantation.

Our research is the first study to assess HRQoL among kidney transplant patients in a low resource setting. We have also established that presence of comorbidities is likely to decrease the HRQoL among renal transplant recipients. However, recall bias may have affected the participants’ capacity to report physical symptoms that they experienced. In addition, other factors that may cause distress such as COVID -19 pandemic may have influenced patient’s perception of life resulting in low reporting. The study did not delineate the quality of life influenced by the renal transplantation and the antirejection medication.

## **Conclusions**

HRQoL of kidney transplant patients was good among renal transplant recipients though fear and uncertainty regarding graft survival was reported. Strategies such as counselling and psychological care should be instituted before and after transplantation to help kidney transplant patients cope with life post transplantation. This would also improve the practice of management of renal transplant recipients. Future studies should focus on pre-post analysis comparing the mean scores of quality of life domains before and after renal transplantation to establish the impact of transplantation on HRQoL scores.

## **Abbreviations**

CKD: Chronic kidney disease; ESRD; End stage renal disease; ESRD-SCL: End-Stage Renal Disease Symptom Checklist; GI :Gastrointestinal; GODT :Global Observatory on Donation and Transplantation; HRQoL :Health related quality of life ;KDQOL: Kidney Disease-Quality of Life;KTQ-25: Kidney transplant questionnaire-25;KNH :Kenyatta National Hospital; KNH UON-ERC: Kenyatta National Hospital -University of Nairobi, Ethics Research Commission; IS: Immunosuppressant; MPA: Mycophenolic Acid; NHP: Nottingham Health Profile;SF-36:36-Item Short Form Health Survey; RT: Renal transplantation; RTR: Renal transplant recipients; PGWB: Psychological General Well-Being Index .

## **Availability of materials and data**

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

## **Ethics approval and consent to participate**

Permission to carry out this study was granted by the KNH/UON Ethics and research committee (KNH/UON-ERC) vide approval reference number P70/02/2021. Oral, written and signed consent was sought from eligible participants. Participant information was safeguarded using unique identifier codes throughout the study.

## **Consent for publication**

This is not applicable

## **Conflict of interest declaration**

The authors declare no conflict of interest.

**Disclaimer (Artificial intelligence)**

All authors hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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