International Journal of Sciences

Published online 03 20, 2022
**ISSN** 2763-5392

# Epidemiological and financial profile of heart transplantation in a large hospital in Recife-PE-Brazil

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## To cite this article:

Rodrigues, M.F.S.; Souza, R.M.; Melo, N.F.B.; Pereira, R.L.; Almeida, V.S.C.; Silva, A.A.S.; Andrade, S.S.; Lima, T.M.; Santana, S.M.C.; Araújo, C.A.S.; Silva, P.R.R.; Lacerda, S.D.L.; Silva, L.A.; Primo, G.N.; Santana, L.C.; Souza, A.C.A. ***Epidemiological and financial profile of heart transplantation in a large hospital in Recife-PE-Brazil.*** *International Journal of Sciences.* Vol. 3, No. 2, 2022, pp.131-135. ISSN 2763-5392.

**Received**: 03 02, 2022; **Accepted:** 03 04, 2022; **Published**: 03 20, 2022

**Abstract:** Heart transplantation is currently evaluated as an alternative for the treatment of diseases of which they were

previously considered out of therapeutic possibility. Cardiovascular diseases are the main causes of death in Brazil and in several developed countries. Among them is heart failure, which is a condition considered severe and irreversible. Today, with the advance of medicine and technology, for the treatment of irreversible heart failure, heart transplantation has been used as the last possibility of intervention. Therefore, this aimed to verify the epidemiological profile of patients submitted to heart transplantation at the Heart Institute of Pernambuco INCOR/PE. A descriptive retrospective study was developed that seeks to describe and quantify patients who underwent cardiac surgery through medical records provided by the institute from April 2000 to April 2016, through medical records analysis. Information on the epidemiological data of patients is effective for a better understanding of the person with social reality. Due to this, little is known to suffer the epidemiological profile of patients who are submitted to heart transplantation. Heart transplantation (CT) is the treatment of choice for many patients with end-stage HF who remain symptomatic despite medical therapy. The main causes of morbidity and late mortality of patients undergoing CT are infections, chronic kidney disease, vascular disease of the cardiac graft. The inclusion of surgical techniques and improvement in postoperative care demonstrated an evolution in long-term results after CT.

**Keywords:** Heart transplant. Epidemiology. Heart failure. Surgical treatment

# 1. Introduction

The population in the course of its history has been marked by a series of transformations, of which they have caused instability in one or more systems of the organism. However, cardiovascular diseases have provided statistically significant dimensions among morbidity and mortality agents, both in developed and developing countries[1].

Diseases of the circulatory system make up a group of chronic diseases that is considered a broad current public health problem. Among these, cardiovascular diseases are first responsible for the mortality of 17,520 people in a global total of 35,576 deaths worldwide2. In view of this, studies indicate that in recent years, the number of diseases caused by these diseases has been growing at an accelerated pace not only in developed countries. These projections suggest the expansion of their relative importance in low and middle-income countries3.

Therefore, advances in medicine along with technology, severe cases, previously evaluated irreversible, have the refuge of surgery to replace cardiac structures such as valves and even the organ itself4. Today, heart transplantation is a surgical alternative of the most used in the treatment of irreversible cardiomyopathies. Therefore, heart transplantation is responsible for the evolution of expectations and quality of life of those who undergo such a procedure5.

Some literatures dealing with these subjects show that survival after a heart transplant in one year is 85%. Nevertheless, it has in the literature records of people with survival of up to 17 years after transplantation. However, it is worth mentioning that the living condition of these individuals exposes significant evolution, as they conquer physical capacity, returning in some cases to work and still playing sports[6]

However, the centers from which cardiac surgeries have been combined with heart transplantation with a high complexity surgical procedure offered to their clients. Since the Brazilian Association of Organ Transplantation (ABTO) more than 1,777 heart transplants were performed in Brazil, of which 52% consisted of 52% in the Southeast, 28% in the Northeast and 20% of them in the Southern region. In association with the organ receptor gender, 75% are male. In the country, there are several registered teams, and at present, few of them are active for the practice of heart transplants[7].

In view of the above, by verifying the scarcity of related studies on the subject, the objective was to investigate the epidemiological characteristics of patients submitted to heart transplantation. However, this study justifies the knowledge of transplanted patients who were essential for a broader understanding, which in turn contributed to the design of specific strategies to care for health recovery. Thus, it is necessary to produce knowledge related to the group of patients submitted to heart transplantation, in order to evaluate their specific problem and face challenges according to the peculiarities of the profile of the specific clientele.

Thus, this study is important in addition to detecting the population, developing future therapies to prevent the development of disorders of the cardiovascular system.

# 2. Methodology

To obtain the epidemiological profile of patients submitted to heart transplantation, a descriptive retrospective study was developed, which seeks to describe and quantify patients who underwent cardiac surgery.

The study was conducted based on medical records of patients undergoing heart transplantation of both sexes and of different ages with current survival and death in a large hospital, the real hospital Portuguese (RHP) located in the city of Recife - PE. Being, these patients treated and monitored by the Heart Institute of Pernambuco - INCOR/PE.

All patients submitted to heart transplantation and who after performing the heart transplant were used as inclusion criteria, who were discharged for cure or who evolved to death, and exclusion of those who did not fit within the profile and those who evolved to death before surgery.

The data collection process occurred through the use of analysis of medical records to trace the epidemiological profile, we used patients who underwent heart transplantation in the RHP and monitored by INCOR/PE. The researchers performed extensive readings in the medical records from April 2000 to April 2016. They are being storage in Microsoft

Excel.

However, the project was analyzed and approved by the Altino Ventura Foundation ethics and research committee. And it strongly adopts ethical precepts, as recommended by resolution 466/12. Finally, the identity of patients whose medical records used for the research was protected.

**Statistical analysis**

The Shapiro-Wilk normality test will be applied to evaluate the distributions. For comparison between individuals and control group , an unpaired Student's T test will be applied for parametric and Mann-Whitney distributions for non-parametric distributions.

For the comparations, the parametric distributions, the ANOVA test will be performed a pathway followed by the Neulman-Keusl post-test will be applied. In situations where the normal distribution is not accepted, the Friedman test followed by the Bonferroni post-test will be applied.

For parametric distributions, Pearson's correlation test will be applied, while for non-parametric distributions the Spearman correlation test will be applied. Differences in these tests will be considered statistically significant when the value of "p" is less than 0.05. The statistical program to be used will be Biostat 2009 version 5.8.4.

# 3. Results and Discussion

**Table 1:** Mean and standard deviation of the underlying pathologies of heart transplantation from 1998 to 2015.

| Variables | Alive | Death | Retransplantation | P |
|---|---|---|---|---|
| **CD. Tip. IDIOPATICA** | 13.5+ 7.64 | 37± 21.21 | 1.5± 0.70 | 0,22 31 |
| **CD.TIP. HYPERTENSIVE** | 278.6 8±95. 68 | 261.96±94 .16 | - | 0,51 53 |
| **TIP CD. ISQUEMIC** | 31.84 ±34.8 7* | 29.9±37.2 7 | 31.12±34.44 | 0,84 65 |
| **CD. Tip. CHAGASICA** | | | - | |
| **CD.TIP. ALCOHOL** | | | - | |
| **CD.TIP. CONGÊNITA** | | | - | |
| **CD. Tip. VALVULAR** | 93.93 ±70.6 4 | 77.31±46. 4 | - | 0,73 38 |
| **CD.TIP. ICC** | | | - | |
| **CD.TIP IAM** | | | - | |
| **CD.TIP. ENDOCARDITIS** | | | - | |
| **CD. Tip. PERIPOSTO** | | | - | |
| **TIP CD ORTHOPICES** | | | - | |
| **TIP CD. PERIPOSTO** | | | - | |
| **TIP CD.** | | | - | |

**Table 2:** quantify transplants and re transplants from 1998 to 2015.

| Variables | Mean ± standard deviation |
|---|---|
| **Transplantation** | 77± 43.73 |
| **Median** | 77 |
| **(Min-Max)** | 2-152 |
| **Retransplantation** | 3.00±1.00 |
| **Median** | 3,00 |
| **(Min-Max)** | 2-4 |

**Table 3.** Mean and standard deviation of the frequency and costs of heart transplantation from 1998 to 2015.

| Variable | Mean ± standard deviation |
|---|---|
| Frequency | 6.66± 3,272 |
| Median | 6 |
| (Min-max) | (2-16) |
| Value | 266,229.95± 256,770.41 |
| Median | 177.939,92 |
| (Min-max) | (45,755.94 - 1,005,047.07) |

**Table 4.** The mean and standard deviation of age in transplantation and re transplantation from 1998 to 2015.

| Variables | Mean ± standard deviation |
|---|---|
| Transplantation | 46.88±14.58 |
| Median | 47,96 |
| (Min-max) | 14,27 - 69,57 |
| Re transplant | 48±4.24 |
| Median | 48 |
| (Min-max) | 45 - 51 |

**Table 5.** The mean and standard deviation of the years of survival of living patients who died after transplantation from 1998 to 2015.

| Variables | Years of Survival (Alive) | Years of Survival (Obits) | Years of Survival (Retransplantation) |
|---|---|---|---|
| **Average ±standard deviation** | 8.21± 5.28 | 2.73± 4.38 | 0.34±1.98 |
| **Median** | 7,61 | 0,25 | 0 |
| **Min-Max** | 0.95±22.32 | 0±17.51 | 0±15.82 |

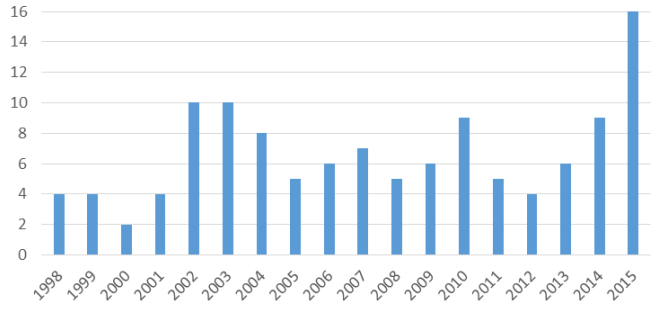


**Figure 1**. Frequency-by-year ratio of heart transplant exclusion from 1998 to 2015

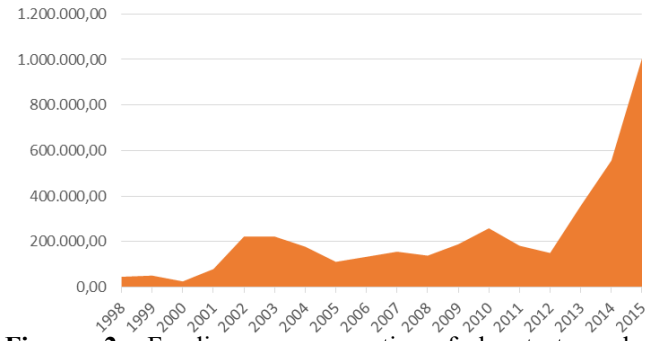


**Figure 2**. Funding-per-year ratio of heart transplant exclusion from 1998 to 2015

Information on the epidemiological data of patients is effective for a better understanding of the person with social reality. Due to this, little is known to suffer the epidemiological profile of patients who are submitted to heart transplantation.

Heart transplantation (CT) is the treatment of choice for many patients with end-stage HF who remain symptomatic despite medical therapy. Where congestive heart failure (HF), one of the main causes for the evolution of CT affects 23 million people worldwide[8].

In Brazil, cardiac surgery is somewhat developed, but the number of centers from which the procedure is performed and the number of annual transplants is insufficient for the desired9. In view of this, several factors are contributing to the above, among them, the scarcity of donors, compatibility, socioeconomic problems , among others.

Regarding the epidemiological profile, several etiologies affect patients with irreversible heart failure, which lead to a heart transplant. Therefore, studies conducted in São Paulo indicate that heart transplant patients provide as their first underlying etiology idiopathic dilated cardiomyopathy after ischemic cardiomyopathy and chagasic cardiomyopathy as third[10,11]. In a multicenter study, similar proportions were found with the aforementioned study.

In Pernambuco, according to the study conducted by Moraes Neto (2001), ischemic heart disease appears first followed by idiopathic dilated cardiomyopathy, regarding Chagas cardiomyopathy in only one patient[12].

Studies previously conducted at the Heart Institute of Pernambuco - INCOR/PE, present results regarding the profile of patients related to age and gender, where they showed that 82.9% were male and 45.7% were older than 50 years. Regarding the preoperative data, it was pointed out that 74.2% required previous hospitalizations. Data related to hospital mortality occurred in the hospitalization phase. On the data catalogued on postoperative complications, 37.1% presented complications during the hospitalization period. In the late postoperative period, 82.1% presented complications during the observation period, ranging from 1 to 68 months.

Regarding the late mortality indicator, it was verified that the survival perspective was 70% in one year and 30% in 5 years.

The long-term results after CT improved with advances in transplantation, surgical techniques, immunosuppressive modalities and postoperative care. The International Society of Heart Transplant Registry (ISHLT) has reported 89,000 heart transplants worldwide from 1983 to 2014. Brazil, which in 1930 had a 12% mortality rate from cardiovascular diseases, rose to 31% in 2003[13].

Since then, cardiovascular disease has been marked as the first group of causes of mortality, remaining in this position followed by the group of neoplasms. In this group of diseases, heart failure stands out, which in 2007 was responsible for 293,375 hospitalizations out of a total of 1,156,136 nationwide[14].

For the American Society of Cardiology, the 1-year survival rate is about 90%, the 5-year rate is about 70%, but only about 20% survive 20 years or more. The main cause of death after heart transplantation is cancer, followed by coronary artery vascular disease (CAV), then graft failure. Some patients develop left ventricular dysfunction. Others develop antibody-mediated rejection, in recent years this has been more readily recognized[15].

For Rosa *et al*., when evaluating the epidemiological profile submitted cardiac transplants, from the sample analyzed n=20, found that n=18 (90%) had a rheumatic

etiology, however, (85%) of the sample had undergone valvular surgery. The analysis of this research showed that age, sex, rheumatic activity and rejection were not associated with one-year mortality. It is reported that mortality was 20% in one year[16].

The main causes of morbidity and late mortality of patients undergoing CT are infections, kidney disease, vascular disease of the cardiac graft. Adverse effects of immunosuppressive drugs continue to be problematic as well. These include infection, malignancy, osteoporosis, chronic renal toxicity, hypertension, and neuropathy[17].

## 4. Conclusions

The inclusion of surgical techniques and improvement in postoperative care demonstrated an evolution in long-term results after CT. Brazil's position in the field of transplants is increasing, being a reference in CT, in the case of Chagas disease, guiding practices incorporated worldwide.

It is expected to increase the specific knowledge of health professionals in the stimulum to reflections that arouse interest in the scientific community for further studies on heart transplantation. The epidemiological profile of patients submitted to heart transplantation in the field of study hospital, in summary, demonstrate that there was a predominance of adult, male and married patients. Chagas cardiomyopathy was the main indication for heart transplantation.

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