

ANALYSIS OF DONOR CORNEA RETRIEVAL DATA- HOSPITAL AND RESIDENCESRekha Gyanchand¹¹Consultant and Medical Director, Department of Ophthalmology, Lions International Eye Bank, Bangalore.**ABSTRACT****BACKGROUND**

The voluntary eye donation is still the most popular methods of eye donation in our country. Since last three decades, the voluntary eye donation is promoted by a number of NGOs and Government of India. The meaning of voluntary eye donation is that an individual has prior knowledge about eye donation and also has the contact number of the eye bank. When they come across any death in their community, they will contact the eye bank for eye donation. As per Eye Bank Association of India, the incidence of total blindness is 8.9 million and 1% of this is corneal blindness. Each year, 25,000 to 30,000/new corneal blind patients are added. The voluntary eye donation is not sufficient in providing transplantable corneas to the corneal blind. As our concentration is mainly on voluntary eye collections, this is one of the main reasons that we are unable reach our target of sight restoration in the management of corneal blindness. In this study, we have analysed the voluntary eye donations procured from residence and hospital.

The aim of the study is to compare corneas procured by hospital eye donations and residence eye donations to look into all factors that contribute to a transplantable cornea.

MATERIALS AND METHODS

The donor corneas retrieved from the year 2005-2010 were analysed. The hospital eye donations and residential eye donations were divided into two study groups. The factors analysed were number of corneas collected, donor age and gender, serology test result, death to preservation time (DPT), optical grade cornea, utilisation of corneas for transplantation and role of pledging in eye donation.

Study Type- Retrospective study.

Study Done- At Lions International Eye Bank, Bangalore.

RESULTS

The total number of donor eyes collected from the year 2005-2010 were 7362 of which residence collections was 50.73% and hospital collections was 49.26%. The 5-year period between from 2005 to 2010 in spite of not conducting a Hospital Cornea Retrieval Program (HCRP), we still had received a number of young corneas from hospitals. The transplantable grade corneas were 26.33% in hospital eye donations and 16.26% at residence. The death to enucleation time was less in hospital deaths when compared to that of residence collection.

CONCLUSION

The hospital eye donations more of transplantable grade corneas were collected when compared to residence eye donations. The HCRP would be the method to target the backlog of corneal blindness. The various public awareness programs do play an important role in spreading the message of eye donation.

KEYWORDS

DTP = Death to Preservation Time, HCRP = Hospital Cornea Retrieval Program.

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BACKGROUND

According to the National Program for Control of Blindness (NPCB) estimates, there are currently 1,20,000 corneal blind persons in the country. According to this estimate, there is addition of 25,000-30,000 new corneal blindness cases added on each year in the India.¹ The burden of corneal

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Corresponding Author:

Dr. Rekha Gyanchand,

No. 94/c, 9th Cross, RMV Extension, Bangalore-50080.

E-mail: rekha221@gmail.com

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disease in our country is reflected by the fact that 90% of the global cases of ocular trauma and corneal ulceration leading to corneal blindness occur in developing countries.²

A huge gap is seen between demand and supply of donor cornea. We need to decrease this gap and for this we do require a number of optical grade corneas.³ The public awareness programs in our country is active for the last three decades and financial support is provided by the government of India and various NGO organisations. This has to some extent increased at least the voluntary urban eye donations.²

The present scenario in India, the eye banks receive donor corneas mainly from voluntary donations. These eye donations maybe come either from the residence or

hospital.^{1,4} The major disadvantage of the voluntary eye donation is that the next of kin needs to realise the responsibility of eye donation at the time of death of the next of kin, but at those moments of grief, this realisation may not actually materialise into actual eye donation.⁵ The eye donations that we receive from the residence, the death certificate and medical records is not available due to which the eye banks do not collect the eyes even if the donor family is willing for eye donation. The corneas received from voluntary eye donations especially the residence collection have aged donors. The residence eye donation after complete donor processing, the number of corneas not fit for transplantation is more than that of hospital collections.

The advantages of voluntary donations that come from hospitals is that the donor medical records is available for eye bank reference, medical certificate is ready, donors are younger.⁶ The motivated hospital staff reminds the family members about eye donation and help the donor family to contact the eye bank if required.

Aim- To compare donor corneas procured by hospital eye donations and residential eye donations. To look into all parameters that contribute to a transplantable grade cornea.

Statistical Analysis- The statistical method used is percentage.

Study Type- Retrospective analysis.

MATERIALS AND METHODS

This study was conducted at Lions International Eye Bank (LIEB), Bangalore.

The donor records were analysed for 5 years period from 1st January 2005 to 31st December 2010. A total number of 3681 donor records were reviewed. In the study, the donors were divided into residential eye donations and hospital eye donations. The indications, contraindications and corneal grading protocol were based on the NPCB guidelines for standard of eye banking in India 2009.¹

The information for the study was obtained from the following donor forms-

1. Place of eye donation- Hospital or residence.
2. Donor details- Age, gender, DTE (death to enucleation) and DTP (death to media preservation time).
3. Donor medical records.
4. Serology report.
5. Donor cornea evaluation records.
6. Utilisation or transplantation records.
7. Adverse reaction report records.

The donor parameters analysed in each group were-

- No. of corneas retrieved.
- Age/gender distribution.
- Death to enucleation time.
- Enucleation to preservation time.
- Cornea grading by slit-lamp biomicroscopy and Konan eye bank specular microscope.
- Serology report - tested for HIV, HBsAg, HCV and VDRL.
- No. of corneas utilised.
- No. of pledging vs. eye donation.

Donor Corneal Grading followed at the Eye Bank^{7,8,9}

Slitlamp Biomicroscopic and Specular Microscopy-

Excellent cornea = No arcus, clear and compact stroma and no. folds in descemet's membrane, CD-3000 cells/mm².

Very good = Very light arcus, clear stroma, few faint DM folds, CD=>2600 cells/mm².

Good tissue = Stromal cloudiness and numerous DM folds, CD=>2000 cells/mm².

Fair grade = Heavy arcus >2.5 mm, moderate epithelial haze, moderate stromal oedema and heavy DM folds, CD = 1500 cells/mm² to 2000 cells or not.

NSFS = Not suitable for surgery. The reasons could be donor disease, serology positive, incomplete medical history, collection of donor eyes beyond 6 hrs. of death.

<p>Excellent</p> <ul style="list-style-type: none"> No epithelial defects Crystal clear stroma No arcus senilis No folds in Descemet's membrane Excellent endothelium <p>Very good</p> <ul style="list-style-type: none"> Slight epithelial haze or defects Clear stroma Very slight arcus Few light folds Very good to excellent endothelium-no defects <p>Good</p> <ul style="list-style-type: none"> Obvious moderate epithelial defects Light to moderate cloudiness Moderate arcus senilis <2.5 mm Obvious folds (numerous but shallow) Few vacuolated cells <p>Fair</p> <ul style="list-style-type: none"> Obvious epithelial defects (>60%) Moderate to heavy stromal cloudiness Heavy folds, (numerous, central) Heavy arcus senilis >2.5 mm Fair to good endothelium-moderate endothelial defects, vacuolated cells, low cell density <p>Poor</p> <ul style="list-style-type: none"> Moderate vacuolated cells Severe stromal cloudiness Marked folds (heavy, numerous, central) Fair endothelium-marked defects, low cell density, numerous central vacuolated cells Technical problems in removal
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Inclusion Criteria

All eye donation done at Lions International Eye Bank, Bangalore, from the year 2005 to 2010 was considered.

Exclusion Criteria

- Eyes received from other eye banks or from eye collection center were not considered.
- Donor eyes were not retrieved if the donor cause of death belonged to any contraindications as per NPCB.

RESULTS

The total number of donor eyes collected by the LEIB from 2005 to 2010 was 7363.

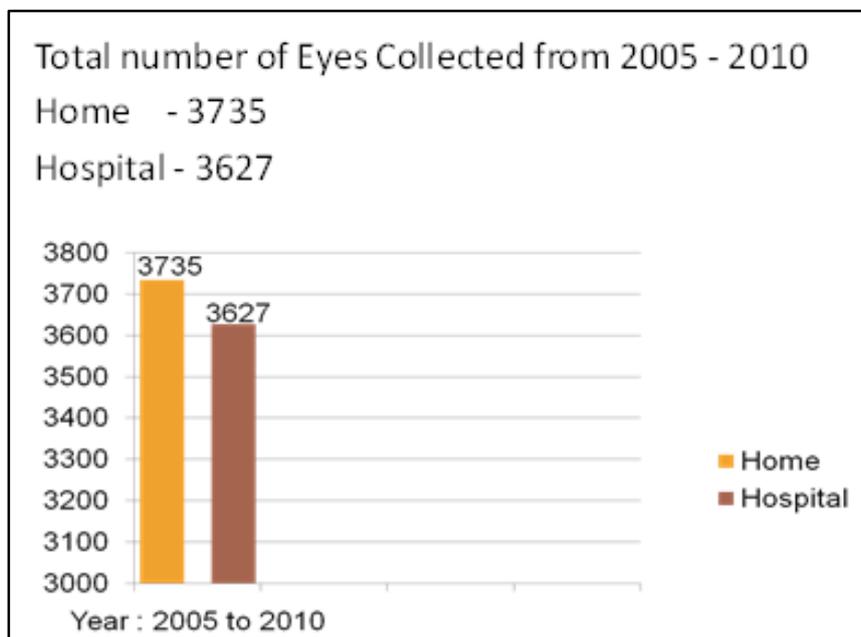


Figure 1. Donor Eye Collection

The number of donor eyes collected for residence was 3735 (50.73%) and from hospitals and nursing homes was 3627 (49.26%).

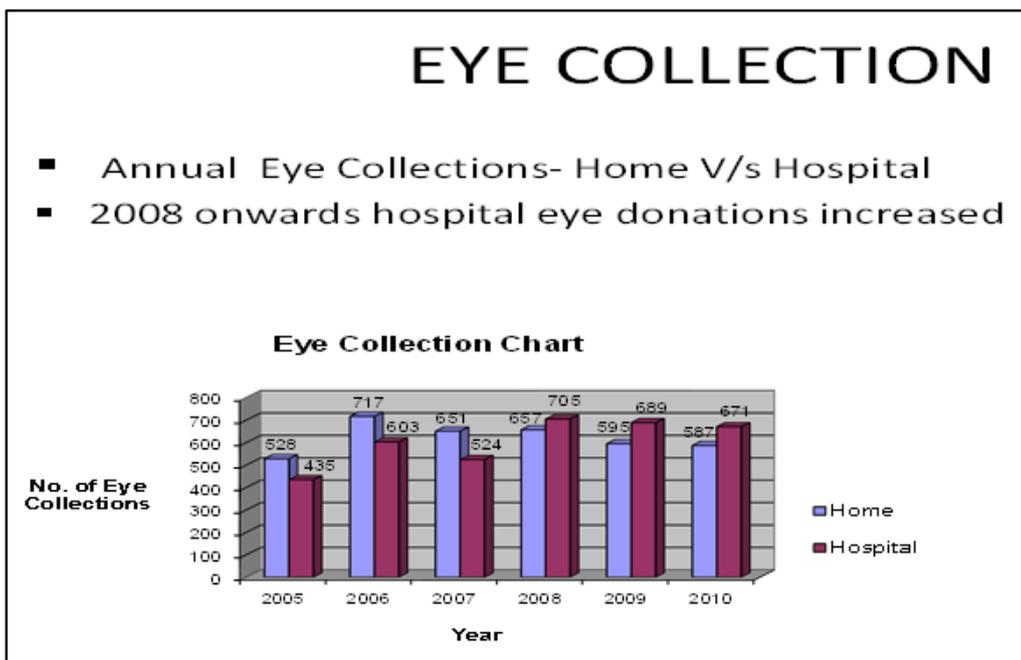


Figure 2. Eye Collection

Year	2005	2006	2007	2008	2009	2010
Home	528	717	651	657	595	587
Hospital	435	603	524	705	689	671

The Annual Donor Eye Collection from Residence and Hospitals

The annual eye collection from 2005 to 2010 is as table 2. From 2008, we find an increase in eye collection from hospitals when compared to residence. This could be because the eye bank was conducting frequent audio-visual lectures in hospitals and public forums.

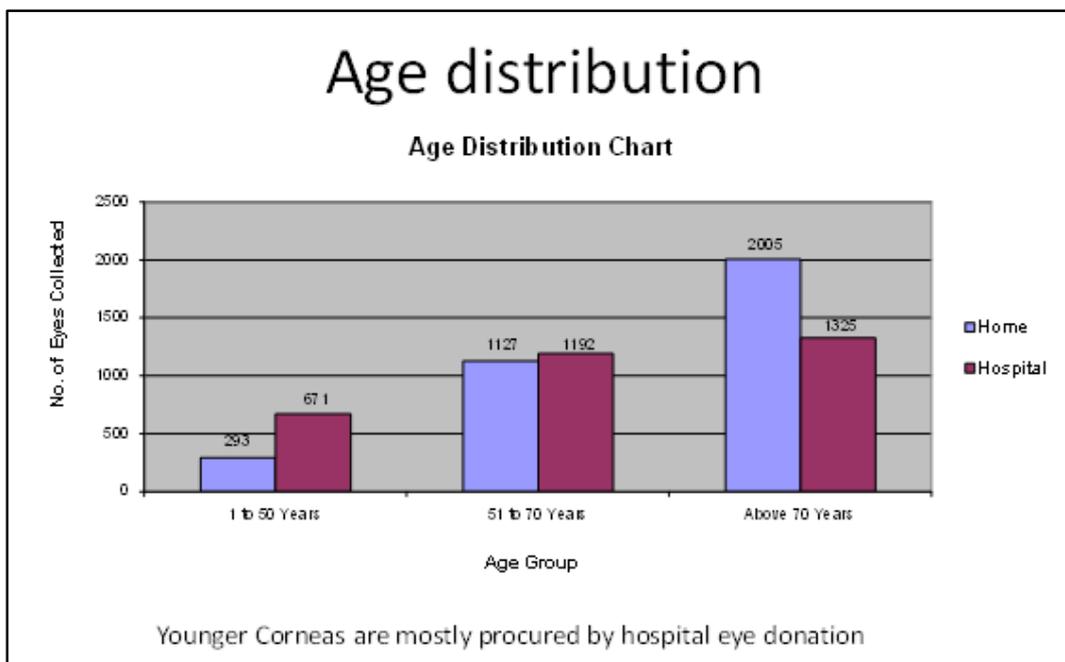


Figure 3. Age Distribution

The eye donations were categorised into three age groups 1 to 50, 51 to 69 and above 70. The residence eye collection less than 50 yrs. age was 7.86% (293 eyes) when compared to hospital donations of 26.33% (955 eyes).

Above 70 yrs., majority of the eye donations were from residence.

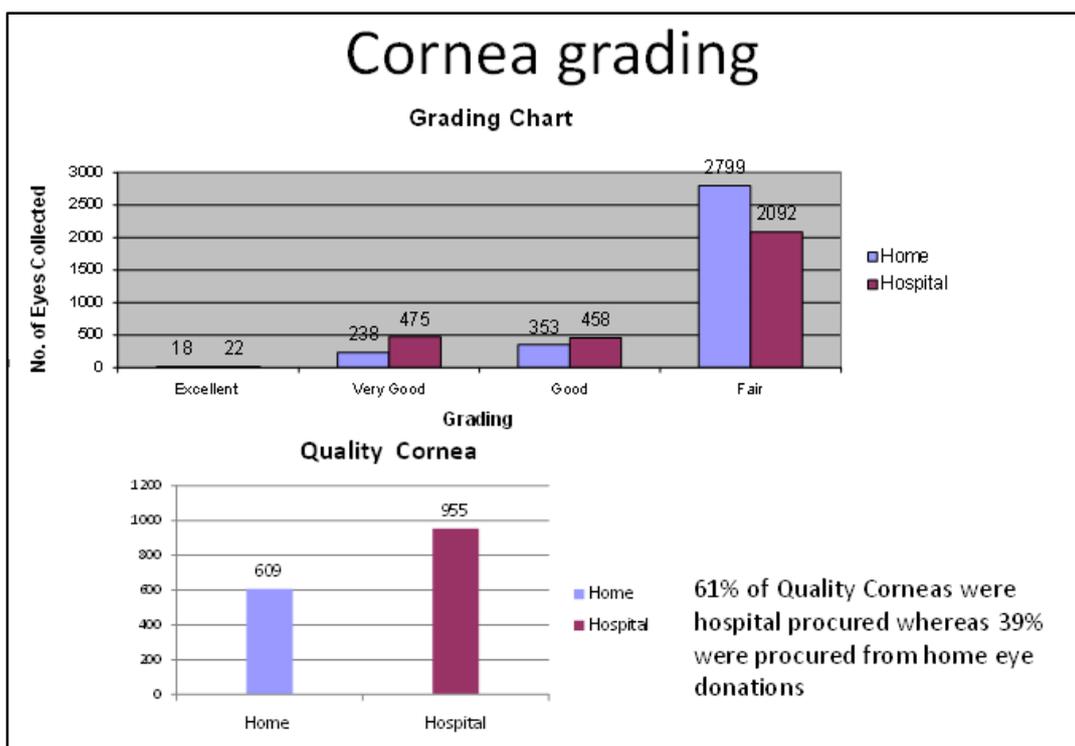


Figure 4. Cornea Quality-Excellent and Very Good

The cornea is considered to be of an optical grade if it is graded as excellent and very good. The cornea have a good endothelial count more than 2600 cells/mm². These optical grade corneas are used for Penetrating Keratoplasty (PKP) and Endothelial Keratoplasty (EK). In residence collection, optical grade cornea were 16.26% (609) and in hospital eye donations were 26.33% (955).

Excellent cornea = No arcus, clear and compact stroma and no folds in descemet's membrane, CD-3000 cells/mm².

Very good = Very light arcus, clear stroma, few faint DM folds, CD = >2600 cells/mm².



Figure 5

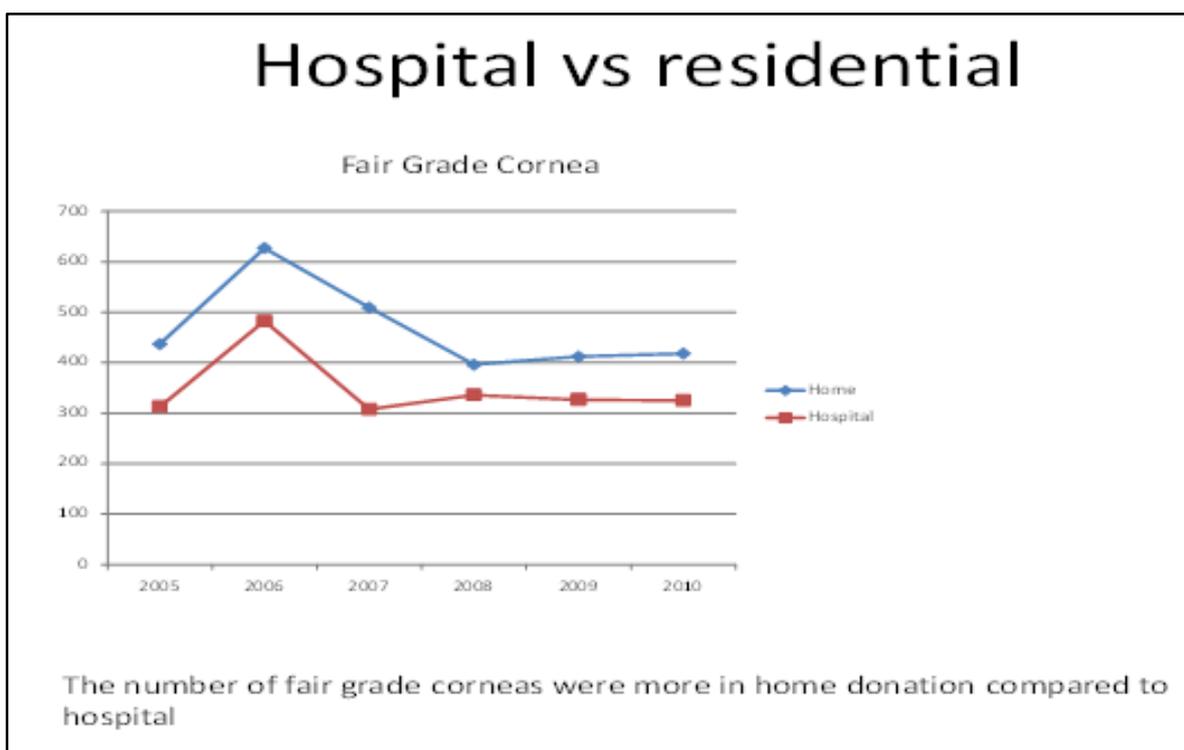


Figure 6. Fair Grade of the Cornea

The fair grade corneas were 74.93% (2799) in residence and 57.67% (2092) in hospital collections. The endothelial count is less than 2000 cells/mm². These corneas can be used for tectonic graft, patch grafts or therapeutic grafts. If the donor cornea has a central clear zone of 8.50 mm, it can be used for anterior lamellar keratoplasty. The number of fair grade corneas collected was more in residence donor eye collections than hospital eye retrieval.

Fair grade= In young corneas, no arcus in older heavy arcus >2.5 mm, moderate epithelial haze, moderate stromal oedema and heavy DM folds, CD = 1500 cells/mm² to 2000 cells or not recordable at times.

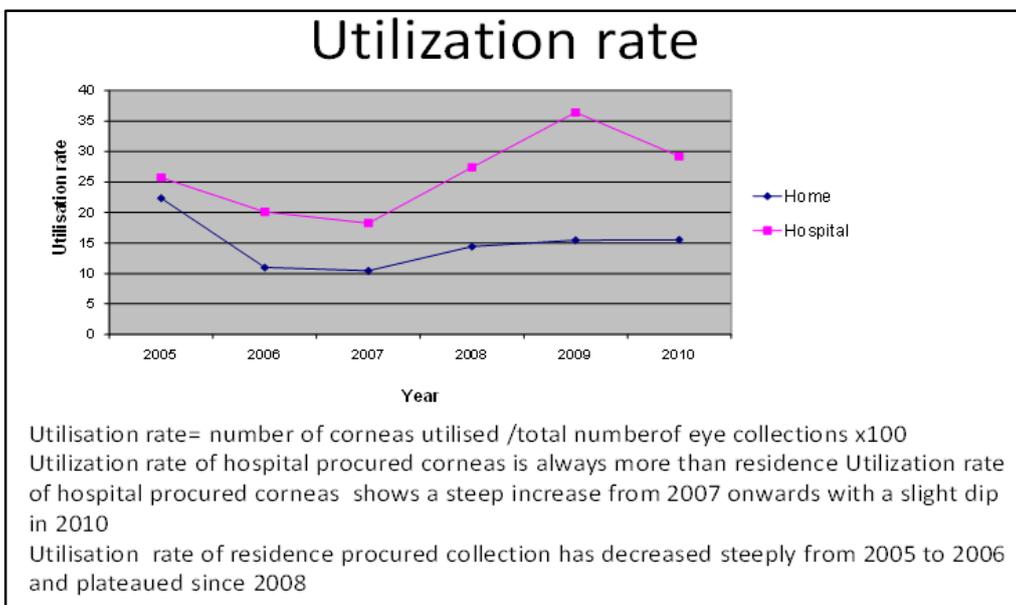


Figure 7. Cornea Utilisation for Transplantation

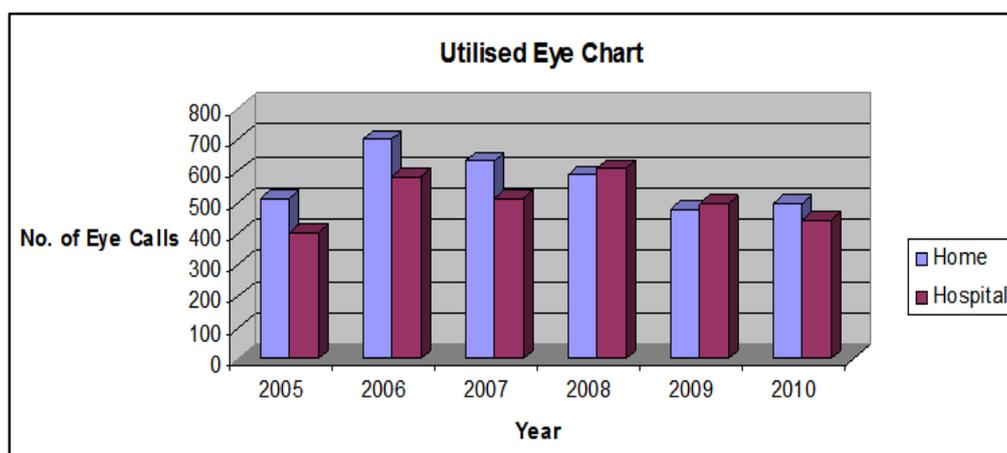


Figure 8. Cornea Utilisation for Transplantation

The corneas utilised for transplantation from residence collection was 16.26% when compared to hospital donor cornea collection, which was 26.33%. The donor eyes collected from hospitals had better optical quality.

Adverse Reaction Report Post Keratoplasty

No surgeon reported any problems related to the donor cornea, which was distributed to them or postoperative problems like infection or primary donor failure, which could have been related to donor cornea.

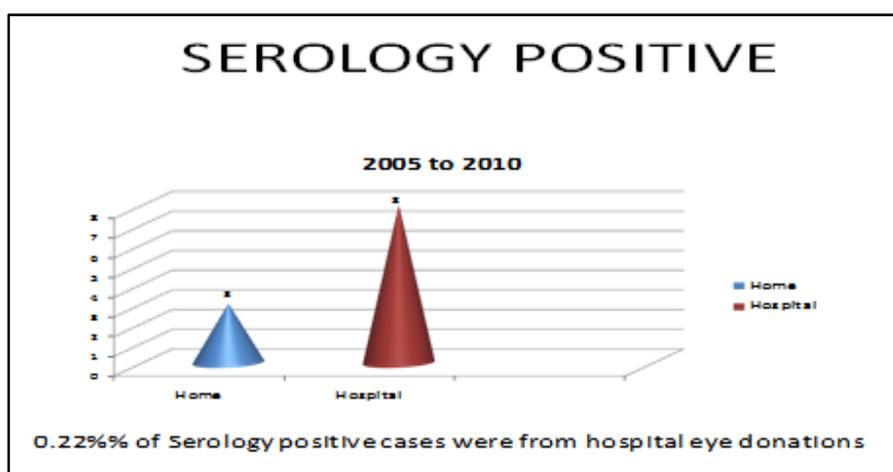


Figure 9. Serology Positive

The serology test as recommended by NPCB was done. The serology test performed as a part of donor cornea processing was HIV, HbsAg, VDRL and HCV. In residence donors, the test was positive in 0.08% when compared to hospital donor positivity was 0.22%.

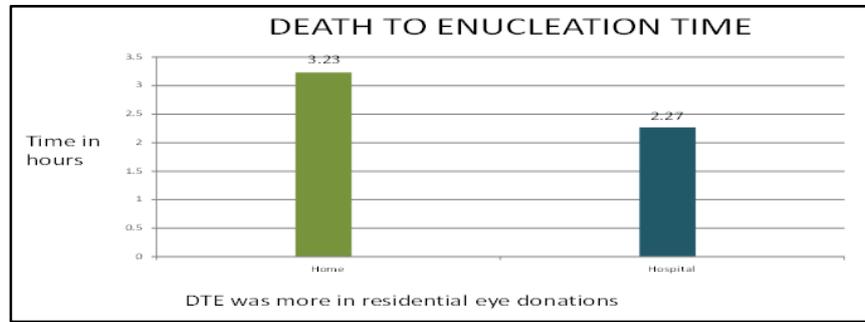


Figure 10. Death to Preservation or Enucleation Time (DTP)

The death to enucleation time in residence collection was 3.23 hrs. compared to 2.27 hrs. in hospital collection. The death to enucleation time was prolonged in residence donor eye collections when compared to hospital collection. This is also one of the factors that contribute to the deterioration of the donor cornea.

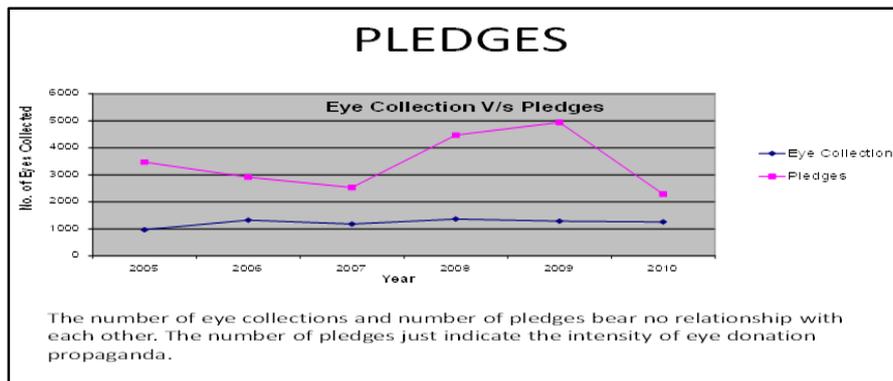


Figure 11. Pledging

The pledging is a method of creating awareness in the public. Pledging does help in sensitising the people about eye donation. But, the number of pledging recorded is not related to the eye donations procured either at the residence or hospitals. The number of pledging per year was fairly constant from 2005. The graph curve is almost straight, but there has been a steady increase in eye donation each year.

DISCUSSION

Even though, this was not a HCRP based study, it still helps us to understand the quality of retrieval of corneas from the hospitals. Our study showed the number of donor corneas received from residence were 50.73% and 49.26% from hospitals. The donors less than 50 yrs. age were 7.86% from residence and 26.33% from hospitals. Our study showed younger donors were more from hospital donations.⁴ A study by N Sharma et al reported in a HCRP-based study, which had a higher proportion of donors in younger age (H=81.6% vs. R=21%), (H=Hospital, R=Residence).⁹ A study done by Jonathan H. Lass et al showed that the corneas received from a donor 66 to 75 years old experienced cell loss of 79% at 10 yrs. after penetrating keratoplasty. The study by Adroaldo Lunardelli et al¹⁰ was regarding the serology test report done in corneal donors retrieved from hospitals. The serology test done were HIV, HCV, HbsAg, the incidence of

positivity was 23% and majority were males. Our study also showed a higher positivity in hospital collections of 0.22% and less positive residence 0.01%, and as per NPCB rule in India, the VDRL test is mandatory.

The corneal transplantation done in residence collection was 16.26% when compared to hospital collection, which is 26.33%. The donor eyes collected from hospitals had better optical grade quality tissue. A study by N. Sharma showed optical grafts to be 91.2% through the HCRP and 8.7% by residence collection.

Sharma et al⁴ higher proportions of corneas in HCRP were used for optical indications 24.5% vs. 13.3%. While in a study by Patel et al,¹¹ cornea utilisation rate was as high as 79% with 68% of tissues received from coroners service and Oliva et al⁶ found tissue utilisation as high as 72% in a Hospital Cornea Retrieval Program (HCRP) model.

The Death to preservation time (DPT) in residence eye collection was 3.23 hrs. as compared to 2.27 hrs. in hospital eye retrieval. In our study, the mean death-to-preservation time was 3.9 ± 1.9 hrs., which is far better than a study done by Patel et al¹¹ who have shown this interval to be 15.2 ± 6.2. The lower the death to preservation time, better the donor cornea quality. A study done by Woodford S Van Meter et al stated if the death to preservation time is more than 6 hrs., it causes corneal sloughing and deterioration of

the cornea.¹² The number of pledging done each year was not related to the eye donations done either at the residence or hospitals.¹³ A study by Tandon et al also showed prior knowledge of eye donation had no influence on willingness for eye donation.

CONCLUSION

The public awareness program on eye donation has to be continued to sensitise the population. The Hospital Cornea Retrieval Program (HCRP) will play an important role.

This would target the corneal blindness problem in India.

In this study, which is not a HCRP based, helped us to understand that the hospital retrieved corneas do provide a large number of transplantable grade cornea.

The hospital retrievals also has the following advantages like-

- Younger donors.
- Donor medical record available.
- Cause of death is known.
- Exact time of death.
- Death to enucleation time is reduced.

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