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Epidemiological profile and study on waiting lists for corneal transplants in a tertiary hospital

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ABSTRACT

Introduction: Epidemiological studies and about patients' waiting time on queues for corneal transplantation are important, as they allow us to know the assisted population and assist the medical team. **Objective:** To evaluate the epidemiological and demographic profile of patients undergoing corneal transplantation from January 2014 to September 2018 at a teaching hospital in the city of Santo André, as well as their waiting time for the procedure. **Methods:** Retrospective descriptive study, performed through analysis of medical records and data from the website of the Government of the State of São Paulo's transplant center. The study was conducted at the External and Corneal Diseases sector of the discipline of Ophthalmology from Centro Universitário FMABC. The following data were evaluated: gender, age, race, origin and waiting time for the patient to have a transplant. **Results:** A total of 139 corneal transplant patients were recruited for the study, with a mean age of 47.4±23 years. According to gender, just over half of the transplanted were female (50.4%). Regarding to skin color, 45.3% of the patients were white, 44.6% were brown and 10.1% were black. As for their origin, most patients were from the city of Santo André. **Conclusion:** This study enabled the assessment and knowledge of the epidemiological profile and waiting time for corneal transplantation in our patients. This information is important, as it helps us to understand the profile of the assisted population and in the organization and planning of the medical team, contributing to better guidance and care for the patients.

Keywords: corneal transplantation; epidemiological profile; corneal transplant row.

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Declaration of interest: nothing to declare

INTRODUCTION

The healthy cornea is a transparent, avascular tissue, intensely innervated, rich in collagen and resistant to trauma. It is responsible for approximately 74% of the total refractive power of the eye, being essential to maintain a good visual quality[1]. The low visual acuity, secondary to diseases that affect the cornea, represent a high rate of reversible

blindness in the world. These diseases have different etiologies, among them, degenerative changes, chronic diseases, corneal ectasias, inflammatory, post-surgical, infectious and traumatic diseases[2,3].

In recent years, there has been a great evolution in eye surgery, including corneal transplantation. The history of corneal procedures may be divided in two eras: the "Age of heteroplasty", from 1800 to 1900, and the "Age of Homoplasty", from 1900. Through animal studies, scientists started to shape and define the reality of a surgery which would become commonplace after a century.

The first lamellar keratoplasty was done by German surgeon Arthur von Hippel in the late 19th century – marking the beginning of the era of modern keratoplasty –, while the first penetrating keratoplasty considered successful was performed at the beginning of the 20th century by Zirm[1].

Corneal transplantation is able to restore corneal anatomy, structure transparency and vision, thus being an effective treatment for many serious corneal diseases[4-6]. Compared with other organs and tissues, the cornea has a lower rejection rate, which gave rise to the concept of "immune privilege of the cornea". This "immunological privilege" occurs due to its relative isolation from the body's immune system due to the absence of lymphatic vessels and vascularization in the cornea in its normal state.

Modifications and advances in surgical techniques, instruments and equipment, methods of preserving the donor cornea and better postoperative control have also contributed to greater success in corneal transplants[7].

Corneal transplantation is performed more and more by ophthalmologists in Brazil due to a growing awareness of the population for organ donation and the emergence in the country of new eye banks[8,9]. Another factor responsible for the increasing number of corneal transplants is the better organization of the work carried out by the Eye Banks in which quick notification and preservation allow for a better anatomical condition of the donor cornea[10,11].

The distribution of corneas in Brazil is conducted by the Central of Notification, Collection and Distribution of State Organs (CNCDO). It obeys the elapsed time of enrollment in a unified list (Ordinance GM no. 3407 of August, 5th 1998), and the date of enrollment of the patient in the unified list is the reference to start the calculation of the overall waiting time. The waiting list is usually statewide, but in some States it can be divided by region. The Eye Bank (EB) is responsible for the approach and capture of corneas and ocular tissues, in conjunction with the Intra-Hospital Transplantation Commissions, and also for the processing, evaluation and correct storage of these tissues, with the State being responsible for distributing the tissues, managing the waiting list, analyzing special cases and emergencies[12-14].

Epidemiological studies conducted to assess the profile of patients already transplanted or waiting for transplantation are important because they allow the assessment and knowledge of the assisted population. The evaluation of waiting time for corneal transplantation is also a relevant data, as it assists in the organization and planning of the medical team and contributes to better guidance and care for the patients.

The present study aimed to assess the epidemiological and demographic profile and the waiting time of patients undergoing corneal transplantation from January 2014 to September 2018 at a teaching hospital in the city of Santo André (SP).

METHODS

Design of the study

This is a retrospective descriptive study. It was conducted by analyzing the patients' medical records and using data from the transplantation center website of the State of São Paulo. The study was conducted in the External and Corneal Diseases sector of the Discipline of Ophthalmology from Centro Universitário FMABC, with information from patients who underwent corneal transplantation (lamellar and penetrating) at Hospital Estadual Mario Covas from January 2014 to September 2018. Medical records of 139 patients were evaluated according to the following data: gender, age, race, origin and waiting time for the transplant (time interval between registration on the transplant list and the date of the procedure). This study was done in accordance with the relevant guidelines and regulations/ethical principles stated by the Declaration of Helsinki.

Inclusion Criteria: Patients undergoing optic corneal transplantation (lamellar and penetrating), except prioritized and tectonic, from January 2014 to September 2018, at Mario Covas State Hospital; complete medical record containing the research data: gender, age, race and origin. We also evaluated the waiting time for the transplant using data from the website of the transplant center of the Government of the State of São Paulo.

Exclusion criteria: Patients with incomplete relevant data in their medical records; Patients with missing medical records.

Statistical analysis

In the description of the characteristics of the study population, the frequency distribution as well as the absolute and percentage frequencies were presented. Regarding the description of the variables "age" and "waiting time for the transplant", the mean and standard deviation were used in the analysis of the first variable, while the representation by the median and interquartile range were used for the variable waiting

time (this variable did not present a normal distribution, so the Komogorov-Smirnov normality test was applied). In the analysis of the association of the characteristics of the patients with the waiting time, the Chi-square and Fischer's exact tests were applied to compare the frequencies. In the comparison of medians, the Kruskal-Wallis test was applied. The statistical significance adopted in the study was 5% ($p<0.05$) and the software used was STATA v.14.

RESULTS

From January 2014 to September 2018, 139 corneal transplant patients were recruited for the study, with a mean age of 47.4±23 years. The minimum age was 5 years and the maximum was 87 years. Divided into age groups, in 39.6% of the transplants patients were 60 years of age or older; 34.5% were in the 20 to 39 age group, 11.5% were under 20 and 14.4% were between 40 and 59 years of age. According to gender, a little more than half of the transplant recipients were female (50.4%). Regarding race, 45.3% of the patients were white, 44.6% were brown and 10.1% were black. Regarding the provenance of the case, 46.1% of the patients were from the city of Santo André, 20.9% from São Bernardo do Campo, 15.8% from Mauá, 7.9% from Ribeirão Pires, while 8.6% of the cases corresponded to patients residing in the cities of Diadema, São Vicente, São Caetano do Sul and Rio Grande da Serra (Table 1).

The analysis of the waiting time for a patient to get a transplant, the average found was 8.1 months, with a minimum of 1 month and a maximum of 16.1 months. It is observed that 21.2% of the patients underwent the transplant in the first 3 months after enrollment, 17.5% between 3 months and 6 months (in cumulative terms), while 38.7% of the patients had to wait up to 6 months for the procedure. However, the most frequent waiting time was from more than 6 months to 12 months (35.8% of the cases), while 25.6% of the patients had to wait for more than 12 months (Figure 1).

When analyzing whether some of the characteristics of the patients are associated with the waiting time, it was observed that none of them showed any association – that is, the waiting time was not influenced by age, gender, race or origin (Table 2).

Comparing the median "waiting time" between the age, gender and race groups, there was also no statistically significant differences found, showing that the waiting time experienced by the patients was not influenced by those characteristics (Figure 2).

Table 1: Characteristics of patients undergoing optic corneal transplantation, from January 2014 to September 2018, at Mario Covas State Hospital.

Caracteristics	N (%)
Number of patients	139 patients
Age range	
Under 20 years	16 (11.5%)
From 20 to 39 years	48 (34.5%)
From 40 to 59 yearss	20 (14.4%)
60 years or more	55 (39.6%)
Sex	
Male	69 (49.6%)
Female	70 (50.4%)
Race	
White	63 (45.3%)
Brown	62 (44.6%)
Black	14 (10.1%)
Provenance	
Santo André	64 (46.1%)
São Bernardo do Campo	29 (20.9%)
Mauá	22 (15.8%)
Ribeirão Pires	11 (7.9%)
Diadema	6 (4.3%)
São Caetano do Sul	5 (3.6%)
Rio Grande da Serra	1 (0.7%)
São Vicente	1 (0.7%)

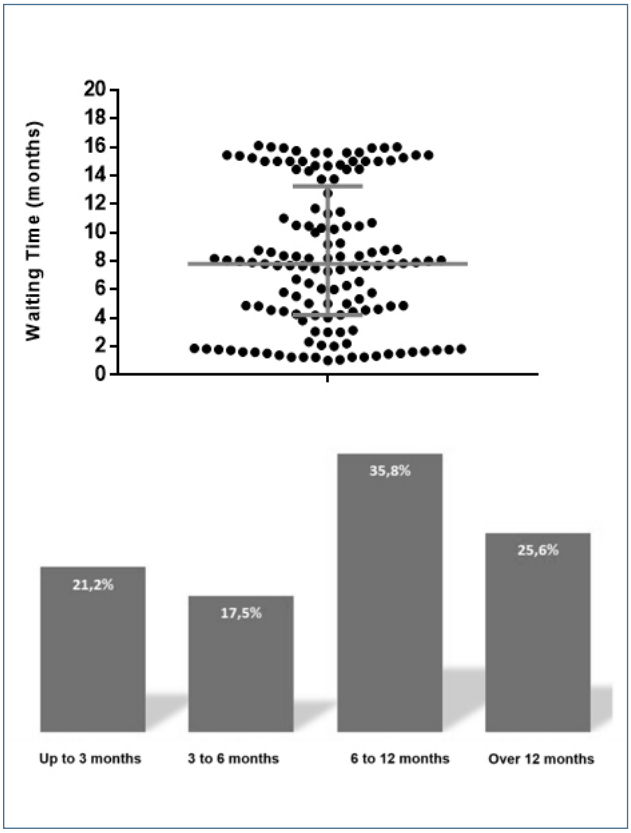

Figure 1: Description of the waiting time for patients for optic corneal transplantation, from January 2014 to September 2018, at Mario Covas State Hospital.

DISCUSSION

In our study, the mean age of the patients was 47.4±23 years, with a minimum age of 5 years and a maximum age of 87 years, and in 39.6% of the transplants, the patients were 60 years old or older. Regarding gender, a little more than half of the transplant recipients were female (50.4%). Regarding race, 45.3% of the patients were white, 44.6% were brown and 10.1% were black. Regarding the waiting time in the transplant queue, the average obtained was 8.1 months, with a minimum of 1 month and a maximum of 16.1 months.

A study carried out in 2006 by Netto et al. showed that 59.6% of the patients were male and 40.3% were female, with an average age of 37 years (ranging from 3 to 83 years). According to the origin of the patients, 68% were from the state of São Paulo, 6% from the states of Minas Gerais and Paraná, 5% from Rio de Janeiro, 3% from Maranhão and 12% from other states[15].

Fabris et al. published a study in 2001 in which 60.9% of patients were male and 39% female. The age of the sample studied ranged from 3 to 89 years, with a mean age of 42.3±19.8 years. The skin color most frequently observed was white, with 74 patients (89.2%), followed by black, with 9 cases (10.8%). The average waiting time for a corneal donor varied between zero and 39 months, with an average of 17.3±9.9 months. From this studied transplanted patients, 36 (41.4%) were from Porto Alegre, 22 (25.3%) from the municipalities in the metropolitan region of Porto Alegre, 26 (29.9%) from Rio Grande do Sul's interior, and 3 (3.4%) from Santa Catarina[16].

In a study published in 2018, Bigan et al.[17] obtained a mean age of patients of 59±15 years. In their study on the subject published in New Zealand, Crawford et al.[18] noted that the age of the patients ranged from 3 to 95 years, with an average of 46.4 years. Regarding gender, 44.2% were female and 55.8% were male. Here, it was observed that 58.3% of the transplant patients were European, 11.9% Maori, 18.7% from the Pacific, 6.5% from India and 4.4% from other regions.

A study carried out in 2016, Belghmaidi et al.[19] showed that 51.3% of the patients were male and 48.6% female. The mean age was 34 years, with extremes ranging from 6 to 85 years. In a study published in 2018 by Fonseca et al., 55.5% of the evaluated patients were male and 44.5% were female. The mean age was 46.7[20].

In a 2016 publication, Almeida et al.[21] observed that 54% of the patients were female and 35% were between 61 and 80 years old; the average waiting time in the transplant queue most often found ranged from 1 to 6 months.

In their work published in 2014, Araujo et al. showed that there was no statistically significant difference between the frequency of both genders, being 52.2% of the patients male and 47.8% female. The average age group was 52.1 years, with 1 year being the lowest age and 90 the largest. The average waiting time in the transplant queue was 6.28 months.

Table 2: Description of the waiting time and characteristics of patients undergoing optic corneal transplantation, from January 2014 to September 2018, at Mario Covas State Hospital.

Characteristics	Up to 3 months (n=29)	Up to 6 months (n=24)	From 6 to 12 months (n=49)	More than 12 months (n=35)	p-value
Age range					
Under 20 years	3 (18.7%)	1 (6.2%)	8 (50%)	4 (25.0%)	
From 20 a 39 years	13 (27.1%)	6 (12.5%)	15 (31.2%)	14 (29.2%)	0.385[a]
From 40 to 59 years	2 (10.0%)	6 (30.0%)	5 (25.0%)	7 (35.0%)	
60 years or more	11 (20.7%)	11 (20.7%)	21 (39.6%)	10 (18.9%)	
Sex					
Men	17 (24.6%)	12 (17.4%)	21 (30.4%)	19 (27.5%)	0.549
Women	12 (17.6%)	12 (17.6%)	28 (41.2%)	16 (23.5%)	
Race					
White	16 (26.2%)	12 (19.7%)	19 (31.1%)	14 (23.0%)	0.353[a]
Brown	12 (19.3%)	10 (16.1%)	21 (33.9%)	19 (30.7%)	
Black	1 (7.1%)	2 (14.3%)	9 (64.3%)	2 (14.3%)	
Provenance					
Santo André	15 (23.8%)	11 (17.5%)	18 (28.6%)	19 (30.2%)	
São Bernardo do Campo	5 (17.2%)	5 (17.2%)	12 (41.4%)	7 (24.1%)	
Mauá	4 (19.0%)	4 (19.0%)	9 (43.0%)	4 (19.0%)	
Ribeirão Pires	2 (18.2%)	2 (18.2%)	4 (36.4%)	3 (27.3%)	0.971
Diadema	1 (16.7%)	0 (0%)	3 (50.0%)	2 (33.3%)	
São Caetano do Sul	1 (20.0%)	2 (40.0%)	2 (40.0%)	0 (%)	
Rio Grande da Serra	0 (%)	0 (%)	1 (100%)	0 (%)	
São Vicente	1 (100%)	0 (%)	0 (0%)	0 (%)	

[a] Fisher's exact test

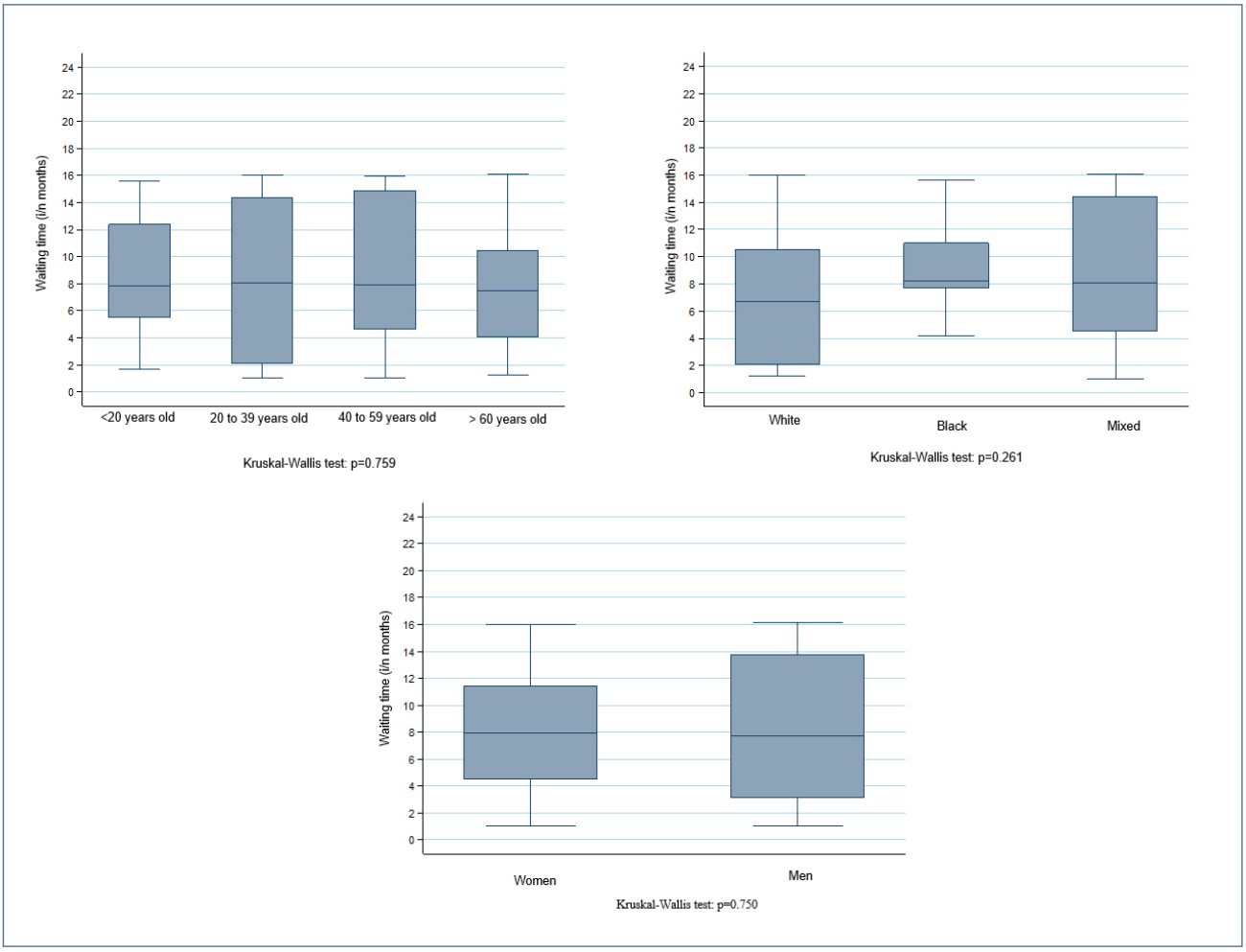

Figure 2: Comparison of waiting time for optical corneal transplantation according to the characteristics of patients (age, gender and race) who underwent optical corneal transplantation, between January 2014 and September 2018, at Mario Covas State Hospital.

As for the waiting time in the transplant queue, the research made by Fabris et al.[16] indicated an average of 17.3±9.9 months; Almeida et al.[21] research showed the period from 1 to 6 months as the most frequent time; Araujo et al.[22] obtained an average time of 6.28 months. In our study, the average waiting time was 8.1 months, similar to the time found in the literature.

Conclusion

This study enabled the assessment and knowledge of the epidemiological profile of our patients and their queue time waiting for corneal transplantation. This information is important, as it helps us to understand the profile of the assisted population and in the organization and planning of the medical team, contributing to better guidance and care to those patients.

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