



AN ASSESSMENT OF EYE DONATION PATTERN AND ITS UTILIZATION AT TERTIARY CARE CENTER IN CENTRAL INDIA.

Ophthalmology

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ABSTRACT

Purpose: To assess the donor's profile, trends in eye donations, and corneal utilization. **Methods:** This is a four year retrospective study conducted from January 2016 to December 2019, data was collected from the eye bank records. Detailed retrospective assessment of eyeballs was done in form of the patient's medical as well as ocular history, cause of death, time of death, time of enucleation, patient's serological status for HIV and HbsAg. Appropriate corneas were used for penetrating keratoplasty and the rest was used for study purposes. **Results:** This study includes 172 corneal donors (344 eyes) and 142(142 eyes) corneal recipients. We found that the mean age of donors was 66.53 years (SD = 19.41), the median age was 70 years, and the age range was in between 8 to 100 years. Amongst donors, the maximum percentage of corneal utilization for PKP (73%) was seen in 31 to 50 years of age group. In 81 to 100 years of age groups majority of corneas (80 %) were used for study purpose. In our eye bank, most of the corneas i.e. 110(64%) received from peripheral collection centers. We noted corneal ulcer (44%, n=62) as the most common indication for PKP. The maximum number of cases underwent therapeutic PKP (67%, n=95), followed by optical PKP (33%, n=47). **Conclusion:** Assessing the eye bank to know the reasons behind corneal non utilization, measures taken to overcome it, and usage of long term storage media can help to increase tissue utilization.

KEYWORDS

Corneal Blindness, Corneal Transplantation, Eye Bank.

INTRODUCTION

As per the world health organization (WHO), visual impairment is a major public health problem globally, affecting approximately 314 million peoples, of which 45 million are blind.^[1]

Corneal blindness is one of the leading causes of preventable blindness in India. Corneal transplantation with a good quality donor corneal tissue is the mainstay of the management of corneal blindness, which is the most frequently performed transplant procedure worldwide.^[2,3] In various parts of the world, there is a discrepancy between the need for and the availability of corneal grafts which poses a challenge to public health specialists and the health system.^[4,5]

National Programme for Control of Blindness (NPCB), an initiative by the government of India, has worked hard to reduce blindness through comprehensive eye care services, including corneal transplantation.^[6] In the last few years, the Eye Bank Association of India has made efforts to increase the corneal procurement rate. As the corneal blindness cases, which are added every year, to be as high as 30,000 cases each year, an estimated approximately 277,000 donor tissues are needed every year to combat these high corneal blindness cases.^[7-9]

With improved awareness among the general population regarding eye donation and the developed infrastructure of eye banks in India, corneal retrieval is going high but not enough to meet the perceived need for corneal transplants per year.^[10] Even after raising numbers for corneal retrieval, qualitative improvement is a way forward to achieve.^[7]

METHODS AND MATERIALS

This is a retrospective study conducted at a tertiary eye care center from January 2016 to December 2019. All procedures were followed in accordance with the Helsinki Declaration of 1975, as revised in 2013. Data of corneal donors, as well as recipients, were collected from the eye bank record. Our eye bank received eyeballs from hospitals, mortuary, and residence. We also received donor tissues from peripheral collection centers outside the city which is brought by an ophthalmic assistant. Relatives were counseled for enucleation procedure, any contraindication for enucleation or transplantation, its usage for research purposes, and got duly signed no objection certificate from them. If relatives denied consent, then enucleation was not performed.

Detailed retrospective evaluation of eyeballs received by our institute was done in form of the patient's medical as well as ocular history,

cause of death, time of death, time of enucleation, patient's serological status for HIV, and HbsAg. Then slit lamp examination of the cornea was done to assess epithelial defect, exposure keratitis, arcus senilis, corneal scar, stromal edema, descemet's membrane folds, endothelium status, anterior chamber, iris, pupil, and lens status. Then corneal button was made and stored in MK (McCarey and Kaufman) media. From the waiting list, patients were called for full thickness penetrating keratoplasty (PKP). Those corneas not used for PKP was used for study purpose.

RESULTS

This is a four-year retrospective study that includes 172 (344 eyes) corneal donors and 142 (142 eyes) corneal recipients. In our study maximum number of the donors belonged to the age group of 71 to 80 years (24%, n= 42), followed by 61 to 70 years (19%, n=33) and, very few belonged to the age group of 0 to 10 years (0.5%, n=1). The mean age of donors was 66.53 years (SD = 19.41), the median age was 70 years, and the age range was between 8 to 100 years.

Amongst donors, the maximum percentage (73%) of corneal utilization for PKP was seen in 31 to 50 years of age group, and in 81 to 100 years of age groups majority of corneas (80 %) were used for study purpose. Out of 172 donors, 113(66%) were males and 59(34%) were females. The maximum number of corneas i.e., 110(64%) received by our eye bank were from peripheral collection centers which were brought by ophthalmic assistants. 15% (n= 25) of corneas were retrieved from the donor's residence and 14% (n=24) were retrieved from the same institute (through (HCRP) Hospital cornea retrieval program) by our eye bank personals. (Figure 1)

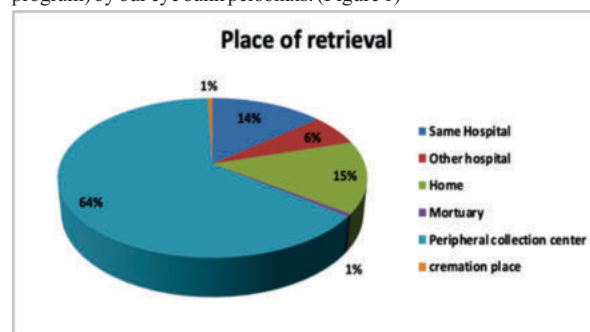


Figure 1: Place of Eyeball Retrieval

The majority of corneas (96%, n=165) were retrieved within the first 6 hours of death. Out of 344 corneas, majority of corneas i.e. 59% (n=202) were used for study purpose, and 41% (n=142) were used for PKP. The most common cause of death in donors was cardiovascular disease (47%, n=80), followed by natural death (29%, n=50). (Figure 2)

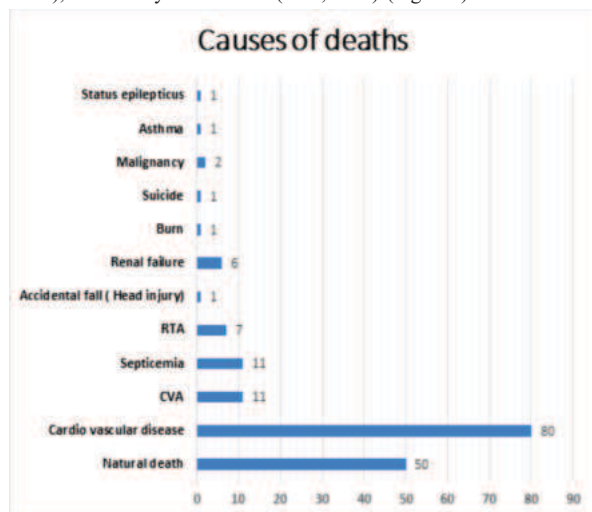


Figure 2: Cause of Death of Donor

Out of 142 recipients, 23 cases underwent PKP in 2016, 37 cases underwent PKP in 2017, 33 cases underwent PKP in 2018, and 49 cases underwent PKP in 2019. Most of the recipients belonged to the age group of 41 to 60 years (46%, n=66), and very few recipients belonged to the age group of 0 to 10 years (0.7%, n=1). It had shown that 75 (53%) recipients were males and 67 (47%) recipients were females. Most common indication for PKP was corneal ulcer (44%, n=62), followed by corneal opacity (32%, n=46), status post PKP (11%, n=15), and pseudophakic bullous keratopathy (9%, n=13). (Figure 3) The maximum number of cases underwent therapeutic PKP (67%, n=95), followed by optical PKP (33%, n=47).

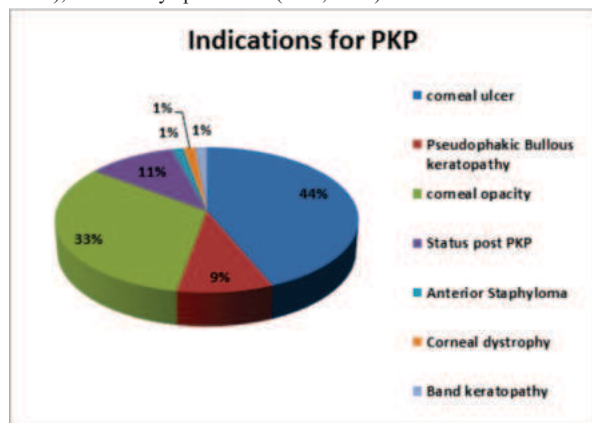


Figure 3: Indications for PKP

DISCUSSION

Our study showed male preponderance amongst the donors that were in resemblance to other studies.^[11-14] In our study majority of the donors belonged above 60 years of age group and the largest proportion was in between 71-80 years. This may be because natural deaths and death related to cardiovascular diseases are more common in the elderly age group. This was similar to previous studies.^[11,15]

Amongst donors, we found that the percentage of corneal utilization was more in the middle age group and lesser in extremes of ages. According to some studies the reason behind the non-utilization of corneas in the young age group was its parameters, as it is thinner, steeper, and having a smaller diameter, which creates technical difficulties during transplantation and may develop higher postoperative myopia because of the steeper curvature of the cornea.^[16,17]

In our study tissue utilization in the older age group (above 60 years) was about 35%, this is consistent with Moyes et al who showed the lower corneal utilization rate i.e. 23% rate in donors aged 70-75 years.

^[18] While Armitage et al reported a 45% rate in donors above 80 years^[19] and Gain et al reported a 53% rate in donors 85-100 years, which is more in old age.^[20] So according to some studies the advanced donor age alone didn't have an adverse effect on transplant survival or outcome,^[15,21-27] other factors like endothelial cell density and function with advanced age were also the documented reason for adverse effect on transplant survival.^[17, 28-32] so, thorough preoperative endothelial assessment of donor tissue is mandatory for better results.

As our state had very few eye banks (both government and private) so, the number of eyeballs received from peripheral collection centers were more as compared to eyeballs retrieved by our eye bank personal. In our study, corneal procurement through HCRP was very less, so to increase the eye donation rate proper implementation of HCRP is necessary which can be achieved by recruiting a well trained Eye Bank counsellor (EBC) or hospital staff^[33,34], screening of potential donors and their counselling for eye donation.

In our study majority of corneas were retrieved within the first 6 hours of death. Despite early retrieval, most of the time corneas were primarily preserved and transported in a moist chamber from other eyeball collection centers, so it took more than 6hrs for its preservation in MK media. As the cornea is viable only for 6 hours, its procurement should be done within 6 hours of death. According to Woodford et al.^[35] if the time taken for preservation exceeds more than 6 hours it may result in sloughing of the donor epithelium. We have to educate the health care workers regarding post-death care of cornea because lack of protection measures taken after death to prevent exposure of eye and its contamination can directly impact its utilization. Most of the time certain factors like medico-legal formalities before retrieval and counselling after death can be the reasons for a delay in procurement.

Cardiovascular disease was the most common cause of donor's death followed by natural death, this finding was similar to the study by Hussain Y et al.^[11] as the rate of cardiovascular diseases was increasing nowadays and manifesting in the younger age group also. Our study showed that most of the recipients belonged to the age group of 41 to 60 years and had male preponderance. This is because in our society males are the decision-makers and give a quick response for performing PKP, but females take more time for their decision and sometimes deny undergoing any surgery. Cunningham et al. reported similar results in their study.^[13]

A corneal ulcer was the most common indication noted in our study for PKP, followed by corneal opacity. The incidence of infective keratitis was more and these patients are readily available for PKP as they are already admitted in the hospitals when other patients denied coming for PKP. This finding was similar to the other studies.^[36,37] According to some previous studies healed keratitis (38.03%) followed by acute infectious keratitis (28.38%) was the leading indication for PKP.^[38]

CONCLUSION

A discrepancy in corneal demand-supply gap and availability of good quality cornea is the major limiting factors to overcome the burden of corneal blindness. Counseling and consent of both donor's relatives, as well as recipients, play an important role in cornea donation. Certain measures like increasing eye bank at the periphery, effective public awareness, training of health care workers, or eye bank counselors, might help us to curtail current corneal scarcity.

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