Factors that Influence the Durability of Transplanted Kidneys in South Africa

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Abstract

Kidney transplantation is the cornerstone for renal treatment in patients with end-stage renal failure. Despite improvements in short-term outcomes of renal transplantation, kidney allograft loss remains a huge challenge. The aim of the study was to assess factors that influence the durability of transplanted kidneys among transplant recipients in South Africa. A descriptive cross-sectional study design was used. A random sampling was used to select 171 participants. Data were collected through structured face-to-face interviews developed from in-depth consideration of relevant literature. Data were coded and entered into the SPSS software, version 24. The entered data were analysed using descriptive and inferential statistics. The results revealed that the average durability of transplanted kidneys was 9.07 years among selected kidney transplant recipients in South Africa. Factors associated with the durability of transplanted kidneys included age, the sewerage system and strict immunosuppressive adherence, all with a P-value = .000, followed by the mode of transport (P-value = .001) and support system (P-value = .004). Other variables including demographics, the healthcare system, medication and lifestyle modification engagement were not associated with the durability of transplanted kidneys. Understanding the factors that influence the durability of transplanted kidneys among kidney transplant recipients in South Africa is crucial. The study revealed associated factors and gaps which may be contributory factors to kidney allograft loss. This study provides an opportunity to introduce specific interventions to nephrology professionals to promote prolonged graft durability. It is recommended that a specific intervention model be developed, which targets South African kidney recipients taking into account the significant variables in this study and the socio-economic status of the country.

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Introduction and Background

Kidney transplantation is the most convenient way of rehabilitating patients with end-stage renal disease (ESRD) back into the community. Renal transplantation is considered the treatment of choice for ESRD compared to dialysis, offering better health-related quality of life and higher survival rates (Muduma et al. 2016). According to Tong et al. (2012), worldwide, there is a severe shortage of suitable living-directed and deceased donors, and waiting times to receive a kidney can exceed 10 years. According to Davids, Marais and Jacobs (2017), the number of South Africans on renal replacement therapy on 31 December 2015 was 10 360, of which 13.4 per cent had a functioning renal transplant. Furthermore, of the 8 969 patients on dialysis, 16.1 per cent were on peritoneal dialysis and 83.9 per cent on haemodialysis (Davids, Marais, and Jacobs 2017). Thus, effective self-management post-kidney transplantation is imperative to improve the durability of transplanted kidneys.

According to Kilonzo et al. (2017), South Africa represents a sustainable model of dialysis rationing. Owing to resource constraints, in 1997 the National Department of Health introduced dialysis and transplantation guidelines which emphasised equitable access to treatment (Kilonzo et al. 2017). South Africa has 2.1 nephrologists per million population as compared with 16 nephrologists per million population in the United States (Kilonzo et al. 2017). Many factors influence the long-term outcome of kidney transplantation, which is defined very schematically by renal dysfunction leading to graft loss (Legendre, Canaud, and Martinez 2014). According to Ortiz et al. (2014), the success of kidney transplantation could be achieved by prolonging patients' survival and enhancing patients' well-being after receiving this treatment. Strict adherence to immunosuppressant medication is essential for the long-term survival of kidney grafts (Muduma et al. 2016; Williams et al. 2015). Low adherence in the immunosuppressant group was associated with longer time after kidney transplantation and a higher rehospitalisation rate (Lee et al. 2015). Moreover, a critical role for the success of transplantation is also played by the collaboration between patients and the transplant team (Ponticelli and Graziani 2012). The durability of transplanted kidneys is vastly improved by adherence to healthcare recommendations. Treatment adherence generally includes regular intake of medications, monitoring of vital signs, undergoing diagnostic tests, following dietary and exercise protocols, abstinence from substance abuse and regular follow-ups (Kumar and Mattoo 2015).

In a study done by Marsicano et al. (2015) in Brazil, a higher family income was the only factor that was associated with immunosuppressive non-adherence, moreover, the lower income recipients benefit from better access to care and coverage of healthcare costs after transplantation. This is supposed to result in a better immunosuppressive adherence compared to high-income patients who have experienced these benefits continuously (Marsicano et al. 2015). This confirms that non-adherence to

immunosuppressive medication affects the graft survival post kidney transplantation as indicated by Pabst et al. (2015) and that contributes to poor graft survival. Similarly, non-adherence to medical treatment in transplant recipients is a major risk factor for graft rejection episodes, and it has significant financial implications (O'Grady et al. 2010). Furthermore, renal transplant patients have the lowest recorded levels of adherence among transplant recipients with non-adherence rates of between 15 per cent and 55 per cent (O'Grady et al. 2010). A study done by Ghoneim et al. (2013) in Egypt revealed that the overall actuarial graft survival was 86.7 per cent and 65.5 per cent at 5 and 10 years, respectively. Furthermore, it was observed that the graft survival was essentially stable throughout the first five years, and then a negative and steady decline was observed thereafter presumably due to chronic allograft nephropathy (Ghoneim et al. 2013).

A study done by Mirzaee et al. (2014) showed that pre-transplant hypertension, body mass index (BMI), serum creatinine and gender had a significant association with odds of allograft failure in long-term survivors. In addition, it was demonstrated that the BMI, donor source, donor age, and pre-transplant dialysis duration were associated with survival of kidney allograft in short-term survivors. A study done by De Sandes-Freitas et al. (2015) highlighted that a prolonged delayed graft function (DGF), determined by re-transplantation and higher HLA mismatches, was associated with inferior renal function, and patient and graft survivals at one year. Pre-emptive kidney transplantation is associated with both longer patient and graft survival (Riffaut et al. 2015). A study done by Pahwa et al. (2014) revealed that donors' higher age did not show a significant impact on allograft survival, although kidney allografts demonstrated decreased short- and long-term renal function. Understanding the factors that influence durability of transplanted kidneys may assist in identifying risk factors contributing to kidney allograft loss.

Statement of the Research Problem

Ingsathit et al. (2013) indicate that immunosuppressive protocols and the medical care of transplant recipients have improved the early outcomes of kidney transplantation. However, long-term survival has not shown significant improvement as grafts continue to fail (Ingsathit et al. 2013). There is a continuing increased prevalence of ESRD in South Africa (Adeniyi et al. 2017). Despite efforts to improve the number of kidneys available for transplantation, dialysis growth has been estimated at approximately eight per cent per annum whereas kidney transplantation rates (KTR) have grown at only four per cent (Bendorf et al. 2013). This means that the gap between the number of people who require dialysis and those who will receive a transplanted kidney is increasing over time (Bendorf et al. 2013). According to Tenenbaum (2016), more than 100 000 people are waiting for a deceased donor kidney, but only about 17 000 kidney transplants are performed each year. Therefore, the long waiting list for these patients to get a kidney, the imbalance of demand and supply and the strict national guidelines of South Africa (Department of Health 2009) for chronic renal dialysis that entitles one

to be eligible for transplantation makes it imperative to improve durability of transplanted kidneys. Little has been recorded on factors that influence durability of transplanted kidneys in South Africa, making it crucial to analyse such factors.

Purpose of the Study

The purpose of the study was to assess factors that influence the durability of transplanted kidneys among transplant recipients in South Africa.

Specific Objectives

- To determine the average durability of transplanted kidneys among kidney transplant recipients in South Africa.
- To analyse factors that influence the durability of transplanted kidneys among kidney transplant recipients in South Africa.

Methodology

A cross-sectional descriptive study to determine and analyse factors that influence the durability of transplanted kidneys among kidney transplant recipients was carried out at four state hospitals. The four state hospitals were selected from the only four provinces offering kidney transplantation in South Africa. These provinces are the Western Cape, KwaZulu-Natal, Gauteng and the Free State.

Sample Size

A sample size of 171 kidney recipient participants was drawn using the simple random sampling method. The total population was 1 094 from all participating hospitals. A sample of 151 was determined by power analysis based on alpha .05, power of .80 and an effect size of .2. Twenty more participants were added to make 171 to increase the power of analysis and to cater for attrition. Since there were four hospitals, the sample size was proportionally divided according to the estimated population proportions of kidney transplant recipients in each hospital. Figure 1 shows the formula calculation.

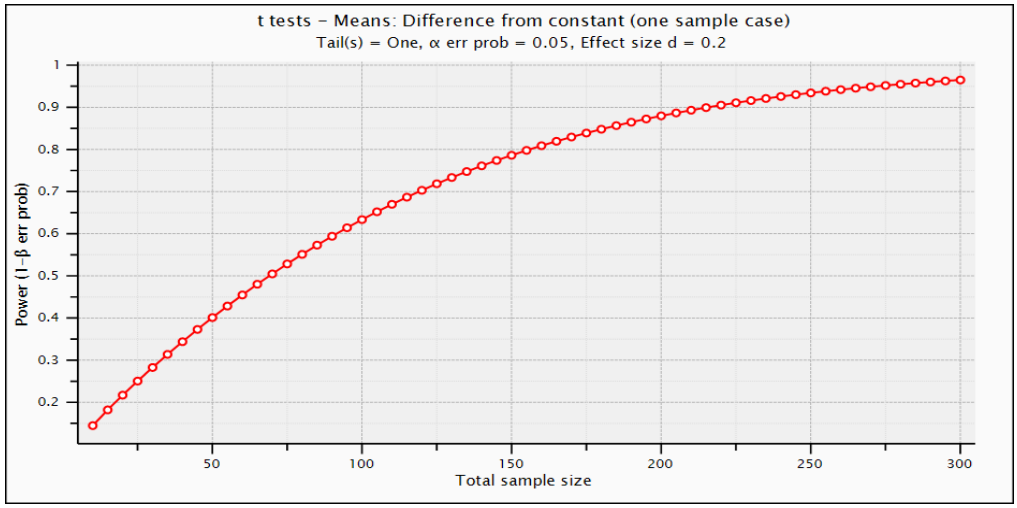

Figure 1: Formula calculation graph

Inclusion and Exclusion Criteria

The inclusion criteria for this study were all living kidney recipients, with a failed or functioning graft, attending transplant follow-up clinics at selected hospitals, both male and female, live and cadaveric transplant recipients, all being at least one year post-transplantation. The kidney recipients were 18 years and older.

The exclusion criteria were the deceased kidney recipients, those below 18 years, those who were critically ill and those who were less than one year post-transplantation. Those below 18 years were not able to give informed consent, the critically ill could not be in a position to complete the interviews and the state of mind might not have permitted full cooperation. Those less than one year post-transplantation could not have had a realistic perception of factors affecting the durability of the transplanted kidney because they were still in the acute phase.

Data Collection Instruments

Data were collected using a structured interview schedule. The interview schedule was developed from the in-depth literature review, consultation with nephrology experts and some aspects of the interview schedule that were borrowed from the end-stage renal disease adherence questionnaire (ESRD-AQ) and the Medication Adherence Questionnaire (MAQ) (Kim et al. 2010; Morisky, Green, and Levine 1986). The researcher did not request permission from the owners of the research instruments for their use because they were already in the public domain. The interview schedule had a section for demographics and items on engagement with medication, lifestyle modification and the healthcare system.

Face-to-face interviews were conducted to collect the data. The content validity of the structured schedule was ensured by submitting the tool to the experts in the field of nephrology in the teaching and clinical area. A pretest was also conducted at one of the non-participating state hospitals offering kidney transplantation involving adult kidney recipients who met the inclusion criteria. The reliability coefficient was .78 (i.e. Cronbach's alpha was 0.78).

Data Analysis

Data analysis was performed using the Statistical Package of Social Sciences (SPSS) version 24. Factors that influence the durability of transplanted kidneys were analysed using descriptive statistics namely frequencies, means and percentages. (Refer to Table 3.) The chi-square test was used to test whether a statistically significant relationship existed between two categorical variables. The selected independent variables were age, gender, religion, race, marital status, employment status, monthly income, level of education, donor type, mode of transport, sewerage system, residence, availability of a caregiver, dialysis before transplantation and a support system, strict adherence to immunosuppressive medication, lifestyle medication, and the healthcare system. The dependent variable was the durability of the transplanted kidney.

Ethical Considerations

Support letters were sought from the gatekeepers where the research was conducted. Thereafter, ethical approval was sought from the Biomedical Research Ethics Committee at the University of KwaZulu-Natal (reference number BE 284/16). Permission was sought from the Departments of Health of KwaZulu-Natal, the Western Cape, the Free State and Gauteng. Permission was also sought from the selected study facilities before the start of the study. The participant's rights to self-determination, privacy, confidentiality, fair treatment, and protection from discomfort and harm were observed. Written informed consent was obtained after a full explanation of what is expected and of the potential benefits of the study to the participants. Risks were minimised throughout the study through the use of study code numbers, and careful attention was paid to the protection of the information.

Results

The findings of the study are presented according to demographic data, descriptive statistics between different variables (demographics, strict adherence to immunosuppressive medication, lifestyle modification, and the healthcare system) and the years post-transplantation.

Demographic Data

Table 1 displays selected demographic data. The sample consisted of 171 kidney recipients within the age range of 19 to 76 years and a mean of 44,66. The highest age category was 41 to 50 years and the lowest was above 60 years. The majority of the

participants were males 105 (61.4%). A total of 85 (49.7%) of the participants were married. About 94 (55%) and 55 (32.1%) of the participants had completed grades 8 to 12 (high school education) and tertiary education respectively. Of the 171 participants 88 (51.5%) were unemployed. Most participants (100; 58.5%) earned below R3 000. Most participants 82 (48%) were black followed by mixed race (55; 32.2%). The majority of the participants were Christians (135; 79%), followed by Muslims (27; 15.8%). The majority of the participants (121; 70.8%) were of the cadaveric donor type. Most participants (103; 60.2%) used public transport, followed by those who used private cars (57; 33.3%) and only 11 (6.4%) used both public and private transport. The majority of the participants (167; 97.6%) used the flushing system for sewerage, followed by those who used the bucket system (1.2%), the Blair system and pit latrines with 1 (.6%) each. An average number of participants, 88 (51.5%), lived in low-density housing, followed by 72 (42.1%) of the participants who lived in high-density housing. The majority of the participants, 146 (85.4%), received both social and financial support. The majority, 158 (92.4%), had caregivers and almost all participants, 164 (95.9%), had dialysis before their transplants.

Table 1: Demographic variables for post-kidney transplant recipients (N = 171)

Variable	*Frequency (n)*	*Percentage (%)*
Age categories (years)		
18–30	35	20.5
31–40	31	18.1
41–50	47	27.5
51–60	37	21.6
Above 60	21	12.3
Gender		
Male	105	61.4
Female	66	38.6
Marital status		
Married	85	49.7
Single	58	33.9
Divorced	9	5.3
Separated	3	1.7
Widowed	8	4.7
Cohabitation	8	4.7
Level of education		
Grade 7 and below	22	12.9
Grades 8 to 12	94	55
Tertiary education	55	32.1

Variable	*Frequency (n)*	*Percentage (%)*
Employment status		
Full-time employment	50	29.2
Contract/casual worker	23	13.5
Self-employed	10	5.8
Unemployed	88	51.5
Monthly income		
Below R3 000	100	58.5
R3 000–R6 000	22	12.9
R6 001–R10 000	12	7.0
Above R10 000	37	21.6
Race		
Black	82	48
White	17	9.9
Mixed race	55	32.2
Indian	17	9.9
Religion		
Christian	135	79
Hinduism	4	2.3
Islam	27	15.8
Non-denominational	5	2.9
Donor type		
Cadaveric	121	70.8
Live-related	49	28.6
Live-unrelated	1	.6
Mode of transport		
Public transport	103	60.2
Private car	57	33.3
Both public and private	11	6.4
Sewerage system		
Flushing system	167	97.6
Blair system	1	.6
Pit latrines	1	.6
Bucket system	2	1.2
Residence		
Low density	88	51.4
High density	72	42.1
Informal settlements	8	4.7
Rural/farms	3	1.8
Support system		
Social support	25	14.6
Social and financial support	146	85.4

Variable	*Frequency (n)*	*Percentage (%)*
Availability of caregiver		
No	13	7.6
Yes	158	92.4
Dialysis before transplantation		
Yes	164	95.9
No	7	4.1

Other Variables

Table 2 displays other variables for kidney transplant recipients. Of the 171 participants only 6 (3.5%) said that they adhered strictly to their immunosuppressive medication, 110 (64.3%) said that they sometimes did so, and 55 (32.2%) confirmed that they were never strict with their immunosuppressive medication. Regarding engagement with lifestyle modification, 27 (16%) of the participants revealed high engagement levels, 105 (61%) revealed moderate levels of engagement, and 39 (23%) revealed low levels of engagement. Concerning the engagement of the healthcare system in self-management among kidney transplant recipients, the majority, 125 (73%), scored the healthcare system low and 46 (27%) scored it high.

Table 2: Other variables for post-kidney transplant recipients (N = 171)

Variable	*Frequency (n)*	*Percentage (%)*
Strict adherence to immunosuppressive medication		
Always	6	3.5
Sometimes	110	64.3
Never	55	32.2
Engagement with lifestyle modification		
High	27	16
Moderate	105	61
Low	39	23
Engagement of the healthcare system in self-management		
High	46	27
Low	125	73

Durability of Transplanted Kidneys Post-Kidney Transplantation

The minimum durability period of post-kidney transplantation was one year while the maximum was 38 years among these participants. The average period (mean ± SE) was 9.07 ± 0.543, median 8.000, mode 2.00, standard deviation 7.10344 and range 37.00.

The results further show that most participants were from 1 year to 10 years post-kidney transplantation, with the highest frequency of 17 (9.9%) being participants at 2 years

followed by 16 (9.4%) of the participants at 6 years. Furthermore, the results reveal that the lowest frequency was mostly from 24 years to 38 years post-kidney transplantation, with 24, 25, 27, 28 and 38 year old participants having only 1 (.6%) each respectively and 2 (1.2%) at 30 and 34 each respectively. The graph highlighted that as the durability period of kidney transplantation was accumulating the number of recipients was decreasing.

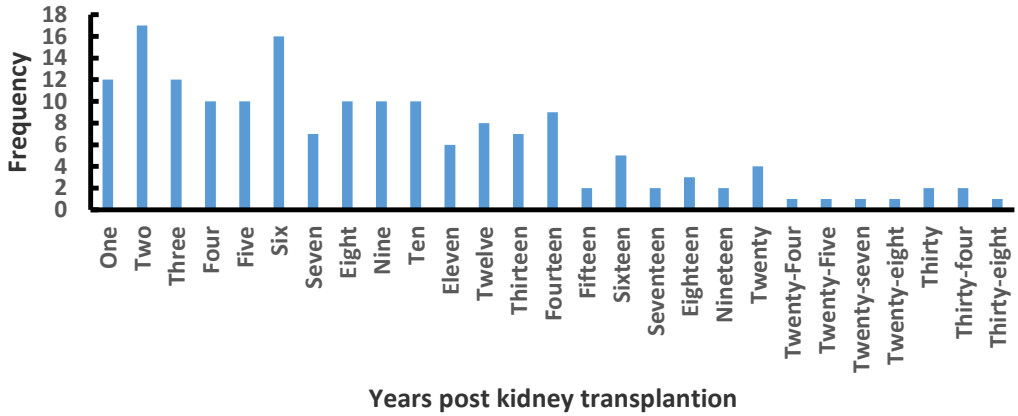

Figure 2: Frequency of number of years post-transplantation

Table 3 displays the significant variables of the mean and confidence interval (CI) in relation to the durability of the transplanted kidney. The categorised age revealed that the mean increased as the age of participants increased with the lowest mean of 6.16 and CI of 4.57–7.74 at age category of 31–40 and the highest mean at above 60 age category with a CI of 12.3–20.9 and P-value = 0.011. The mean for the mode of transplant was better for those who used private modes of transport with a mean of 11.7 and a CI of 9.45–13.98 and the lowest mean was for those who used public transport with a mean of 7.53, a CI of 6.34–8.72 and P-value = 0.001. The sewerage system used revealed a mean of 9.08 and a CI of 8.01–10.2 for those who used the flushing system, and the mean for the bucket system was 2.500 with a CI of 3.85–8.85 and P-value = 0.000. Regarding strict adherence to immunosuppressants, the mean was 11.0 with a CI of 8.71–13.3 for those who confirmed taking their medication strictly as prescribed and the mean was 6.00 with a CI of .587–11.41 for those participants who were never adherent and P-value = .000. The participants who received both social and financial support had a better mean of 9.56 with a CI of 6.30–12.81, while those who only received social support had a mean of 8.99 with a CI of 7.85–10.14 and P-value = 004. Regarding residence, the rural areas or farms had a better mean of 13.67 with a CI of −11.2–38.55 and P-value = 0.000. Dialysis before transplant revealed a better mean of 10 within the 95 per cent CI interval of 5.90–14.10. There was no significant association with the rest of the demographic variables, lifestyle modification and healthcare system.

Table 3: Significant variables with mean, confidence interval and P-value

Variable	*Frequency*	*Mean*	*95% Confidence interval*	*P-value*
Age (years)				
18–30	35	6.23	4.67–7.79	.011*
31–40	31	6.16	4.57–7.74	
41–50	47	7.98	6.35–9.60	
51–60	37	11.0	8.75–13.9	
Above 60	21	16.6	12.3–20.9	
Mode of transport				
Public	103	7.53	6.34–8.72	.001**
Private	57	11.7	9.45–13.98	
Both public and private	11	9.81	8.32–11.31	
Sewerage system				
Flushing system	167	9.08	8.01–10.2	.000**
Bucket system	2	2.500	3.85–8.85	
Blair and pit latrines omitted				
Strict immunosuppressive adherence				
Always	6	11.0	8.71–13.3	.000**
Sometimes	110	8.15	7.00–9.30	
Never	55	6.00	5.87–11.41	
Support system				
Social	25	8.99	7.85–10.14	.004**
Social and financial	146	9.56	6.30–12.81	
Residence				
Low density	88	9.77	8.10–11.44	.048*
High density	72	8.39	6.98–9.80	
Informal settlements	8	5.88	1.64–10.10	
Rural/farms	3	13.67	−11.2–38.55	
Dialysis before transplantation				
Yes	164	9.04	7.93–10.15	.000**
No/pre-emptive	7	10	5.90–14.10	

*Significant variables; **Highly significant

Discussion

The findings revealed that the average durability period for a transplanted kidney in South Africa was 9.07 years, though studies to determine the average graft survival in South Africa as a whole are still non-existent. The results show that the frequency of recipients was mostly from 1 year to 10 years post-kidney transplantation, with the highest frequency being 9.9 per cent at 2 years followed by 9.4 per cent at 6 years. Furthermore, the results reveal that the lowest frequency was mostly from 24 years to 38 years post-kidney transplantation. This meant that the higher the years post-transplantation the fewer the frequency of recipients. The results highlighted that as the durability period of kidney transplantation was accumulating, the frequency of recipients was decreasing. This could be owing to graft loss or death of the recipients due to complications post-kidney transplantation. There was no comparative study found on these findings.

The study revealed that the durability of the transplanted kidney was significantly associated with the age of the recipient with older recipients having an increased durability of transplanted kidneys, meaning that older participants were doing better compared to adolescents. This is consistent with studies done by Akchurin et al. (2014) and Kosaka et al. (2013) in which non-adherence to treatment regimens is prevalent among adolescents and constitutes a major cause of graft loss in kidney transplant recipients within this age category. According to Weng et al. (2013), among recipients of kidney transplants, non-adherence to prescribed immunosuppressive medications commonly occurs and frequently precedes allograft loss. Furthermore, Foster et al. (2011) reported that graft failure was highest in the 19-year-old category. Contradicting this, a study done by Sankaranarayanan et al. (2012) found that patients aged 35 to 49 years and 50 to 64 years, compared to those aged 19 to 34 years, were least likely to be adherent to immunosuppressants.

The mode of transport and the sewerage system were significantly associated with the durability of transplanted kidneys. Those recipients who were using private cars had prolonged durability compared to those who were using public transport. Recipients with private transport are most likely to have a higher quality of life, and may be able to afford healthy meals and better resources. This is supported by a study done by Ortiz et al. (2014) in which the health-related quality of life was better in employed kidney recipients. Again, those using the flushing system had a more extended durability period of transplanted kidneys by comparison with those using the bucket system, Blair and pit latrine systems. The results revealed significant association of residence and durability of transplanted kidneys with rural areas or farms showing prolonged durability compared to others, most likely owing to proper nutrition and less overcrowding, which might be detrimental to transplanted kidneys. However, the kidney recipients who were economically stable in terms of having private transport were mostly likely be able to attend follow-up visits and could seek help when necessary. In addition, good accommodation with flushing toilets would assist in preventing infection. Infection

could be detrimental to kidney transplant recipients on immunosuppressant medication. According to Gordon and Wolf (2009), kidney recipients must undergo routine, lifetime physician and laboratory visits, manage a complex immunosuppressant medication regimen, track graft function vigilantly, monitor their vital signs, manage symptoms, exercise, and maintain a low-cholesterol diet. Therefore, better economic resources, accessible and appropriate transport and good sanitation are crucial.

Recipients who were always strict with adherence to immunosuppressants achieved a better mean and CI than those who declared adherence to be "sometimes" and "never". Hence, strict adherence to immunosuppressive medication may be crucial in prolonging the durability of a transplanted kidney. This is supported by a study done by Weng et al. (2013) in which non-adherence among kidney transplant recipients with prescribed immunosuppressive medication commonly occurs and precedes graft loss. Furthermore, non-adherence to long-term therapies increases sharply after six months, which might partly explain the discrepancy between improved short-term allograft and unchanged long-term allograft survival with the modern immunosuppressive regimens (Obi et al. 2013; Pabst et al. 2015). The kidney recipients with both social and financial support had a better mean and CI of the transplanted kidney than those with social support only, meaning social and financial support was crucial in promoting the durability of the transplanted kidney. This is consistent with a study done by Ndemera and Bhengu (2017), in which both social and financial support is highlighted as facilitators of adherence to healthcare recommendations.

Further, the results revealed that a pre-emptive transplant before a dialysis transplant was significantly associated with the durability of transplanted kidneys, revealing that those who did not dialyse before a transplant had an extended durability period of transplanted kidneys. This concurs with a study by Riffaut et al. (2015) in which pre-emptive transplants were associated with better graft function and survival. Furthermore, Bozkurt et al. (2013) indicated that pre-emptive kidney transplantation increases the health-related quality of life, reducing treatment costs by avoiding dialysis. There was no significant association between race and durability of transplanted kidneys in contrast to studies that highlighted less or non-adherence among black people (Akchurin et al. 2014; Muduma et al. 2016). Furthermore, the results revealed that there was no association between the type of transplant (live-related, live-unrelated or cadaveric) and the durability post-kidney transplantation. This is in contrast to a study by Glorie et al. (2014) in which grafts taken from living donors were found to be generally functioning twice as long as grafts taken from deceased donors.

Conclusion

In this study, the average durability of the transplanted kidney was 9.07 years, with factors associated with this durability including variables such as age, mode of transport, the sewerage system, the residence, support system, and strict adherence to immunosuppressive medication. The associated key factors might have a negative impact thereby reducing the durability of transplanted kidneys in South Africa. Hence

the need to improve resources in terms of good housing, better sanitation coupled with strict adherence to immunosuppressants to improve the lifespan of transplanted kidneys in South Africa.

Recommendations

An in-depth study among kidney transplant recipients in South Africa should be undertaken to determine the kidney transplant survival period as this study did not allow for monitoring or a follow-up over a period. A study on variables such as physiological factors, donor-related factors and the durability of transplanted kidneys is recommended.

There is also a need to develop a specific intervention model, which targets South African kidney recipients, considering the significant variables in this study and the socio-economic status of the country.

Limitations of the Study

The data were collected from four different provinces and analysed as one study. This may not have revealed crucial gaps and risks in respective provinces. The study was only conducted in state hospitals, and not all state hospitals were included. This could have missed some crucial information in some centres doing kidney transplantation. Generalisability to private hospitals was not possible since the study focused only on state hospitals. There was a possibility of information bias because the participants were only selected from those who were scheduled for appointments at the time of the study.

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