

Original
Article**Outcomes of Deceased Donor Kidney Transplantation: A Single-Center Experience from Türkiye**

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JEIMP belongs to "The Foundation for the Management of Chronic Diseases" and is supervised by the MKD Digital Publishing. www.jeimp.com and digitalmkd.com**Abstract**

Background: In Türkiye, approximately 90% of kidney transplants are conducted utilizing allografts from living donors. Due to the low incidence of cadaveric kidney transplants in the country, comprehensive data on the short-term and long-term outcomes of these procedures remain limited. We aim to present the outcomes of deceased donor-related kidney transplantations (DDKTs) performed in our center.

Methods: This retrospective single-center study was conducted at Atilim University School of Medicine-affiliated Medicana International Ankara Hospital. We analyzed DDKTs performed since 2010. Recipients' demographical features, one and five-year recipient and allograft survival rates, functions of surviving allografts, rates of primary non-functioning graft, and delayed graft function were noted.

Results: Among 1155 transplants performed between 2010 and 2023, 83 (7.2%) were DDKTs. Recipients were followed-up mean of 84 months. The one- and five-year survival rates for recipients were 94.0% and 81.2%, respectively, while the survival rates for allografts were 89.2% and 72.7%, respectively. Recipient and allograft survival rates were comparable between genders. The optimal allograft function is observed between one and five years post-transplantation; thereafter, a decline in allograft function is typically noted.

Conclusion: Our study demonstrates promising survival rates for recipients of DDKTs in our center, emphasizing the efficacy of this treatment modality for ESRD patients. DDKT can provide substantial dialysis-free survival for most patients with ESRD.

Keywords: Kidney transplantation, deceased donor, survival, ESRD, mortality, Türkiye

INTRODUCTION

Kidney transplantation is the optimal and preferable treatment option for improving survival and quality of life for patients with end-stage renal disease (ESRD), today (1,2). However, the shortage of allografts is the major obstacle that stands in front of providing more organs for ESRD patients (3).

Türkiye is a leading country regarding organ transplantation with growing experiences since 1975 (4). It has become one of the world's leading transplant centers, performing 3,800 kidney transplants annually before the COVID-19 pandemic (5,6). Besides all efforts, however, deceased donor-related kidney transplantation

(DDKT) numbers have been decreasing year-to-year in Türkiye and have fallen below 10% of all kidney transplantation (5-8). Since the number of DDKT is low, the outcomes and their implications on clinical practice are also less known.

Our hospital is a high-volume transplant center that has been performing kidney transplants for over 15 years. In this regard, we aim to present the basic outcomes of DDKT conducted in our center.

METHODS

This retrospective single-center study was conducted

at Atilim University School of Medicine-affiliated Medicana International Ankara Hospital. All DDKTs performed since 2010 were noted by investigating the hospital software system. The study was carried out in accordance with the Declaration of Helsinki. The consent form is not available since the study is retrospective. The study was approved by the ethics committee of scientific research at Medicana International Ankara Hospital.

The primary goal of the study is to reveal recipient and allograft survival rates. Rejection rates and immunosuppression protocols are not the subjects of the study. One, three, and five-year survival rates were analyzed.

The recipients' demographic features were noted. Allograft functions at one, three, and five years, delayed graft functions, and primary non-functioning allografts were also recorded.

Allograft functions were calculated using an online formula at www.mdrd.com (Chronic Kidney Disease – Epidemiology Collaboration 2009). Recipients who required dialysis within the first postoperative week (due to any cause) were assigned as having delayed allograft function (DGF), while allografts that never functioned were assigned as primary non-functioning allografts.

STATISTICAL ANALYSIS

Statistical analysis was conducted using SPSS (version 13.0 for Windows). Initially, all data underwent normality testing using the Kolmogorov-Smirnov and Shapiro-Wilk tests. Parametric data are presented as mean ± standard deviation, while non-parametric data are presented as median (minimum-maximum). Categorical variables were compared using Pearson's or Fisher's exact test. The impact of factors on survival rates were investigated with regression analysis. A p-value <0.05 was considered statistically significant.

RESULTS

A total of 1155 transplants were performed between

2010 and 2023 at our hospital. 83 of 1155 transplants (7.2%) were DDKT. The mean ages of recipients and donors were 43.85±31 (9-71) and 45.61±17.67 (6-83), respectively. 62.7% of recipients (n=52) were male. The clinical and laboratory features of the recipients and donors are given in **Table 1**. The recipient and allograft survival rates were similar between genders (p=0.867 and p=0.657).

The mean recipient and allograft survivals were 84(0-120) and 48(0-120) months, respectively. Recipient and allograft survivals according to posttransplant years were given in **Table 2**. **Figure 1** and **Figure 2** demonstrate recipient and allograft 5-year survival rates. **Figure 3** and **Figure 4** exhibits a similar 5-year allograft and recipient survival rates between males and females (p>0.05).

Despite a substantial increase in KT numbers in the last decade in our center, the DDKT ratio decreased (**Figure 5**). In univariate analysis, the recipient and donor age had an impact on the recipient's survival rates (**Table 3**).

Surviving allografts exhibited a stable function within 5 years of posttransplant period. However, recipients who received their allografts from older donors (≥65

Table 2. Recipient and allograft survival rates, one to ten years

	Recipient survivor/ nonsurvivor, n(%)	Allograft survivor/ nonsurvivor, n(%)
Year 1	78(94.0%)/5(6.0%)	74(89.2%)/9(10.8%)
Year 2	73(92.4%)/6(7.6%)	63(84.0%)/12(16.0%)
Year 3	70(92.1%)/6(7.9%)	57(82.6%)/12(17.4%)
Year 4	64(88.9%)/8(11.1%)	47(72.3%)/18(27.7%)
Year 5	56(81.2%)/13(18.8)	36(72.0%)/14(28.0%)
Year 6	50(79.4%)/13(20.6%)	32(72.7%)/12(27.3%)
Year 7	46(82.1)/10(17.9%)	24(60.0%)/16(40.0%)
Year 8	40(78.4%)/11(21.6%)	19(22.9%)/17(47.2%)
Year 9	35(76.1%)/11(23.9%)	13(40.6%)/19(59.4%)
Year 10	33(84.6%)/6(15.4%)	9(36.0%)/16(64.0%)

Table 1. The clinical and laboratory features of the recipients and donors

Age, years (recipient)	43.85±31
Gender, male/female, n(%) (recipient)	52(67.2%)/31(32.5%)
Recipient Survivor/nonsurvivor, n(%)	58(69.9%)/25(30.1%)
Allograft Survivor/nonsurvivor, n(%)	56(67.5%)/27(32.5%)
Age, years (donor)	45.61±17.67
Dialysis duration, month	96(2-144)
Delayed allograft function, n(%)	30(36.14%)
Primary-nonfunctioning allograft, n(%)	3(3.6%)
Hospital stay within postoperative 1 month, day	6.3 (4-30)
Discharge serum creatinine, mg/dl	1.7 (0.68-6.20)
Total ATG dose administered within postoperative 1 month, mg	600 (400-1000)
Surgical complications, lymphocele, wound infection, urinoma, vascular, n(%)	11 (13.2%)
Rejection, n(%) biopsy-proven or anti-rejection treatment applied under high clinical suspicion, n(%)	18(22.5%)

ATG; anti-thymocyte immunoglobulin

Table 3. The impact of donor and recipient age on recipient and allograft survival rates

		Univariate		Multivariate	
		P value	CI %95	P value	CI %95
Recipient Survival	Recipient age	<0.001	0.005 – 0.008	<0.001	0.005 – 0.005
	Donor age	0.002	0.001 – 0.004	0.004	0.682 – 0.861
Allograft Survival	Recipient age	0.048	0.011 – 0.054	0.098	0.020 – 0.102
	Donor age	<0.001	0.002 – 0.007	0.002	0.375 – 0.652

years old) had a worse allograft function compared to recipients who received their allografts from donors <65 years old (Figure 6) (p<0.05).

DISCUSSION

While kidney transplantation (KT) offers superior life expectancy and enhanced quality of life compared to current dialysis modalities, the scarcity of available allografts persists as a significant obstacle. Due to the low number of deceased-sourced donations, Turkey ranks first in living-related kidney transplantation. Therefore, little is known about the outcomes of deceased donor-related kidney transplantations (DDKTs) in Turkey. In our center, deceased donor-related kidney transplantation accounts for 7.2% of all KTs and provides a 5-year

recipient and dialysis-free survival rates of 81.2% and 72.0%, respectively.

Previous studies demonstrated a correlation between the prevalence and incidence of KT and the income level of a country. However, variations in these patterns, such as Japan’s low incidence of KT, indicate that cultural practices and considerations regarding deceased donation can constrain the adoption of KT even in high-income countries (9,10). The variable rates of prevalence and incidence of KT worldwide seem to be significantly influenced by government funding strategies for chronic diseases, the availability of donors, and the capacity of healthcare network organizations (10). On the other hand, to compensate for the gap between organ demand and delivery, there is an increasing trend to use low-quality

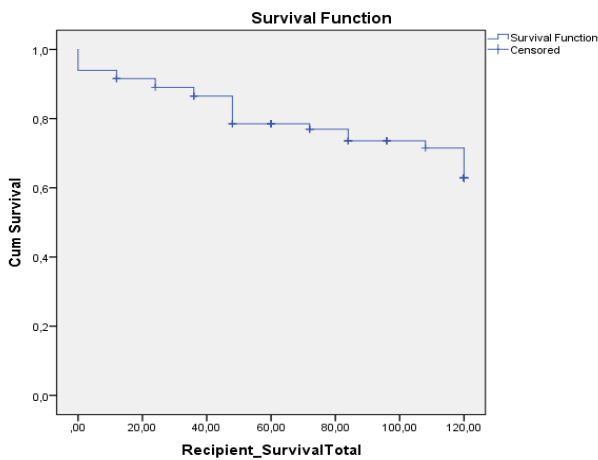


Figure 1. The five year recipients’ survival rates

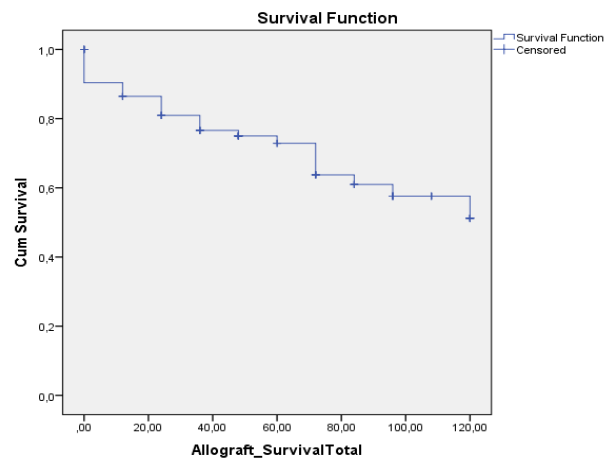


Figure 2. The five year allografts’ survival rates

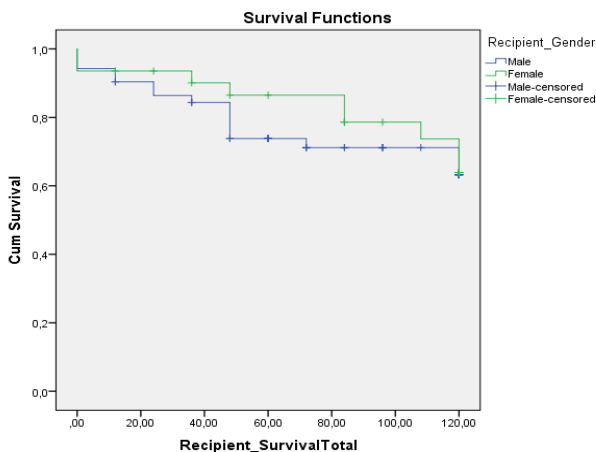


Figure 3. The five year recipients’ survival rates according to genders

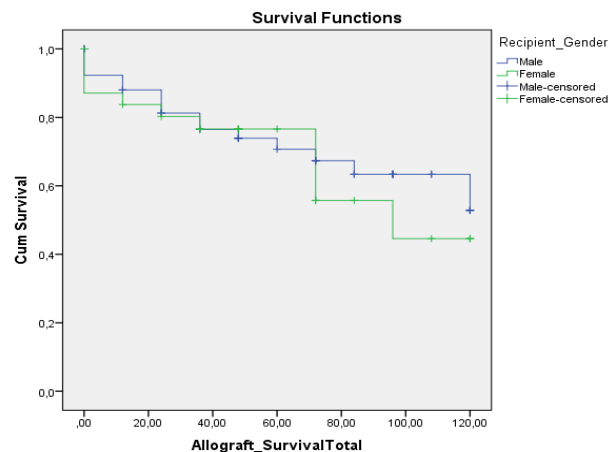


Figure 4. The five year allografts’ survival rates according to genders

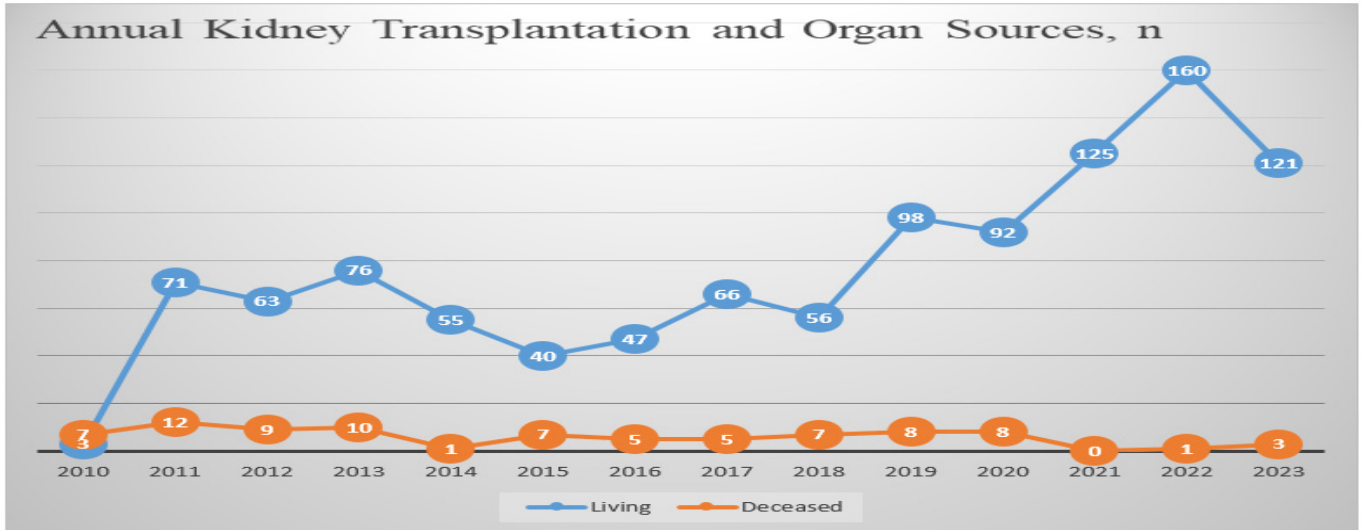


Figure 5. Deceased and living donor kidney transplantation trends between 2010 and 2023 in our center

allografts in KT (11). Nevertheless, despite the use of more low-quality allograft kidneys over the past 10 years, patient and graft survival have remained unchanged. Several factors may have contributed to improving both recipient and graft survival, potentially offsetting the effects of the decline in the quality of donor kidneys (11). This result may be, at least partially, associated with the decreased prevalence of cardiovascular co-morbidities at the commencement of KT as well as improved survival of the general population (13,14).

Turkey has exhibited an interesting trend regarding donor sources in the last decade. Despite being among countries with a high Human Development Index and a substantial increase in the development of its healthcare system, DDKT rates have reduced year by year (ranking 42nd among countries with a transplant program) in Turkey (15). Moreover, this reduction rate in DDKT has emerged despite a substantial increment in total

annual kidney transplantations (5,6). Additionally, the COVID-19 pandemic has caused a sharp decline in DDKT rate, down to around 8% (5). In our center, 1155 kidney transplant performed since 2010 and the overall DDKT prevalence is 7.27%. However, similar to the national registries there is a sharp decline in DDKT numbers was observed following the COVID-19 pandemic. The overall DDKT rates of the last 3 years are around 1.0% in our center, which is not an acceptable and desirable result.

KT provides lower mortality and the risk of cardiovascular events compared to dialysis and the relative benefits of KT likely increase over time (16). In the United States, the 5-year survival rates for living- and DDKTs are 84.6% and 72.4%, respectively. Focusing on other countries, in Australia, New Zealand, Europe, Canada, and South Korea, these rates range from 81% to 90%. Our study holds significance as it provides long-term

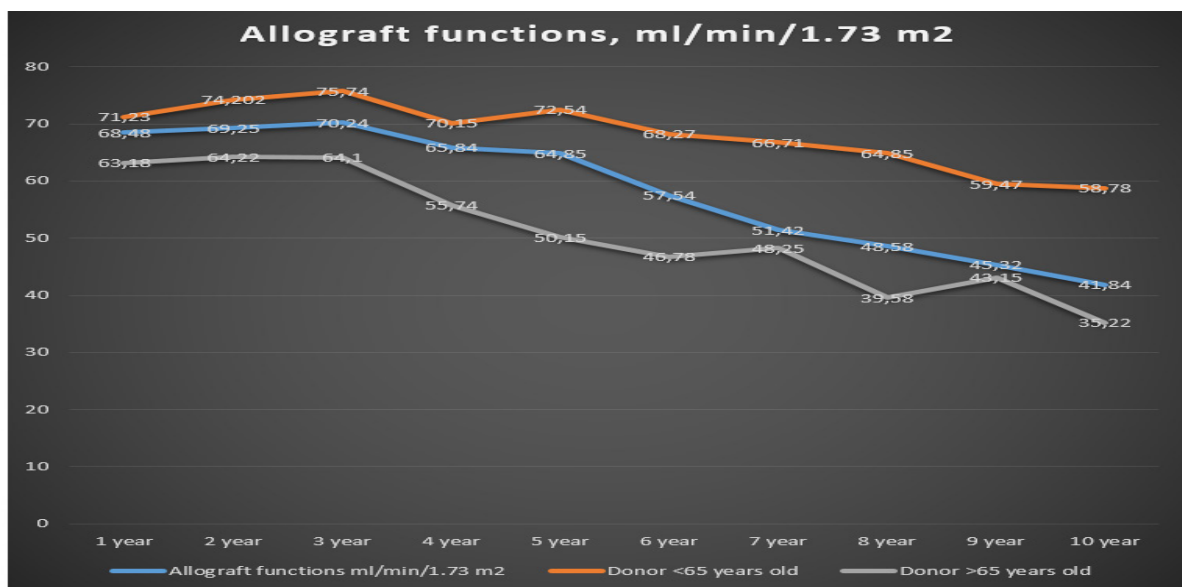


Figure 5. Allograft functions are given in a 10-year time interval

national KT outcomes, enabling valuable comparisons with global results (10,17,18). The survival rates for both living and deceased donor-related kidney transplants are approximately 94.0% and 86.0%, respectively, according to data from the Turkish Society of Nephrology (TSN) Registries (5,6). However, specific survival rates for individual centers remain unknown. Soyulu et al. reported composite recipient survival rates for one and five years, combining both living and deceased donors, at 90.9% and 88.9%, respectively (19). Merhametsiz et al. demonstrated an average recipient and allograft survival rate of around 80% in their study, which included 268 deceased donor kidney transplants (20). In this study, one-year recipient and allograft survival rates were 94.0% and 89.2%, respectively, while five-year recipient and allograft survival rates were 81.2% and 72.0%, respectively. Considering that the 5-year mortality rate reaches 50% in dialysis patients, these results are favorable for individuals with ESRD (21). According to the TSN registry, the annual mortality rate is 10-12% (5).

Older donor age and recipient age are two well-known risk factors for the worse recipient and allograft survival longevity (22,23). In this study, similar outcomes were demonstrated with previous studies. However, younger donors (<65 years old) provided a better allograft functions in recipients.

This study aimed to demonstrate the crude survival rates of deceased donor kidney transplants (DDKTs) performed in a single center. As such, it raises several questions regarding the outcomes. However, the results appear to be superior to those of patients undergoing hemodialysis treatment and comparable to national and international reports.

Limitations of the Study

The study focuses on outcomes from a single center, which may not be representative of broader population trends or variations in transplant practices across different centers. The study has a relatively small sample size, which can affect the generalizability of the findings and limit the statistical power to detect differences or associations. The study does not account for external factors that may influence transplant outcomes, such as changes in medical practice, advancements in immunosuppressive therapies, or variations in healthcare infrastructure and policies over time. The study acknowledges the impact of the COVID-19 pandemic on transplant rates but does not delve deeply into how this may have influenced the observed outcomes or introduced biases due to changes in transplant practices during the pandemic. While the study compares outcomes with national and international reports, it does not include direct comparison groups, such as patients on dialysis or those receiving transplants from living donors, which could provide additional

context for interpreting the findings.

CONCLUSION

In this single-center report, we observe recipient and allograft survival rates comparable to those reported nationally and internationally. Notably, our findings reveal one and five-year recipient survival rates of 94.0% and 81.2%, respectively, similar to previous reports on dialysis survival rates. Given the acknowledged benefits of kidney transplantation, particularly in comparison to dialysis, deceased donor kidney transplantation emerges as a favorable treatment option for patients with end-stage renal disease.

DECLERATIONS

Ethics Committee Approval: A local Ethics Committee Approval was obtained for this single-center retrospective study (2023/12).

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Author contributions: All researchers equally contributed to data collection and analyzing the final version of the article. All authors read and approved the final manuscript.

Conflict of interest: None

Informed consent form: Not available

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