



A TEN-YEAR RETROSPECTIVE INSTITUTIONAL ANALYSIS OF DONOR AND RECIPIENT CHARACTERISTICS AND DEMOGRAPHY IN RENAL TRANSPLANT: WILL THEY AFFECT TRANSPLANT OUTCOMES?

Urology

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ABSTRACT

Introduction& Objectives: Renal transplant has been a boon to patients with end stage renal disease. This study aims to study the long-term outcome of these patients and ascertain, how skewed is the demographic data pertaining to the donors and recipient with respect to gender, whether they have any significance in outcome. **Methods:** We did retrospective analysis of patients who underwent renal transplantation from 2012-2022. Data was compiled from the Digital database as well as departmental and institutional records. The data were analysed based on different variables. All these statistical data was correlated to the outcome of renal transplantation. Chi square test was applied to elicit any statistical significance between gender and outcome of transplantation. **Results:** Total of 168 cases of renal transplant were analysed. Majority of the transplants were live donor Renal Transplantation (86.9%), male recipients (76.7%), females donors (77.3%), mother to son (34.9%), ABO compatible (94%). 82.7% of patients are doing well with graft kidney. **Conclusion:** According to study, females were the predominant donors but did not proportionally receive the kidney, whereas the males even though donated less, received majority of the kidneys. When outcomes were calculated with various variables, male donors donating to female recipient (p value: 0.012962) as well as the DDRT (p value: 0.010987) has significantly more failure rate. These discrepancies have both socioeconomic and medical basis, which must be looked into and further studied.

KEYWORDS

Renal Transplant, LRRT, DDRT

INTRODUCTION& OBJECTIVES

Renal transplant has been a boon to patients with end stage renal disease. Patients with end-stage renal disease have two modalities of management, dialysis and Renal transplantation (1,2). They have better long-term survival with renal transplantation than with dialysis (3,4,5). It is estimated that per year around 735,000 deaths are attributable to chronic kidney disease globally (6). In the year 2021, a total of 9,105 people underwent renal transplant in India, compared to 92,532 in the world. Among that 8275 cases were Live Related renal Transplantation (LRRT) and 830 were Deceased Donor Renal Transplantation (DDRT) (7,8). The prevalence of ESRD requiring transplantation in India is estimated to be between 151 and 232 per million population (9). These data suggests that there is significant gap in the management of ESRD due to shortage of kidneys available for renal transplantation. There is a long waiting list for the procurement of deceased donor renal transplantation, hence majority of the transplant being done is live related renal transplantation (10).

While selecting donors, Anti-HLA antibodies (Abs) have been identified as the most important aspect which has been the predominant cause of early graft failure from hyperacute rejection and acute humoral rejection (11,12). Once the consequences of performing a transplant in the face of a circulating donor-specific alloantibody were fully appreciated and routine pretransplant cross-matching emerged as standard (13). Other variables like gender and age of the kidney donor and the weather are it between the same gender or not, is usually not taken into consideration as it is not shown to have a significant effect on outcome of renal transplantation (14). This study aims to ascertain, how skewed is the demographic data pertaining to the donors and recipient with respect to gender and age. What are all the outcomes of the renal transplant with respect to live and deceased donor renal transplantation and between ABO compatible and non-compatible renal transplantation, between the age and degree of relation of donor.

MATERIALS & METHODS

We did a retrospective analysis of all the patients who underwent renal transplantation during the period of 2012 to August, 2022 in our institution comprising of two hospitals, KMCH and Government Royapettah Hospital, Chennai. Data was compiled from the Digital database as well as the departmental and institutional records. The data were analysed based on variables like age of donor and recipient, gender of donor and recipient, relationship between donor and recipient, ABO compatibility, live and deceased donor. All these statistical data was correlated to the outcome of renal transplantation. Chi square test was applied to elicit any statistically significance between gender and outcome of transplantation.

RESULTS

Total of 168 cases of renal transplant were analysed. Out of them 146 are alive and doing well, 22 have either succumbed or underwent graft nephrectomy. Total of 146 cases underwent live donor Renal Transplantation and 22 underwent Deceased Donor Renal Transplantation. In LRRT, males were the predominant recipients with 112 cases. Female recipients comprised 34 cases. In DDRT, males and females recipients both had 11 cases each. Majority of the donors were females with 113 cases. There were 33 male donors. Total of 9 cases were ABO incompatible, remaining 137 cases were ABO compatible renal transplantation. With 51 cases, mother to son was the most common mode of transplantation. It was followed by 30 cases of wife to husband, 22 cases of mother to daughter, 16 cases of father to son, 8 cases of father to daughter, 5 cases of husband to wife and sister to brother each, 3 cases of sister to sister and brother to brother each. Brother to sister, grandmother to grandson, grandmother to granddaughter were the least common with 1 case each. Female donor to male recipient comprised of 87 cases, Female to female in 26 cases, Male to male in 19 cases, male to female in 14 cases. Among LRRT recipients, 21-30 age group were the majority with 64 cases, followed by 34 cases of 31-40 years, 28 cases of 41-50 years. 51-60 years age group was the least common with 5 cases. Among DDRT recipients, 31-40 and 41-50 age group were the majority with 7 cases each, followed by 6 cases of 21-30 years, 28 cases of 41-50 years. 51-60 years age group was the least common with 2 cases. All the above variables of donor and recipient characteristics were correlated with the outcome of renal transplantation. Chi square test was applied to elicit any statistically significance between those variables and outcome of transplantation.

Among LRRT, 125 of the 146 cases are alive and doing well with the transplant kidney. Failure rate is 14.3% among LRRT. In DDRT, 14 out of 22 cases are doing well, with failure rate of 36.3%. The chi-square statistic is 6.4674. The p-value is 0.010987. Significant at $p < .05$. (Table 1)

Table 1

	Alive/well	Dead/Failur	Total
LRRT	125	21	146
DDRT	14	8	22
Total	139	29	168
The chi-square statistic is 6.4674. The p-value is .010987. Significant at $p < .05$.			

In cases of LRRT, out of 112 male recipients, 99 cases are alive and

doing well with the transplant kidney. Failure rate is 11.6% among male recipients of LRRT. Among female recipients, 26 out of 34 cases are doing well, with failure rate of 23.5%. The chi-square statistic is 3.0105. The *p*-value is 0.082727. Not significant at *p* < .05. In cases of DDRT, out of 11 male recipients, 6 cases are alive and doing well with the transplant kidney. Failure rate is 45.4% among male recipients of DDRT. Among female recipients, 8 out of 11 cases are doing well, with failure rate of 27.27%. The chi-square statistic is 0.7857. The *p*-value is .375399. Not significant at *p* < .05. Among LRRT donors, 25 of the 33 male donated renal transplantation cases are alive and doing well. Failure rate is 24.2% among male donated LRRT. In female donation, 100 out of 113 cases are doing well, with failure rate of 11.5%. The chi-square statistic is 3.3653. The *p*-value is 0.066585. Not significant at *p* < .05. Among LRRT, 117 of the 137 cases of ABO compatible renal transplantation are alive and doing well with the transplant kidney. Failure rate is 14.6% among ABO compatible LRRT. In ABO incompatible LRRT, 8 out of 9 cases are doing well, with failure rate of 11.1%. The chi-square statistic is 0.0834. The *p*-value is .772734. Not significant at *p* < .05. In cases of LRRT, out of 87 female donors to male recipients, 77 cases are alive and doing well with the transplant kidney. Failure rate is 11.5% among female donors to male recipients of LRRT. Among male donors to female recipients, 8 out of 14 cases are doing well, with highest failure rate of 42.9%. The chi-square statistic is 10.7825. The *p*-value is .012962. The result is significant at *p* < .05. (Table 2)

Table 2

Gender: LRRT	Alive/well	Dead/Failure	Cases
Male to Male	16	3	19
Male to Female	8	6	14
Female to Female	24	2	26
Female to Male	77	10	87
Total	125	21	146
The chi-square statistic is 10.7825. The <i>p</i> -value is .012962. The result is significant at <i>p</i> < .05.			

Among LRRT, 61 of the 64 cases in the age group of 21-30 years are alive and doing well with the transplant kidney with a failure rate of 6.25%. In 41-50 years age group, 21 out of 28 cases are doing well, with failure rate of 25%. The chi-square statistic is 7.1138. The *p*-value is .129997. The result is not significant at *p* < .05. Among DDRT, 4 of the 7 cases each in the age group of 31-40 years and 41-50 years are alive and doing well with the transplant kidney with a failure rate of 42.9%. In 51-60 years age group, 1 out of 2 cases is doing well, with failure rate of 50%. The chi-square statistic is 1.4218. The *p*-value is .70044. The result is not significant at *p* < .05.

Table 3

Variables	Most common	Failure rate	P Value	Significance
Type	LRRT (86.9%)	DDRT (36.3%)	0.010987	Yes
Recipient Gender: L	Male (76.7%)	Female (23.5%)	0.082727	No
Recipient Gender: D	M=F	Female (45.4%)	0.375399	No
Donor Gender	Female (77.3%)	Male (24.2%)	0.066585	No
ABO	Comp(93.8%)	Compa (14.6%)	0.772734	No
Relation	F to M (59.6%)	M to F (42.9%)	0.012962	Yes
Recipient age:LRRT	21-30 (44.5%)	41-50(25%)	0.129997	No
Recipient age:DDRT	21-30, 51-60 (27%)	31-40, 41-50 (57%)	0.70044	No

DISCUSSION

This institutional analysis of renal transplantation illuminates the following patterns. First, females constitute a disproportionate majority of donors for kidney (77.3%), whereas the males receive majority of the kidneys (76.7%) and male to female donation is the least common mode with just 9.5% of total transplants, the majority being female to male, constituting 59.6% of the transplants.

This disparity in donor gender can be attributed to the societal factors. As males still constitute the sole bread winner in majority of Indian households and that may be a major factor. It has also been shown in some studies that males may have more degree of ambivalence about donation compared with women (15). In a study conducted by Kayler et al (16) conducted in USA, Females comprised 68% of spousal and 56% of related and unrelated nonspousal donors, correlating the

findings of this study. In another study conducted by Øien et al (17) in Norway also had similar findings with female donors constituting 52.8%. In a study conducted by Avula et al (18) in India also revealed that females were the predominant donors (55%).

There was no statistically significant effect on transplant outcome with Recipient gender, ABO compatibility, Recipient age.

There was statistically significant effect on outcome in type of donation, with DDRT having more failure rate, the chi-square statistic is 6.4674. The *p*-value is .010987. Significant at *p* < .05. There are multiple studies which have provided evidence that the outcome of living-donor transplant is superior to receiving kidneys from deceased donors (19,20). In a study conducted by Nemathi et al (21) patient and graft survivals were also significantly shorter in deceased kidney transplantation than those who received kidney from a living donor. Superior results after LRRT are partly, but not completely, the result of the shorter cold ischemia periods in this population. An increased sharing of unknown immunologic variables (e.g., minor antigens) in the LRRT population that beneficially influences graft survival cannot be excluded. In the LRRT, often there will be lower number of previous transplants, lower peak and current panel reactive antibody, shorter cold ischemia period, lower donor serum creatinine, shorter period of renal replacement therapy before the present transplantation, normal anatomy of the kidney graft, and more HLA identical combinations. These have all been associated with a better prognosis (22,23).

It was statistically significant when relationship between donor and recipient pertaining to gender was taken into account with male donors to female recipients having more failure rate. The chi-square statistic is 10.7825. The *p*-value is .012962. The result is significant at *p* < .05. This finding is not consistent with the available literature. Each study has got different findings and no apparent factor involved in either improving outcome or as an adverse factor have been discovered. According to a study by Naderi et al (24), female recipients, even from male donors, showed higher transplant outcomes in comparison to male recipients (from female donors). Correlating to it, our study also had the highest success rate among female-to-female transplants. Naderi et al hypothesized that as inflamed female's patients have a better outcome compared to inflamed males, because sex hormones may have important cardioprotective effects that limit the effect of inflammation on vascular injury in female patients with end-stage renal disease (ESRD). But this still does not correlate the highest failure rates among male to female transplant in our study. In a study conducted by Kayler et al, higher graft survival rates were found among male-to-male transplantations. They attribute this finding to sufficient functional donor nephron adequacy. In our study the failure rate was highest in male to female transplants, specifically among husbands to wife. This can be due to wives being specifically sensitized to their husbands immune system as a result of exposure to parental antigens during pregnancy (25). The impact of gender on renal transplantation outcomes has been extensively studied but no conclusive evidence has been obtained. Various factors like differential effects of sex hormones on immunologic responsiveness (26,27), drug metabolism (28), and hemodynamic responses (29) has been attributed to the differential outcome of transplantation.

CONCLUSIONS

Hence according to study, females were the predominant donors but did not proportionally receive the kidney, whereas the males even though donated less, received majority of the kidneys. When outcomes were calculated with various variables, male donors donating to female recipient as well as the DDRT has significantly more failure rate. These discrepancies have both socioeconomic and medical basis, which must be looked into and further studied.

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