



Living-Related Kidney Graft Donors Sociodemographic Characteristics and Recipients Clinical Characteristics in Kenya: A Single Centre Experience Kenyatta National Hospital 2010-2015 Audit

Samuel Kabinga^{a*}, Anthony Jude O. Were^b, Joshua K. Kayima^c, Seth O. McLigeyo^d, Patrick Mbugua^e, John Ngigi^f, Benjamin Wambugu^g, Nancy Wangombe^h

^aMaralal County Referral Hospital –Samburu, P.O. BOX 18882 -00100 Nairobi Kenya

^{b,c,d}University of Nairobi, College of Health Sciences, School of Medicine, Department of Internal Medicine and Therapeutics. P.O. Box 30197-00100, Nairobi

^{e,f,g,h}Kenyatta National Hospital – Nairobi, P.O. Box 20723 -00202, Nairobi Kenya

^aEmail: kabingas@yahoo.com , ^bEmail: drajowere@gmail.com , ^cEmail: joshuakayima@yahoo.com

^dEmail: mcligeyo@yahoo.com , ^eEmail: patombuguah@yahoo.com , ^fEmail: drngigi@yahoo.com

^gEmail: marangawambugu@gmail.com , ^hEmail: nancywangombe@gmail.com

Abstract

This article provides summary of sociodemographic and clinical characteristics of the kidney transplant donors and recipients from 2010-2015 from Kenyatta national hospital, Nairobi, Kenya, East Africa. Only living-related organ donation is practiced in Kenya. Accelerated kidney transplantation activities picked up in Kenyatta national hospital from the 2010.

*Corresponding author.

The duration from 2010-2015 has seen more kidney transplantations undertaken in the hospital than the ones done in the same hospital from 1984 when first transplantation was performed in Kenya to 2009. The data were extracted from manual medical records. There were about 120 kidney transplantations performed during this period but only 113 complete records were traceable.

There were 113 medical records for both kidney graft donors and recipients from 2010-2015. Demographic characteristics for donors and recipients captured included age, sex, and donor-recipient relationships. The mean donor age was 32.94 ± 8.52 years, median age of 32 years with minimum donor age of 20 years and maximum of 54 years. Fifty five percent (54.90%) of the donors were males. Among the recipients, the mean age was 39.15 ± 12.68 years, median age of 36 years with the minimum recipient age of 14 years and maximum age of 66 years. Three in every four (74.30%) of recipients were males. First degree relatives contributed 85.60% of all the donors, with brothers and sisters to the recipients contributing almost equally (31.9% and 29.2%) respectively. The recipients clinical characteristics include the primary disease, where hypertension and glomerular diseases contributed 85.0% while diabetes mellitus contributed 13.30% of the documented primary morbidity. Haemodialysis was the only modality of renal replacement therapy with a mean duration of 2.39 ± 1.63 years and modes of 2 and 3 years. The most popular vascular access for dialysis was permanent catheter (58.40%) with arteriovenous fistulae at 25.70%. Blood group O Rhesus positive was the commonest among donors and recipients (70.80% and 53.10% respectively). Blood transfusion was very common among the recipients before and around transplantation. (51% and 68% respectively). The HLA-A, -B, -DRB1 first and second loci match between the donors and recipients were zero match at 5.30%, one match at 9.70%, two matches at 11.50%, three matches at 38.10%, four matches at 20.40% five matches at 2.70% and six matches at 12.40%. All the transplantations were first kidney transplants apart from one case.

In our living-related kidney transplantation programme, the donors are younger than recipients with males being transplanted more than females. First degree relatives dominate the donation. The commonest cause of the ESRD was glomerular diseases and hypertension. The program shows plausible feasibility of organ transplant where the most popular modality of renal replacement therapy.

Key words: kidney donor; kidney graft recipient; renal registry; transplant registry.

1. Introduction

The burden of disease due to end stage kidney disease is on the rise. This has been fueled by the rise in non-communicable diseases like diabetes and hypertension in the background of high prevalence of communicable diseases. Majority of patients with chronic kidney diseases in the sub Sahara Africa (SSA) are young adults aged between 20 – 50 years. The cause is mainly due to diabetes, hypertension and glomerular diseases. Human immunodeficiency virus-related kidney disease is becoming common and presents late, with patients often requiring dialysis. Diabetes mellitus affects 9.4 million people in Africa and has a prevalence of diabetic nephropathy estimated to be 6 – 16% in SSA [1]. Kidney transplantation accords the lowest costs and highest quality of life, followed by peritoneal dialysis, home haemodialysis, and facility-based haemodialysis [2] and is the treatment of choice for patients in ESRD [3]. In Kenya, home haemodialysis services are not available

while peritoneal dialysis is not popular among adult patients. This leaves kidney transplantation as the modality of choice whenever practical [4]. In Kenya, there are only two public health facilities which undertake kidney transplantations. Kenyatta national hospital is one of the two. It is a tertiary referral hospital located in the capital city of Kenya, Nairobi. The hospital has been undertaking kidney transplantation since 1984. However in 2010, there were accelerated kidney transplantation activities. Only living-related organ donation is practiced in Kenya currently. The following is a summary of some sociodemographic and clinical characteristics of kidney graft donors and recipients from 2010-2015.

2. Subjects and Methods

Manual medical records available for the kidney graft donors and recipients who underwent the procedure in Kenyatta national hospital from 2010 to 2015 were retrieved. Data regarding the age, sex, relationship, morbidity among others were extracted and entered into Microsoft Access database. Analysis of the data was performed using SPSS version 20. Sociodemographic and clinical characteristics captured and analysed included the age, sex, donor-recipient relationship, duration of dialysis, dialysis vascular access, human leucocyte antigens match and morbidities among others.

3. Results

Demographic Characteristics

Between 2010 and 2015, there were more than 120 kidney transplantations performed in Kenyatta National Hospital. There were 113 transplantations medical records captured, with an average of 19 kidney transplantations per year from 2010-2015. (Figure 1). There were more male donors and recipients. Majority of recipients (almost 3 in every 4) were males, but among donors males and females were almost equal (54.90% males). Donors and recipients were young with donors relatively younger than recipients. Four out of every ten (41.6%) recipients were not married (Table 1). Since the organ donations were from living-related individuals, first degree relatives (father, mother daughter, son, sister, brother) contributed 85.60% of the donors pool (Table 2).

Table 1: Characteristics of kidney graft recipients and donors 2011-2014

VARIABLE	DONORS	RECIPIENTS
Sex		
Male (%)	54.90	74.30
Age		
Age mean \pm SD* (year)	32.94 \pm 8.52	39.15 \pm 12.68
Median age (year)	32	36
Minimum age (year)	20	14
Maximum age (year)	54	66
Marital status		
Married (%)		58.4

*SD standard deviation

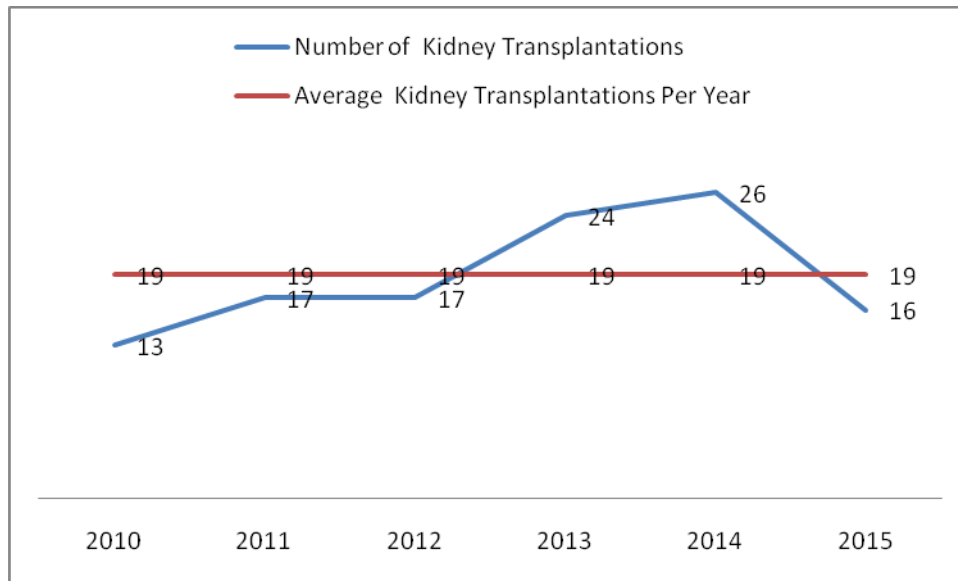


Figure 1: Distribution of kidney transplantations from 2010-2015 in KNH

Table 2: Relationships of the kidney graft donors to the recipients

Relationship	Frequency (N=113)	Percent
Brother	36	31.90
Sister	33	29.20
Son	11	9.70
Daughter	9	8.00
Cousin	7	6.20
Mother	6	5.30
Uncle	3	2.70
Father	2	1.80
Nephew	2	1.80
Aunt	1	0.90
Husband	1	0.90
Others	1	0.90
Wife	1	0.90

Clinical characteristics

The recipients had documented primary morbidity with glomerular diseases and hypertension contributing 85% the documented primary conditions. Almost all the recipients who had glomerular diseases were hypertensive too. There were several documented morbidities in different combinations. The combinations of glomerular diseases and hypertension had the highest contribution of about 57.50%. Diabetes mellitus either alone or

combinations with other conditions contributed 17.6%. (Table 3).

Table 3: Documented primary diseases and composite co-morbidities

Documented Primary Morbidity	Frequency (N=113)	Percent
Glomerular Diseases	68	60.20
Hypertension	28	24.80
Diabetes	15	13.30
Polycystic Kidney disease	2	1.80
Documented composite co-morbidities	N =112	
Glomerular Diseases;Hypertension	65	57.50
Diabetes;Hypertension	18	15.90
Hypertension	18	15.90
Connective tissue Diseases;Glomerular Diseases	2	1.80
Diabetes	2	1.80
Glomerular Diseases	2	1.80
Hypertension;Others	2	1.80
Diabetes;Others	1	0.90
Glomerular Diseases;Others	1	0.90
Hypertension;Obstructive uropathy	1	0.90

All the recipients had been on haemodialysis as the only modality of renal replacement therapy. The shortest duration of haemodialysis was about one year with the maximum duration of about 10 years. Two out of every 3 recipients (67.2%) had dialysed for 1 or 2 years. The mean and the median duration of the haemodialysis were 2.39±1.63 years and 2.00 years respectively. The recipients had had several vascular accesses, this ranged from arteriovenous fistulae to temporary dialysis catheters. The most popular vascular access among the recipients was permanent catheter, which was used by more than half (58.40%) of the recipients. By the time of transplantation, the different vascular accesses had been used. At least 1 in every 4 (25.70%) recipients had arteriovenous fistula as the dialysis access. (Table 4).

Table 4: Vascular Access Among the Transplant Recipients

Vascular Access	Frequency (N=113)	Percent
Permanent Catheter	66	58.40
AV [†] -Fistula	29	25.70
Temporary Catheter	6	5.30
AV-Fistula;Temporary Catheter	5	4.40
Permanent Catheter;Temporary Catheter	5	4.40
AV-Fistula;Permanent Catheter	2	1.80

†AV; arteriovenous

Majority of the donors and recipients had blood group O Rhesus positive. Seventy percent of donors and 53.10% of the recipients had blood group O Rhesus positive. (Table 5). Blood transfusion was common among the transplant recipients. There were more blood transfusions peritransplant (68%) when compared with 51% pretransplant. There were 35.50% of individuals with more than 3/6 HLA match. About 5% had zero match while 12.40% had perfect match. Majority (38.10%) were haploidentical. (Table 6).

Table 5: Donor and Recipients Blood Groups

Blood Group	Recipients Frequency	Recipients Percent	Donors Frequency	Donors Percent
O positive	60	53.10	80	70.80
A positive	21	18.60	13	11.50
B positive	19	16.80	11	9.70
AB positive	10	8.80	6	5.30
O negative	2	1.80	2	1.80
B negative	1	0.90	0	0.00
A negative	0	0.00	1	0.90

Table 6: Matching for Human Leucocyte Antigen-A, -B, and -DRB1 first and second loci

HLA Match	Frequency (N=113)	Percent
0	6	5.30
1	11	9.70
2	13	11.50
3	43	38.10
4	23	20.40
5	3	2.70
6	14	12.40

Almost all (99%) of the recipients had not had previous kidney graft. Only one of the recipients received a second kidney graft.

4. Discussion

The prevalence and incidences of chronic kidney disease is on the rise globally. This has been fueled by the rise

in non-communicable conditions including diabetes and hypertension. The definitive management of end-stage kidney failure is transplantation. Kenya has a population of about 42 million, and with a prevalence of kidney disease estimated at about 10%, there are 4.2 million Kenyans with kidney disease, and subsequently, a large number will require renal transplantation. Between 2010 and 2015, there were more than 120 kidney transplantations performed in Kenyatta National Hospital and has proven that kidney transplantation is a feasible therapeutic option just like in Latin America where data from dialysis and transplant registry has shown that kidney transplantation is feasible, available, and an increasingly used modality for renal replacement therapy in all Latin American countries [5]. This is a small number when compared with other countries in the world like Poland where from 1998 to 2014, the total number of deceased kidney transplantations was 15,009 [6], Mexico where, according to the National Transplant Center (CENATRA), from January 1994 to December 2014, a total of 3643 kidney transplantations were conducted (about 365 transplants/year); most were living donor 3236 (89%) [7] just like Kenya where all the donations were living-related. Other regions in the world like Korea have more people undergoing kidney transplantation in several hospitals. From Korean kidney transplant data 2009-2010, there were 2292 kidney transplantations from 46 hospitals [8] while Taiwan Organ Registry and Sharing Centers reported 1,502 kidney donors allocated from 2005-2013 [9]. Mediterranean region in Europe reported total of 19,426 kidney transplants performed (30 pmp) in 2015 [10]. In Iran, averagely, about 1800 kidney transplants per year are performed [11]. Egypt has recorded 2,485 living renal transplantations from March 1976 to December 2013 [12]. This shows that where cadaveric programmes are available, more transplantations take place.

The donors and recipients characteristics vary world over. The mean ages of our donors and recipients were about 33 and 40 years respectively, which were comparable with ones reported in Mexico where the average recipient age was 28 years, and the average age of the donor was 34 years [7]. This is younger donor age when compared with cadaveric donors age reported elsewhere like Belgium and New Zealand where mean donor age of almost 50 years has been documented [13, 14]. Siblings donated more frequently (51%), followed by parents (34%) [7]. Similar trend in relationship of donors and recipients was noted in Egypt [12], just like in our study. There are more males than females donors and recipients in Taiwan [9], Korea [8] and Egypt [12].

The most prevalent conditions documented as the primary diseases in our study were glomerular diseases at 60%, hypertension at 28% and diabetes at 13%. Similar pattern has been reported in Thailand where the most common identified causes of end-stage renal disease were chronic glomerulonephritis (38.8%), followed by hypertensive nephropathy (13.0%), diabetic nephropathy (6.0%), and lupus nephritis (1.7%) [15, 16]. In Korea the most common cause of ESRD was glomerulonephritis with an increase in diabetic nephropathy cases [8], while in Mexico 4 out of every 5 of cases, the cause of end-stage renal disease was unknown [7]. This is different from the reports from Spain where the most frequent cause of primary renal disease was diabetes mellitus at 24.6% in 2013 [17], similar to Europe reports where diabetes mellitus as the cause of end-stage renal disease comprised 24% of the incident renal replacement therapy patients [10].

The vascular access is one of the factors which can be considered to hasten the pre-transplant preparations. Difficult vascular accesses are not uncommon. Arteriovenous fistulae are preferred though they were not the most prevalent vascular access modalities by the time of transplantation. Catheters were the most common.

The commonest blood group for both donors and recipients was O Rhesus positive representing the prevalence of the blood group in our setting. Tissue typing for HLA-A, -B and DRB1 first and second loci showed a zero match 5.30% comparable with one reported in Egypt at 8.8%. Fifty percent match was found in about 40% of our study, again comparable with same percentage match in Egyptian study [12]. Poor match of less than 50 % was common among our study population at 26.50%. This might result in high immunosuppressive therapies in the attempts to tame the immunity to avert graft rejection.

5. Conclusions

In our living-related kidney transplantation programme, the donors are younger than recipients with males being transplanted more than females. First degree relatives dominate the donation. The commonest cause of the ESRD was glomerular diseases and hypertension. The program shows plausible feasibility of organ transplant where the most popular modality of renal replacement therapy is haemodialysis.

6. Limitations of the audit

This was audit of medical records, and not all records were traceable because the records are manually kept.

7. Recommendations

Electronic medical record keeping to limit the data loss, and ease record retrieval. Follow up studies on the health status of the donors and recipients are necessary to assess the health status and the kidney grafts survival.

Acknowledgements

We are very grateful to the Kenyatta National hospital renal unit staff who care for these patients. Many thanks to the health information and medical record staff in the renal unit.

8. Conflict of interest

None.

References

- [1]. Naicker, S., Burden of end-stage renal disease in sub-Saharan Africa. *Clinical Nephrology*, 2010. 74(Suppl 1): p. s13-s16.
- [2]. Ferguson, T.W., et al., Cost-effective treatment modalities for reducing morbidity associated with chronic kidney disease. *Expert Rev Pharmacoecon Outcomes Res*, 2015(Epub ahead of print): p. 1-10.
- [3]. Dharnidharka, V.R., P. Fiorina, and W.E. Harmon Kidney Transplantation in Children. *New England Journal of Medicine*, 2014. 371(6): p. 549-558.
- [4]. Rodig, N.M., K. Vakili, and W.E. Harmon, *Pediatric Renal Transplantation*. 2015.
- [5]. Cusumano, A.M., G.J. Rosa-Diez, and M.C. Gonzalez-Bedat, Latin American Dialysis and Transplant Registry: Experience and contributions to end-stage renal disease epidemiology. *World J Nephrol* 2016

- September 6; 5(5): 389-397, 2016. 5(5): p. 389-397.
- [6]. Czerwiński, J., et al., Evolution of Organ Transplantation in Poland 1966 to 2014: Dates and Numbers. *Transplant Proc*, 2016. 48(5): p. 1423-1436.
- [7]. Puentes-Camacho, A., et al., Epidemiological Characteristics of the Largest Kidney Transplant Program in Mexico: Western National Medical Center, Mexican Institute of Social Security. *transproceed*, 2016. 03.
- [8]. Ahn, C., et al., Initial report of the Korean Organ Transplant Registry: the first report of national kidney transplantation data. *Transplant Proc*, 2014. 46(2): p. 425-430.
- [9]. Chiang, Y.J. and K.H. Hsu, Long-term graft outcome analyzed from a national registry point of view. *Transplant Proc*, 2014. 46(2): p. 467-468.
- [10]. Kramer, A., et al., Renal replacement therapy in Europe: a summary of the 2013 ERA-EDTA Registry Annual Report with a focus on diabetes mellitus. *Clinical Kidney Journal*, 2016. 9(3): p. 457-469.
- [11]. Jame Jam News. The monthly costs of treatment for kidney patients. 2012.
- [12]. Matter, Y.E., et al., Impact of Donor Source on the Outcome of Live Donor Kidney Transplantation: A Single Center Experience. *Nephrourol Mon*, May 2016. 8(3): p. e34770.
- [13]. Gelder, F.V., et al., Overview of the Belgian donor and transplant statistics 2006: results of consecutive yearly data follow-up by the Belgian Section of Transplant Coordinators. *Transplant Proc*, 2007. 39(8): p. 2637-2639.
- [14]. Clayton, P.A., et al., Risk-Factor Profile of Living Kidney Donors: The Australia and New Zealand Dialysis and Transplant Living Kidney Donor Registry 2004-2012. *Transplantation*, 2016. 100(6): p. 1278-1283.
- [15]. Ingsathit, A., et al., Thai Long-term outcome of kidney retransplantation in comparison with first kidney transplantation: a report from the Thai Transplantation Registry. *Transplant Proc*, 2013. 45(4): p. 1427-1430.
- [16]. Noppakun, K., et al., A 25-year experience of kidney transplantation in Thailand: report from the Thai Transplant Registry. *Nephrology (Carlton)*, 2015. 20(3): p. 177-183.
- [17]. Escobar, E.M., The Spanish Renal Registry: 2013 report and evolution from 2007-2013. *n e f r o l o g i a* 2016. 6(2): p. 97-120.