

# Characteristics of Deceased Donor Candidates in Deceased Donor Liver Transplant (DDLT) at H. Adam Malik Central General Hospital, Medan

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## Abstract

**Introduction:** Liver transplantation is a critical intervention for end-stage liver diseases, yet challenges persist across pre-, peri-, and post-transplant phases. This study aims to characterize potential deceased liver donors to inform transplantation practices and outcomes.

**Methods:** A descriptive observational study with a case series design was conducted at H. Adam Malik Hospital, Medan, from September to December 2023. Medical records of Deceased Donor Liver Transplant (DDLT) candidates were analyzed for demographic and clinical characteristics using SPSS software.

**Results:** Of the 100 DDLT candidates analyzed, the majority were male (66%) with a mean age of 60.73 years. Blood type O was most common (40%), and cardiovascular disease was the leading etiology (38%). All donors were viable, with signs of brainstem death present in all cases.

**Discussion:** Liver transplantation has evolved over decades, yet challenges persist, including donor shortages and disparities in recipient access. Age-related factors and donor-recipient matching play significant roles in transplant outcomes. Education level and blood type influence organ allocation and waiting times. Optimizing organ utilization and allocation remains crucial for improving transplant practices and outcomes.

**Keywords:** Liver transplantation, Deceased donor, Donor characteristics, Transplant outcomes, Organ allocation.

## Introduction

Currently, liver transplantation is a proven intervention technique that can save lives in patients with end-stage liver disorders, both acute and chronic. Transplantation can restore quality of life, reduce mortality and reduce morbidity. Liver transplantation is considered a last resort in the treatment of various hepatologic disorders when all other interventions have failed. (Dababneh and Mousa, 2022). Liver transplantation is listed as the second most common transplant after kidney transplantation in the United States. Since 1988, a total of 170,000 transplants have been performed in the United States of which nearly 8,900 transplants are performed annually. In fact, Deceased Donor Liver Transplant (DDLT) is the most frequently used method, where

in America, 8,400 cases are carried out by DDLT, while the remaining 500 are Living Donor Liver Transplants (LDLT). (Miyara et al, 2021)

The discovery of the liver transplant technique leading to DDLT began in 1958, when Francis Moore described an orthotopic liver transplant technique in dogs. In 1963, Starzl et al performed the first liver transplant. In the first five liver transplants, no patient survived more than 23 days. In 1967, prompted by Calne's use of an antilymphocytic serum, Starzl began a series of successful liver transplants. By 1977, 200 liver transplants had been performed worldwide. During this period, technical problems were successfully resolved. Roy Calne, in 1979, used cyclosporine for the first time on two patients who had undergone liver transplants. In 1989, Starzl et al reported a series of 1,179 consecutive patients undergoing liver transplantation and reported survival rates of between one and five years of 73% and 64%. Finally, in 1990, Starzl et al reported successful use of tacrolimus in patients who underwent liver transplantation and experienced rejection despite receiving conventional immunosuppressive treatment.

However, there are quite a few challenges faced in liver transplantation in both developed and developing countries. According to Theocharidou and Adebayo, in 2022 there are 3 main challenges facing liver transplantation currently, namely: (1) pre-transplantation aspects (management of patients on the waiting list, the impact of COVID-19 on advanced liver disease); (2) peri-transplant aspects (stopping transplantation due to the pandemic, donor and recipient compatibility testing, healing and utilization of donor organs) and (3) post-transplant aspects (immunosuppression management) (Theocharidou and Adebayo, 2022).

For this reason, prioritization is needed to see patients who require immediate and non-immediate transplantation. At the meeting of the American Society of Transplant Physicians (ASTP) and the American Association for the Study of Liver Disease (AASLD), there were several patient characteristics that were important to follow so that the practice of liver transplantation could run according to its ideals and outcomes. In principle, patients must have a 90% chance of survival within 1 year to be considered eligible. To determine this, ASTP and AASLD use various parameters such as the Child-Pugh score, hepatic encephalopathy staging, cirrhosis scoring. All of this was done based on patient characteristics in the United States. (Lucey et al, 2003)

A study at a general hospital in Padang reported that patients with liver cirrhosis were found to be more in the 51-60 year age group (35.2%) with the predominance of patients with liver cirrhosis being men. (Yusminingrum et al, 2019). Another study by Ndraha et al reported that the prevalence of liver cirrhosis sufferers in a public hospital in Jakarta was 63.7% in men and 36.7% in women, with the largest age group being 40-60 years old, namely 55.3%. (Ndraha et al, 2018) This data proves that Indonesia also really needs liver transplants. To meet the need for liver transplants and make priorities in accordance with the principles of beneficence, non-maleficence, justice and patient autonomy, researchers conducted a study of the characteristics of potential donors. This is crucial because Deceased Donor is a replacement answer for Living Donor. Therefore, researchers are trying to make a study regarding potential donors at the H. Adam Malik Central General Hospital, Medan, especially potential Deceased Donors in DDLT (Deceased Donor Liver Transplant) in the future, and this research is new research and is very important for carried out both in Indonesia in general and at the H. Adam Malik Medan Central General Hospital in particular.

## Methods

This research is a descriptive observational study with a case series design. Data was collected from medical records of patients who were Deceased Donor candidates for DDLT at H. Adam Malik Hospital, Medan. The research was conducted at the H. Adam Malik Central General Hospital in Medan with samples collected from patients in the period September 2023 to December 2023. The research population was all patients who were Deceased Donor candidates. The reachable population is all patients who are Deceased Donor candidates at H. Adam Malik General Hospital, Medan. The research sample is a portion of the accessible population that meets the inclusion and exclusion criteria.

The inclusion criteria for the study included Deceased Donor candidate patients aged 18-66 years, patients with brain stem death and patients with livers that were still viable for donation. Exclusion criteria for the study included incomplete medical record data in terms of demographic, clinical and liver profile, patients with a history of acute or chronic liver disease and liver volume

below <40% of the recipient's liver volume. Research data analysis was carried out using SPSS software. The analysis carried out is descriptive analysis. Categorical data will be displayed in the form of frequency and percentage, while numeric data will be displayed in the form of average and standard deviation if the distribution is normal and median (min-max) if the data is not normal.

## Results

This study is observational descriptive research with a case series design. Data were collected from the medical records of Deceased Donor Liver Transplant (DDLT) candidates at H. Adam Malik Hospital in Medan. The research was conducted at H. Adam Malik Central General Hospital in Medan, with samples collected from patients during the period from September 2023 to December 2023, totaling 100 patients.

**Table 1. Demographic Characteristics of Study Subjects (n=100)**

Variable	Mean±SD (Min-Max)	
Age	60.73±11.366 (35-83 years)	
Variable	Frequency (n)	Percentages (%)
Gender		
Male	66	66%
Female	34	34%
Ethnicity		
Batak	45	45%
Mandiling	38	38%
Jawa	14	14%
Minang	3	3%
Religion		
Islam	58	58%
Christian	42	42%
Education		
SD	3	3%
SMP	9	9%
SMA	88	88%
<b>Total</b>	<b>100</b>	<b>100%</b>

Table 1 illustrates the demographic characteristics of the study subjects, with an average age of 60.73 ± 11.366 years, ranging from 35 to 83 years. The most common gender was male, with 66 subjects (66%), while female subjects accounted for 34 subjects (34%). The Batak ethnicity was the most prevalent, with 45 subjects (45%), followed by the Mandailing ethnicity with 38 subjects (38%), Javanese ethnicity with 14 subjects (14%), and Minang ethnicity with 3 individuals (3%). The majority of the subjects were Muslims, totaling 58 subjects (58%), while Christians accounted for 42 subjects (42%) (Figure 4.3). High school education (SMA) was the most common, with 88 subjects (88%), followed by junior high school (SMP) with 9 subjects (9%), and elementary school (SD) with 3 subjects (3%).

**Table 2. Clinical Characteristics of Study Subjects (n=100)**

Variable	Frequency (n)	Percentages (%)
Blood type		
A	12	12%
B	36	36%
AB	12	12%
O	40	40%
Donor viability		
Viable	100	100%
Not viable	0	0%
Etiology		
Chronic heart disease	23	23%
Chronic limb injury	3	3%
Cardiovascular disease	38	38%
Hemorrhagic stroke	24	24%
Ischemic stroke	9	9%
Heart tamponade	3	3%
Brain death sign		
Present	100	100%
Not present	0	0%
<b>Total</b>	<b>100</b>	<b>100%</b>

Table 2 presents the clinical characteristics of the study subjects, with blood type O being the most common among 40 subjects (40%), followed by blood type B with 36 subjects (36%), and blood types A and AB each with 12 subjects (12%). The most frequent etiology observed was cardiovascular disease, with 38 subjects (38%), followed by hemorrhagic stroke with 24 subjects (24%), chronic heart disease with 23 subjects (23%), ischemic stroke with 9 subjects (9%), chronic limb injury, and cardiac tamponade, each with 3 subjects (3%). Regarding donor viability, all 100 subjects (100%) were categorized as viable. Signs of brainstem death were found in all 100 subjects (100%).

### Discussion

Liver transplantation began nearly 50 years ago with Thomas Starzl's first orthotopic liver transplant in 1963, followed by the first successful liver transplant in 1966. Since then, liver transplantation has become widespread worldwide. It has become the preferred management for patients with end-stage liver disease due to better outcomes and broader indications. However, the shortage of organ donors and increasing demand have led to the need for expanding concepts to enhance graft availability. Old and marginal liver donor acceptance, alongside alternative techniques like liver graft splitting and the use of living donors, have been proposed to reduce patient mortality on the waiting list.

The criteria for brain death agreed upon globally have spurred rapid growth in Deceased Donor Liver Transplantation (DDLT) over the last 10-20 years, with 135 programs across 37 US states and significant growth in Europe. However, data from South America, Eastern Europe, and Asia are challenging to obtain due to the lack of national registries or limitations in implementing brain death criteria. Research indicates that demographic characteristics such as donor age, which averages around 60.73 years in this study, play a significant role in liver transplantation outcomes.

Age-related changes in liver function, including decreased tissue mass and blood flow, are crucial factors affecting transplantation outcomes, particularly in older donors. While some studies advocate for using elderly donors for less critically ill recipients, others caution against prolonged cold ischemic time, which appears detrimental to elderly liver graft outcomes. Gender disparities in liver transplantation persist, with women facing greater challenges in accessing and receiving liver transplants compared to men, even after the implementation of MELD-based allocation systems.

Education level emerges as a determinant of health outcomes, with higher education correlating with better health knowledge and compliance, crucial for post-transplant prognosis. However, unlike previous research, education level does not significantly affect survival rates in liver transplant recipients. Moreover, disparities in organ allocation based on blood type are evident, with blood type O candidates experiencing longer waiting times and higher MELD scores upon allocation.

Studies suggest that organ viability and procurement intervals play critical roles in transplant success, with the cytokine storm continuing post-brain death. Understanding these mechanisms could improve organ utilization and transplant outcomes. Despite advancements, challenges persist in organ procurement and allocation, emphasizing the need for ongoing research to optimize transplant practices and outcomes.

## Conclusion

Liver transplantation represents a cornerstone in the management of end-stage liver diseases, offering a lifeline to patients by restoring their quality of life and reducing mortality. Despite its evolution from experimental procedures to established medical practices, significant challenges persist across all phases of transplantation. These challenges encompass pre-transplant assessments, peri-transplant logistics, and post-transplant care, necessitating careful patient selection and resource allocation based on established criteria such as survival probabilities within the first year and demographic characteristics.

The emergence of brain death criteria has propelled the growth of Deceased Donor Liver Transplantation (DDLT), yet global disparities in access persist, along with challenges in optimizing organ viability and procurement intervals. Education remains paramount in navigating the complexities of liver transplantation, ensuring optimal post-transplant care and addressing disparities in organ allocation. Ongoing research and innovation are crucial to overcoming these challenges, enhancing transplantation practices, and ensuring equitable access to life-saving interventions for patients worldwide.

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