

Epidemiological profile of corner donors in Piauí

Perfil epidemiológico de doadores de córnea no Piauí

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ABSTRACT

Purpose: The study aimed to trace the epidemiological profile of donors of corneas in Piauí through searches in medical records. **Methods:** This is a descriptive, quantitative, observational, cross-sectional and retrospective study that aims to evaluate data obtained from medical records of 811 donors of corneas from the Getúlio Vargas Hospital in Teresina-PI, in the period of January 1, 2010 to 31 December 2016. **Results:** The study showed an increase in the number of donors over the period from 2010 to 2014, but decreased over the period from 2015 to 2016. There was also a predominance of male donors, aged between 21 and 59 years, from the city of Teresina and with regard to the donor's cause of death, the majority of deaths occurred due to external causes of morbidity and mortality (which include, mainly, violent deaths due to automobile accidents, suicides, stab wounds or fire) and the second largest cause was represented by diseases of the circulatory system. **Conclusions:** For the success of this process, it is essential to make the population aware of the importance and the need for organ and tissue donations for the benefit of sick patients, saving lives or rehabilitating them and, thus, allowing these individuals to participate fully in social life and the usual economic activities of most citizens. Therefore, it is necessary to invest in programs, training and also to increase the number of qualified professionals, from the capture team to the transplant team, all of which are extremely important for the increase in corneal uptake.

Keywords: Tissue donors; Eye bank; Health profile; Cause of death

RESUMO

Objetivo: O estudo objetivou traçar o perfil epidemiológico dos doadores de córneas no Piauí através de buscas em prontuários. **Métodos:** Trata-se de um estudo descritivo, quantitativo, observacional, transversal e retrospectivo, que se propõe a avaliar dados obtidos de prontuários de 811 doadores de córneas do Banco de Olhos do Hospital Getúlio Vargas em Teresina-PI, no período de 1º de Janeiro de 2010 a 31 de Dezembro de 2016. **Resultados:** O trabalho mostrou um acréscimo do número de doadores ao longo do período de 2010 a 2014, porém decresceu ao longo do período de 2015 a 2016. Observou-se, também, o predomínio dos doadores do gênero masculino, da faixa etária entre 21 a 59 anos, de procedência do município de Teresina e no que diz respeito às causas mortis dos doadores, a maioria dos óbitos ocorreram por causas externas de morbidade e mortalidade (onde se incluem, principalmente, mortes violentas por acidentes automobilísticos, suicídios, ferimentos por arma branca ou de fogo) e a segunda maior causa foi representada por doenças do aparelho circulatório. **Conclusão:** Para o êxito desse processo é fundamental a conscientização da população sobre a importância e a necessidade das doações de órgãos e tecidos para o benefício de pacientes enfermos, salvando vidas ou reabilitando-os e, dessa forma, permitindo que estes indivíduos participem integralmente da vida social e de atividades econômicas habituais da maioria dos cidadãos. Portanto, é necessário investir em programas, treinamentos e, também ampliar o número de profissionais qualificados, desde a equipe de captação à equipe de transplantes, todos são de extrema importância para o aumento da captação de córneas.

Descritores: Doador de tecidos; Córnea; Banco de olhos; Perfil de saúde; Causa de morte

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The present study was carried out at College Center UNINOVAFAPÍ and at Getúlio Vargas Hospital (HGV), in Teresina – PI, Brazil.

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INTRODUCTION

Cornea is a transparent tissue located in the anterior region of the eyeball. It represents the anterior sixth fraction of the eye and is the most curved of its structure - elliptical meniscus shape. Cornea has mechanical (eye resistance to eye pressure and protection against external agents) and optical function (transmission, diffusion, reflection and light refraction). Several degenerative, infectious or traumatic pathologies are capable of causing changes in cornea's optical function, as well as of impairing visual acuity by likely causing blindness and, consequently, the need for cornea tissue transplantation.⁽¹⁻⁵⁾

Cornea transplantation consists in replacing opaque or sick cornea by that from a healthy donor. This tissue replacement can cover total (penetrating) or partial thickness (lamellate). Cornea penetrating transplantation can be classified into optical, tectonic, therapeutic and cosmetic transplant, depending on its end.^(6,7)

This transplantation modality has been in place in Brazil since 1998, but it is currently facing its ascending moment due to donors' age group broadening, the enhanced selection of donated tissue, the new surgical techniques - which allow the performance of surgeries under conditions seen as inoperable 10 years ago - and the growing awareness of the population.⁽⁸⁾ According to the Brazilian Association of Organ and Tissue Transplantation (ABTO), 100,521 corneal transplantations were carried out in the country between 2012 and 2018; and 14,943, from January to September 2019.⁽⁹⁾

Eye banks are in charge of capturing, processing, assessing, classifying, storing and distributing eye tissue, they must fulfil legal demands in order to be implemented and to be granted with the license to operate⁽¹⁰⁾. Lack of eye tissue and of Eye banks capable of supplying cornea in many Brazilian states, within the appropriate amount and quality required to meet the demand for transplantations, remain a reality. Accordingly, actions taken by Eye Banks are essential, be them the active search of donors, interviews with family members, the capturing of donated tissues in time and the distribution of high-quality standard cornea.⁽¹¹⁾

The identification of potential donors happens through passive notification and active search. Every patient in the age group 02-80 years who dies is a potential eye tissue donor to transplantations - until 06 hours after cardiorespiratory arrest or 24 hours after it, if the body is stored in refrigerated chamber, which makes it a potential eye tissue donor to transplantations; the patient does not have to be diagnosed with brain death. Donor's eyelids must be kept closed in order to avoid cornea drying due to exposure to light. The procedure can be carried out outside the hospital environment (morgue). The maximum time of cornea extracorporeal preservation is 14 days.⁽¹²⁾

The main aim of the current study was to draw the epidemiological profile of cornea donors in Piauí State by looking for medical reports and by taking into account the following parameters: age group, sex, cause of death and the geographic origin of corneal donors.

METHODS

Descriptive, quantitative, observational and cross-sectional study of the retrospective type aimed at describing data collected from corneal donors' medical reports, which were provided by the eye banks of public hospitals in Teresina County, Piauí State, Brazil; as well as at drawing donors' epidemiological profile from

January 1, 2010 to December 31, 2016. The present study was carried out in Getúlio Vargas Hospital (HGV), which is located at Avenida Frei Serafim, n. 2352, Bairro Centro (Sul), CEP 64001-020, Teresina-PI, Brazil.

The assessed population counted on 811 corneal donors registered in the Eye Bank of Getúlio Vargas Hospital in Teresina-Pi, Brazil (BTOC-HGV), from January 1, 2010 to December 31, 2016. Data collection was performed through census and covered all donation cases recorded throughout the study period.

All medical reports of corneal donors, and of cornea captured, processed, assessed, classified, stored and distributed by the Eye Bank of Getúlio Vargas Hospital, from January 1, 2010 to December 31, 2016, were included in the study.

Medical reports that were not fully filled out were excluded from the study. In total, 11 reports were excluded due to item 'cause of death' and 01 due to item 'geographic origin'; thus, totaling 12 excluded medical reports.

Data were collected at the Eye Bank of Getúlio Vargas Hospital (BTOC-HGV) through the analysis of medical records and through form filling (APPENDIX) - forms were elaborated by the researchers and counted on pre-defined questions. Form content regarded patients' sociodemographic data (age, sex, donor's cause of death and geographic origin). The causes of death were gathered in categories according to chapters in the International Classification of Diseases (ICD-10) - 13 groups were formed, in total.

Data in the applied forms were firstly recorded in Microsoft Excel 2010 spreadsheet and exported to the IBM SPSS Statistics 20.0 software. The quantitative analysis was carried out in statistical software; it aimed at establishing the descriptive statistics (frequency and percentage) of the recorded results. Result presentation was performed through figures and tables.

The research was carried out after the project was submitted, analyzed and approved by the Research Ethics Committee of College Center UNINOVAFAPI on April 18, 2017, under CAAE n. 64944917.0.0000.5210, which is in compliance with Resolution 466/2012 from the National Health Council. This Resolution regulates the operational and ethical matters of scientific studies with humans and all ethical aspects in place in the country.

RESULTS AND DISCUSSION

Cornea transplantation is the most successful procedure among tissue transplantations in humans to restore corneal transparency. The constant advancements in organ processing techniques applied to cornea evaluation and conservation have allowed the number of corneal transplantations carried out in Piauí State and in Brazil to rise, as well as allowed relevant improvement in post-operative outcomes.^(7,13)

In total, 811 corneal donors were registered in BTOC-HGV throughout the seven years of the current study (2010-2016). The number of donated corneas grew from 2010 to 2014, but it decreased from 2015 to 2016 (Figure 1).

Figure 1 shows the slow and varying increase in the number of donors throughout the seven years of the present study; it went from only 111 donations in 2010 to 127, in 2013, it reached its peak (151) in 2014, but there was slight reduction in this number from 2015 (118) to 2016 (86). Results met the ones observed in studies carried out in other eye banks, such as the one performed in São Paulo Hospital, São Paulo City (São Paulo State), in 2007, whose number of donors rose from 740 (between 1996 and 2000) to 2047

(between 2001 and 2005),⁽¹⁴⁾ as well as in the study conducted in Sorocaba Ophthalmological Hospital (São Paulo State), which has shown slow increase in the number of donated corneas – it went from 260 (in 1984) to 2778 (in 2004).⁽¹⁵⁾

Assumingly, the broader awareness by the population about organ donation and about its importance is the reason for such a larger number. This increased number can be attributed to advertisement campaigns in the media at social and hospital scope. It is also described in a study carried out in Sorocaba Ophthalmological Hospital (São Paulo State), which recorded the positive impact of external-marketing actions on the number of donations in its eye bank.^(13,15)

According to the aforementioned study, there was slow reduction in the number of donors between 2015 and 2016, which is likely associated with external death causes and to lack of qualified and trained health agents to work with corneal collection and transplantation procedures. These factors have direct influence on the number of captured donated-corneas. Thus, it is essential investing in training programs to increase the number of qualified professionals, in teams that go from capturing to transplantation groups - all of these teams are extremely important to increase the corneal capturing rates (Figure 1).

According to Diaz et al.⁽⁸⁾, several factors influence the cornea donation process and it is the cause of losses capable of interfering in the final number of transplantations. These authors have assessed factors influencing the corneal donation process by using secondary data collected from death record books, patients' medical records and from records in the Center of Notification, Capture and Distribution of Organs in Zona da Mata Region of Minas Gerais State. They assessed the following variables: Potential donor, family refuse, medical contraindications, logistics or structural issues and corneal donation. In total, 863 registers were carried out; 16% of all deaths were notified by nurses to the Notification Center. Of the properly notified deaths, 21.5% were identified as potential donors and, of them, 37.2% did not effectively donate an organ due to family refuse and 43.6% due to institutional logistics or structural issues. Only 25% of captured cornea were transplanted.

Donors' distribution per sex (Figure 2) showed the prevalence of male donors (71.64%) to the detriment of female donors (28.36%); these outcomes are similar to results found in studies carried out in hospitals in the Southeastern region of the country, such as in São Paulo Hospital (São Paulo State), in Sorocaba Ophthalmological Hospital (55.3%) and in São Paulo Santa Casa de Misericórdia (54.44%)^(7,15,14).

The greater prevalence of male donors is also seen in the literature and, assumingly, it is justified by the fact that men die younger due to external causes (trauma) and to heart diseases. Results in the present study have shown the significantly bigger fraction of male donors in BTOC-HGV (71.64%) (Figure 2) than that found in the literature (55%). This outcome can be explained by the fact that men have greater risk of being exposed to environmental factors associated with their labor and social activities^(7,13-16).

Distribution based on age group (Figure 2) highlighted the prevalence of adult donors in the age group 21-59 years (65.60%) and of elderly donors, older than 60 years (24.29%). This outcome is different from those found in studies available in the reviewed literature, such as that carried out in São Paulo Hospital (São Paulo State), which showed the prevalence of donors in the age group 70-79 years (18.9%); this group was followed by the age group 60-69 (18.6%). The study carried out in Pedro Ernesto

Graphic 1
Distribution of the number of donors per year.
Teresina (PI), 2010-2016

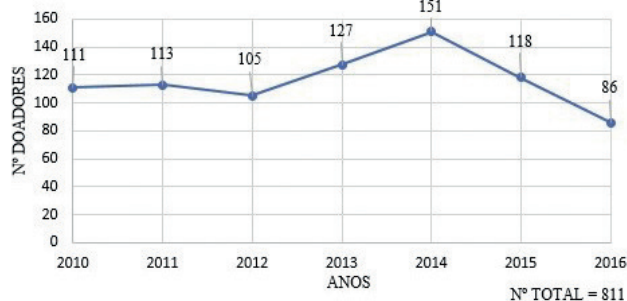


Figure 1. Distribution of number of donors per year

Graphic 2
Demographic profile of the sample
Teresina 9PI), 2010-2016.

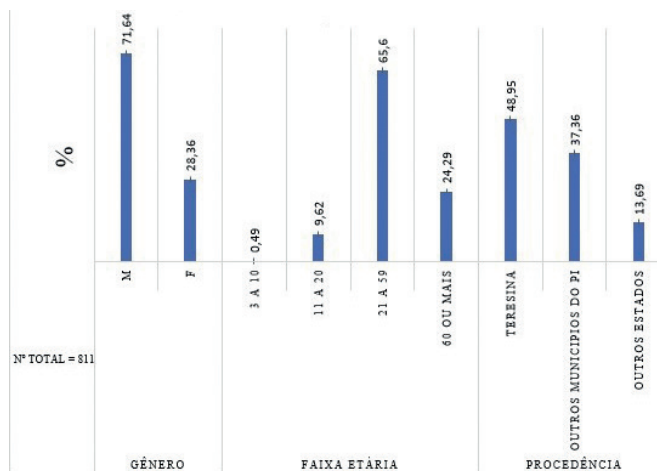


Figure2. Demographic profile of the sample

University Hospital (Rio de Janeiro State) presented the prevalence of donors in the age group 60 years and older (55.6%). These outcomes point towards differences in life expectancies between the Northern and Southeastern regions. There was also lesser expressive amount of donations among individuals in the age group 11-20 years (9.62%), although they are quite prone to death caused by external factors.^(14,17)

Most donors (48.95%) came from Teresina County, and they were followed by donors from other Piauí State counties (37.36%) and from other states (13.69%). These data are explained by the fact that capturing teams act in Teresina City and that there are not capturing teams in other Piauí counties. Donors from other counties or states were in Teresina when they made the donation (Figure 2).

Silva et al.⁽¹⁸⁾ featured the sociodemographic and epidemiological profile of corneal donors of the Eye Tissue Bank of Rio Grande do Norte State. The sample encompassed 612 donors, who had their corneas donated from January 2007 to July 2012. Results showed the prevalence of male donors (71.4%) in the age group 40-60 years (41.3%), from the metropolitan region (71.1%), who had recorded external causes of death (36.9%).

Graphic 3
Distribution of cause of death
Teresina (PI), 2010-2016

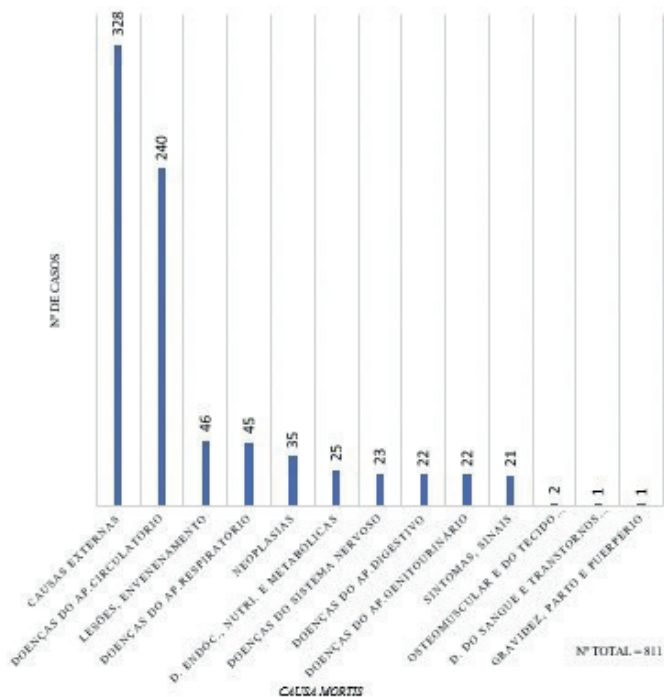


Figure 3. Distribution per cause of death

Graphic 4
Cause of death of donors per sex
Teresina (PI), 2010-2016

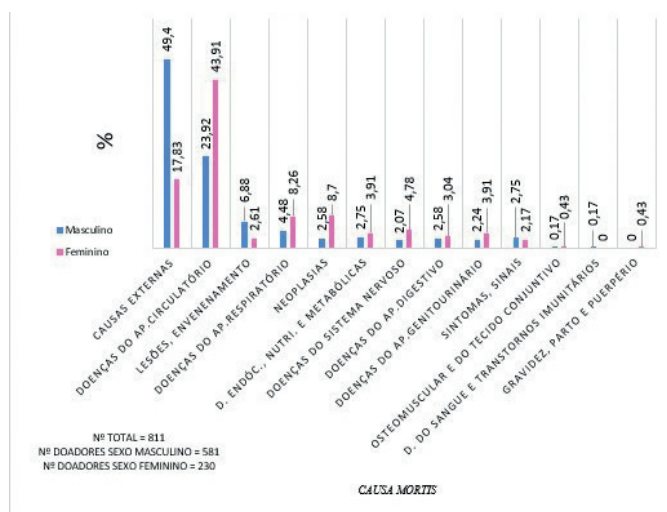


Figure 4. Distribution of cause of death of donors per sex

Of the 1,209 captured tissues, 341 were discarded mainly due to bad-quality tissue.

The causes of death were featured according to chapters in the International Classification of Diseases (ICD-10), thus totaling 13 groups. Most deaths happened because of external morbidity and mortality causes (mainly including violent deaths caused by car accidents, suicide, death by gun fire or by bladed weapon), thus

totaling 328 cases. The second cause of death was represented by circulatory system diseases (including ischemic diseases of the heart, cerebrovascular diseases, pulmonary heart disease and pulmonary circulation) - 240 cases. These diseases were followed by injuries and poisoning, as well as by other consequences of external causes, respiratory tract diseases and neoplasms, that were observed in 46, 45 and 35 donors, respectively. There were 25 causes of endocrine, nutritional and metabolic diseases, and 23 cases of nervous system diseases. Digestive tract and genitourinary tract diseases accounted for 22 deaths, each. On the other hand, abnormal symptoms, signs and findings during clinical and laboratory examinations were observed in 21 donors, and musculoskeletal system diseases were observed in 2 patients. Pregnancy, deliver and puerperium issues, blood diseases and hematopoietic tissue diseases were observed in 01 donor, each (Figure 3).

Silva et al. (18) drew the epidemiological profile of corneal donors in Goiás State. A probabilistic sample with 793 medical records was calculated through the formula by Leslie Kish (Epi Info 7), who took into account the total number of 3,093 medical reports from January 2006 to August 2015. Results have shown that the mean age of donors was 37.33 years; most of them were men (81.21%). The most frequent cause of death was traumatic brain injury (34.04%), which was followed by acute myocardial infarction (14.12%).

Men totaled 581 donors, mostly due to external death causes (49.40%), this factor was followed by circulatory system diseases (23.92%) and by injuries, poisoning and other consequences of external death causes (6.88%). Other causes related to men were respiratory tract diseases (4.48%); endocrine, nutritional and metabolic diseases (2.75%); abnormal symptoms, signs and findings during clinical and laboratory examinations - non-classified in other parts (2.75%); neoplasms (2.58%); digestive tract diseases (2.58%); genitourinary system diseases (2.24%); nervous system diseases (2.07%); musculoskeletal system and conjunctive tissue diseases (0.17%); blood diseases and hematopoietic tissues, and by some immune disorders (0.71%) (Figure 4).

On the other hand, 230 female donors stood out for death caused by circulatory system diseases (43.91%), which was followed by external death causes (17.83%) and neoplasms (8.7%). Other causes related to women were respiratory tract diseases (8.26%); nervous system diseases (4.78%); endocrine, nutrition and metabolic diseases (3.91%); genitourinary system diseases (3.91%); digestive system diseases (3.04%); injuries, poisoning and other consequences of external death causes (2.61%); abnormal symptoms, signs and findings during clinical and laboratory examinations - non-classified in other parts (2.71%); musculoskeletal system and conjunctive tissue diseases (0.43%); pregnancy, delivery and puerperium issues (0.43%) (Figure 4).

Accordingly, although death caused by external factors is the most frequent one, if one takes into account the total number of donors and male donors, female donors are the second most prevalent ones. Circulatory system diseases that are the main causes of death among women; these diseases rank second in the total sample or in the sample of male donors.

Rocon et al. (19) drew the epidemiological profile of corneal and organ donors from five hospitals in Espírito Santo State. Census samples from 40 medical reports collected from March to August 2010 were used. Results have shown that the main causes of death among female donors are related to groups of diseases of the circulatory system (63%); on the other hand, the group of male donors stood out for external morbidity and mortality causes (66%). This outcome is in compliance with the study in question.

Graphic 5
Cause of death of donors per age group.
Teresina (PI), 2010-2016

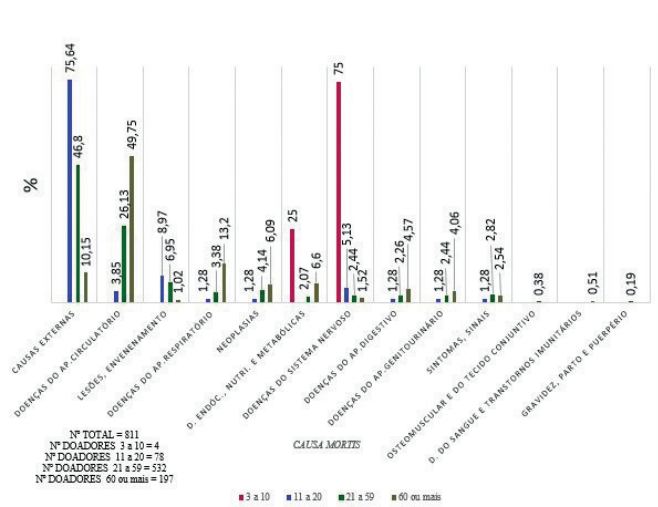


Figure 5. Distribution of donors' death causes per age group

With respect to the age group 3 to 10 years, which totaled 4 donors, 75% of death cases was caused by nervous system diseases; and 25% by endocrine, nutrition and metabolic diseases (Figure 5).

There were 78 donors in the age group 11 to 20 years, most of them died from external death causes (75.64%) and injuries, and from poisoning and other consequences of external causes (8.97%). The other causes of death were nervous system diseases (5.13%), circulatory system diseases (3.85%), respiratory tract diseases (1.28%), digestive tract diseases (1.28%), genitourinary system diseases (1.28%), neoplasms (1.28%) and abnormal symptoms, signs and findings during clinical and laboratory examinations (1.28%) (Figure 5).

The age group 21 to 59 years showed the largest number of donations; 532, in total; most of them died from external death factors (46.80%) and by circulatory system diseases (26.13%). The other causes of death were injuries, poisoning and other consequences of external causes (6.95%); neoplasms (4.14%); respiratory tract diseases (3.38%); abnormal symptoms, signs and findings during clinical and laboratory examinations (2.82%); genitourinary tract diseases (2.44%); nervous system diseases (2.44%); digestive tract diseases (2.26%); endocrine, nutrition and metabolic issues (2.07%); Musculoskeletal system and tissue diseases (0.38%); and pregnancy, delivery and puerperium issues (0.195) (Figure 5).

According to the age group 60 years or older, there were 197 donations. This group stood out for the prevalence of death caused by circulatory system diseases (49.75%), which was followed by death caused by respiratory tract diseases (13.20%); external death causes (10.15%); endocrine, nutrition and metabolic diseases (6.60%); neoplasms (6.09%); digestive tract diseases (4.57%); genitourinary tract diseases (4.06%); abnormal symptoms, signs and findings during clinical and laboratory examinations (2.54%); nervous system diseases (1.52%); injuries, poisoning and other consequences of external causes (1.02%); blood and hematopoietic tissues; and some immune disorders (0.51%) (Figure 5).

The causes of death per age group (among 40 donors from March to August 2010) were analyzed in five hospitals in Espírito Santo State. External morbidity and mortality factors were among the prevailing causes of death in the first four age groups (10 and

41 years), they accounted for 100% of the death causes in the age group 18 and 25 years. Circulatory system diseases prevailed in the age group 42 years on and were the main causes of death in the age group 59 years, or younger; they were followed by death caused by external morbidity and mortality factors in the age group 60 years or older (Rocon et al.⁽¹⁹⁾). Thus, data recorded for donors in the age group 11 to 59 years were in compliance with data in the literature, namely: the prevalence of external death causes. However, the age group 60 years showed results different from that found in other scientific studies, which have shown circulatory system diseases as the main cause of death in this age group (Figure 5).

Thus, the largest number of donors died from external causes, mainly in the age groups 11 to 20 years and 21 to 50 years. External death causes ranked third in the age group 60 years, or older, whereas the age group 3 to 10 years did not record death caused by external factors. Most corneas in this eye bank came from Teresina Emergency Hospital and from the Forensic Medicine Institute, where the rate of death caused by external factors is high; men in the age group 21 to 59 years were the greatest victims of these factors. Such a relevant fact evidences great economic impact, because this group represents most of the economically active population, a fact that brings great losses to society⁽¹⁸⁾ (Figure 5).

Death caused by circulatory system diseases stood out as the most frequent ones in the age group 60 years, or older. However, this factor ranks the second and fourth positions in the age groups 21 to 59 years, and 11 to 20 years, respectively. There were no cases of these diseases recorded in the age group 3 to 10 years (Figure 5).

Nervous system diseases were the main cause of death in the age group 3 to 10 years. However, it ranked the third, eighth and ninth positions in the age groups 11 to 20 years, 21 to 59 years, and 60 years (or older), respectively (Figure 5).

Nowadays, the shortage of organ donors is a universal barrier and the most important factor impairing the provision of tissue for transplantation purposes. Shiratori et al.⁽²⁰⁾ reported that organ shortage does not result from donors' shortage, but from the difficulty in finding them, from not having family consent and from not capturing organs and tissue in time. Lack of eye tissue and of Eye Banks capable of supplying corneas – in the appropriate number and quality for transplantation - in many Brazilian states, remains real. Accordingly, actions taken by Eye Banks are essential, be them the active search for donors, family interviews, capture of donated tissue in time and its distribution based on quality standard.

The planning and performance of socio-educational policies and of preventive measures in transit medicine can reduce the incidence of external causes of death in the young population, and it could help mitigating this high socio-economic impact on the general population. Finally, it is important highlighting the importance of outspreading the need of corneal donation in the social media, so that the population can be aware of its importance and of its benefit to improve the socio-economic level of the nation.⁽¹⁸⁾

Thus, new and in-depth studies are expected to be carried out in order to enhance the evaluation of eye banks and to contribute to define strategies to get more high-quality corneas.

CONCLUSION

According to the herein recorded results, to the literature and to the adopted methodology, it is possible concluding that

811 corneal donors were registered in BTOC-HGV throughout the seven years of the present study (2010-2016). The amount of donated cornea grew in 2012, 2013 and 2014; however, it decreased in 2015 and 2016. Moreover, male donors prevailed, mainly in the age group 21 to 59 years, in Teresina County. When it comes to donors' cause of death, most of them regarded external morbidity and mortality causes (mainly, violent death caused by car accidents, suicide, death by gun fire and bladed weapon); the second greatest cause of it were the circulatory system diseases.

Finally, it is essential outspreading corneal donation in social media so the population can benefit from a larger number of donors, as well as of performed transplantations. New and in-depth studies are expected to be further carried out in order to improve the evaluation of eye banks, since it can contribute to define strategies focused on getting more high-quality corneas.

The population must be aware of the importance and need of donating organs and tissue to help sick patients, save their lives or assure their recovery. This new donation culture would allow these individuals to participate in the common social life and economic activities of most citizens. Therefore, it is necessary investing in training and in rising the number of qualified professionals, from the capturing team to the transplantation team – all these teams are extremely important to increase the number of captured corneas.

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