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ORIGINAL RESEARCH ARTICLE

\\\\Evaluation of donor corneal endothelial cells on eye bank specular microscope

Dr. Chhtradip R. Bhalia[1] | Dr. Madhavi K. Malivad[2*] | Dr. Amit P. Patel[3]

Abstract

Background: Proper evaluation of donor cornea is critical, in deciding the quality of cornea, and thereby to the success of transplantation. With the advent of slit lamp bio-microscopy, and specular microscopy, and with its further availability as an eye bank model, this has become possible. Having known the importance of, and therefore by studying, the endothelium of the donor tissue by doing the specular microscopy with the help of eye bank specular microscope, we can greatly and favourably influence the number of tissues which can be used for various transplant surgeries and make an objective difference to the quality of donor tissues made available for transplantation.

Materials and methodology: A prospective randomised study was carried out from October 2011 to December 2013 at Shri C.H. Nagri eye institute. In this study63 donor eyes were processed and analysed at the eye bank in our institute**.** After evaluation by slitlamp examination tissue were given a clinical grade ranging from excellent to poor.

Obeservations and Results :The study analyzed 63 donor eyes aged 19–84 years, with most donors between 41–80 years. As age increased, endothelial cell density (CD) generally declined, though many older tissues retained good cell counts (1800–2500 cells/mm^2). Specular microscopy altered tissue grading in 38 eyes (60.31%), with 32 (84.21%) upgraded and 6 (15.79%) downgraded ($p < 0.05$). Tissues enucleated and preserved within 6 hours of death maintained higher CD values, while both phakic and pseudophakic eyes showed similar grading improvements. Overall, specular evaluation revealed that a significant number of donor corneas initially graded as suboptimal were suitable for transplantation after endothelial assessment.

Conclusion: In our study, it was found that the Eye Rank Specular Microscopy can Significant alter the final grading of tissues and cause a vital different in its subsequent utilization for various transplant surgeries. In reality there exists a sizable pool of the good quality tissues amongst the available tissues which with improved evaluation techniques can add to the supply of available corneas. Thus for an eye bank, the eye bank specular microscope by providing variable quantitative and qualitative data becomes an indispensable tool for optimizing the availability of tissues for surgery and should be made mandatory analysis in all banks.

Key words: TOD:Time of death, TOE:Time of enucleation, CD: Cell density, HEX: Hexagonality, AVR:Average area, C/MM^2-Cells/mm^2, HCV:Hepatitis C virus

1 | INTRODUCTION

Corneal blindness is one of the leading causes of blindness worldwide. The better part being that majority of it is preventable and curable.So, to cure corneal blindness, concept of corneal transplantation appeared in literature in 18th century. Transplantations were performed experimentally on animals in the 19th century, (1) Proper evaluation of donor cornea is critical, in deciding

[1] M.S.Ophthal, Shri C.H.Nagri Eye Hospital And Research Foundation, Smt.N.H.L. Medical College, Ahmedabad, Gujarat, India.

[2] Associate Professor, Department Of Ophthalmology, Zydus Medical College and Hospital, Dahod, Gujarat, India.

[3] professor Of Ophthalmology,Cornea & Refractive Surgery Unit, Shri C.H.Nagri Eye Hospital And Research Foundation, Smt.N.H.L. Medical College, Ahmedabad, Gujarat, India.

Address correspondence to: Dr. Madhavi K., Malivad, Associate Professor, Department Of Ophthalmology, Zydus Medical College and Hospital, Dahod, Gujarat, India, *Email*: *madhavi.malivad@gmail.com*

the quality of cornea, and thereby to the success of transplantation. With the advent of slit lamp biomicroscopy, and specular microscopy, and with its further availability as an eye bank model, this has become possible. Having known the importance of, and therefore by studying, the endothelium of the donor tissue by doing the specular microscopy with the help of eye bank specular microscope, we can greatly and favourably influence the number of tissues which can be used for various transplant surgeries and make an objective difference to the quality of donor tissues made available for transplantation (2)· After evaluation by slitlamp examination tissue were given a clinical grade ranging from excellent to poor. (3–5)In our study we planned to 1) Objectively document, how eye bank specular microscopy, with regard to the age of the donor, the lens status of the eye, and the date to enucleation and enucleation to preservation times, will alter The final grading of donor cornea from the clinical grading & Its subsequent utilisation for various corneal transplant surgeries 2) On the basis of the outcome of this, whether it would be worth making eye bank specular microscopic evaluation of tissues mandatory in all eye banks. Zirm is credited with performing the first successful penetrating corneal transplant in 1905, Corneal transplantation in humans is not a simple task. It involves evaluation of the patients, availability, evaluation and processing of the donor cornea, performance of meticulous surgery and a responsibility for long term postoperative care. Corneal endothelial cell layer is critical for maintaining structural and functional integrity of cornea. At birth total endothelial cell count is 4000 to 5000 cells/mm^2, (6) As the age advances, and due to surgical trauma and disease, there will be decrease in total cell density, and there will also be morphological changes in the endothelial cells. Sometimes the clinical grading might be on the better side and without doing specular microscopy it is presumed that the endothelial cell density and morphology may be good enough and that the tissue will therefore be good for good prognosis transplantation. However, literature has shown that the cornea can still remain relatively dehydrated in spite of endothelial cell counts as low as 400-500 cells/mm^2. (7)

1.1 | Endothelialcell morphology analysis

The number of cells counted to obtain a maximum accuracy per image has been suggested by Laing et al (8) to be at least 30 cells per image, Doughty (9) suggests at least 75 cells per image and Inaba et al (10) prefers using 100 cell per image. Binder et al (11) expanded the guideline by suggesting as many cells in the image frame as possible, with three images per patient from the center and paracentral regions. The average of the 3 images is used to define the cell density.

1.2 | AIM: "To evaluate the donor corneal endothelial cell on eye bank specular microscope"

To see whether eye bank specular microscopy, with regard to the age of the donor, the lens status of the eye, and the death to enucleation and enucleation to preservation time, will alter

1) The clinical grading of donor cornea.

2) Its subsequent utilization for various corneal transplant surgeries.

On the basis of the outcome of this, whether it would be worth making an eye bank specular microscopic evaluation of tissue mandatory in all eye banks.

2 | MATERIALS AND METHODS

Prospective randomised study was carried out from October 2011 to December 2013 at Shri

C.H. Nagri eye institute. In this study63 donor eyes were processed and analysed at the eye bank in our institute.

2.1 | Exclusion criteria:

- Tissue from the donor whose systemic history was not available.
- Cause of death was not known.
- Donor's blood sample was not available.
- Donors having history of transmissible diseases.
- Donors with positive serological test.
- Tissues sent to the other eye banks.

• Tissues with poor clinical grading where corneo-scleral button was not excised.

• Donor tissues with death to enucleation time >6 hrs.

We included in our study those tissues from which corneo-scleral buttons were excised, preserved in M-K medium and where specular microscopy could be performed, and where their utilization was done at our institute.

2.2 | METHOD

These eyeballs were preserved initially in moist chamber and assessed by slitlamp and their clinical grading was documented. The following factors were analysed and recorded.

• Epithelial defect (drying, erosion, sloughing, tears)

• Exposure keratitis

• Corneal edema (haziness)

• Arcus senilis

• Central corneal scars

• Epithelial edema

• Stromal edema

• Stromal scarring

• Stromal opacification

• Folds in descemet's

• Quality of endothelium

• Condition of anterior chamber

• Lens status

After evaluation by slitlamp examination tissue were given a clinical grade ranging from excellent to poor. After the clinical grading, full thickness corneo-scleral button was excised from the eyeball, with all aseptic precaution in the operation theatre, within a short period from receiving the donor eyes. Button was preserved in M-K (MoCarey-Kaufman) medium. The endothelial cell analysis by konan EB 10 eye bank keratoanalyser (specular microscope) was performed on the preserved cornco-scleral button. Central method of analysis was used to determine cell density. The quantitative and qualitative analysis of the endothelial cells was performed with the help of the following parameters. Mean cell density (CD) and standard deviation of the mean cell area (SD) were assessed for quantitative analysis.

Cell morphology was assessed by co-efficient of variation (CV) and percentage of hexagonal (HEX) cells. On the basis of these values, the final grading was assigned to the tissue with the help of the following criteria.

The final grading and the subsequent utilization of tissues for various transplant surgeries was then analysed with regard to the influence with the age of donor, lens status of donor eye, death to enucleation time and enucleation to preservation time.

Table 1. Endothelial cell count (cells/mm^2)

Cell Density (cell/mm2)	Grading
>3000	Excellent
2501-3000	Very Good
1801-2500	Good
1201-1800	Fair
<=1200	Poor

3 | OBESERVATIONS AND RESULTS

Enothelial cell analysis in relation to age of donor

Our study consisted of 63 eyes. The youngest eye 19 years old and the oldest one was 84 years old. Majority of eyes were from 61-80 years (47.6%) and 41-60 years (38%) of age.

Endothelial cell count (cells/mm^2) in different age groups is demonstrated numerically in Table-1 and Chart-1. The morphological quality of endothelial cells (CV & HEX as percentage) in different age group is shown in **Table-2 and Chart-2.1 & Chart-2.2**

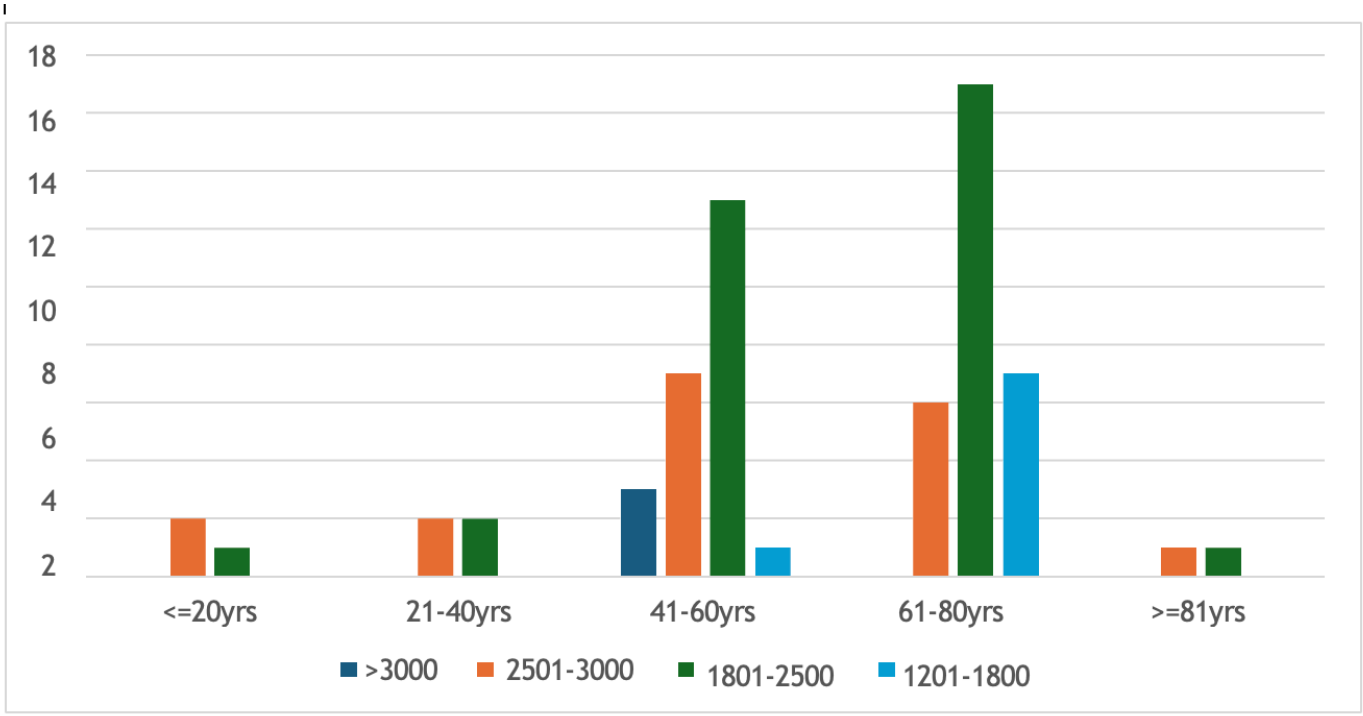


Fig. 1: No of donorshaving different endothelial cell count in different age groups

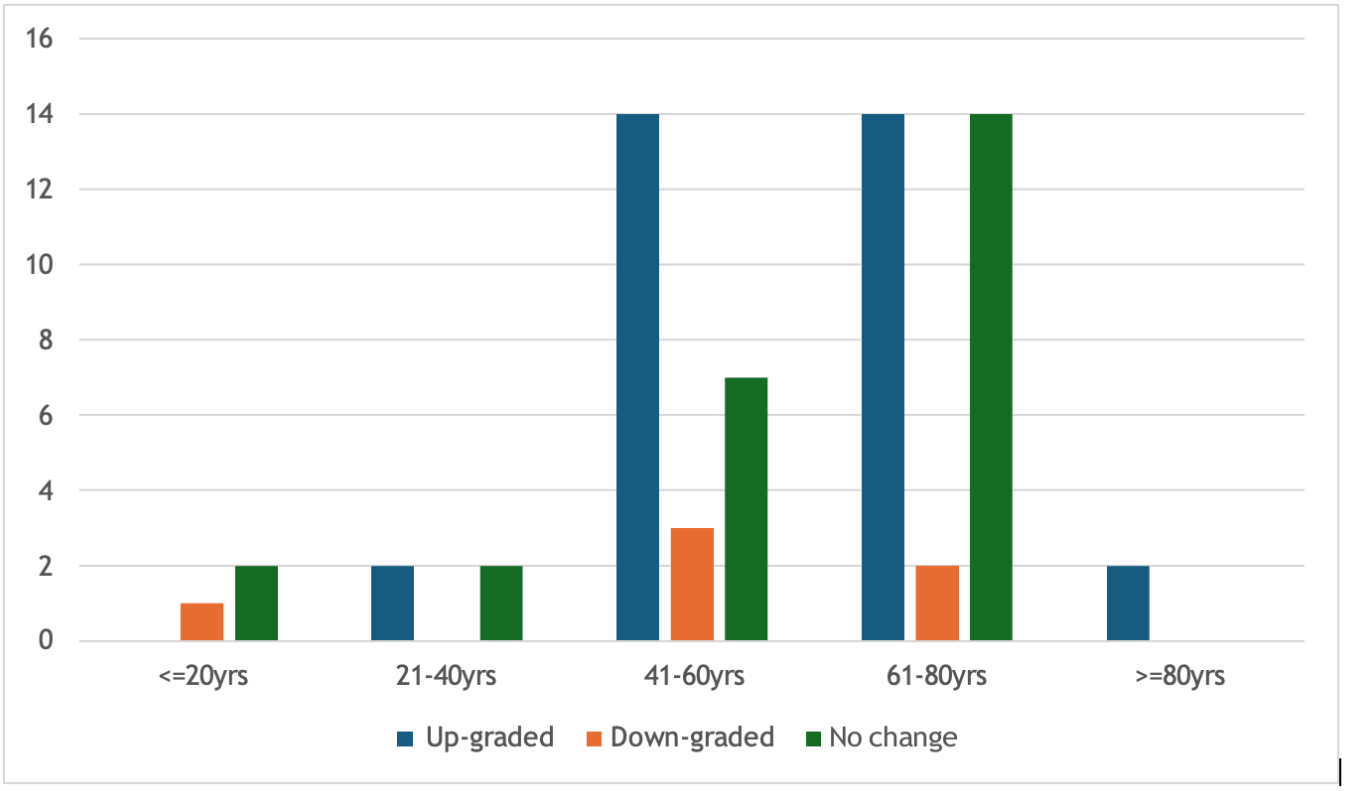


Fig. 2: No of donorshaving different endothelial cell count in different age groups

Table 2. Endothelial cell morphology criteria in different age groups.

Age Groups (years)	Eyes with endothelial cell count >3000 (c/mm^2)	2501-3000 (c/mm^2)	1801-2500 (c/mm^2)	1201-1800 (c/mm^2)	Total Eyes
<=20	0	2	1	0	3
21-40	0	2	2	0	4
41-60	3	7	13	1	24
61-80	0	6	17	7	30
>=80	0	1	1	0	2
Total Eyes	3	18	34	8	63

yes with different endothelial cell count in different age groups

Above results shows that out of 3 tissues with <= 20 years of age,2(66.66%) tissues had CD between 2501-3000 cells/mm^2 and 1(43.44%) tissue had CD between 1801-2500 cells/mm^2. Though there were no eyes in the 1201-1800 cells/mm^2 range, the findings show that even younger age donor corneas may have cell density below 2500 cells/mm^2.No of donor shaving different endothelial cell count in different age groups

Table 3. Change in clinical tissue grading in different age groups

Age Groups (years)	Endothelial cell morphology Eyes with CV <=40%	>40%	Eyes with HEX <=50%	>50%
<=20	0	2	2	1
21-40	0	4	4	0
41-60	8	16	19	5
61-80	9	21	13	17
>=80	1	1	0	2
Total Eyes	18	45	38	25

Table 4. Eyes with different endothelial cell density in tissues with different DTET

Age Groups (years)	Eyes with change in clinical grading Up-graded	Down-graded	Eyes with no change in clinical grading No change
<=20	0	1	2
21-40	2	0	2
41-60	14	3	7
61-80	14	2	14
>=80	2	0	0
Total Eyes	31	6	25

As we go towards the higher age groups, out of 24 eyes between 41-60 years of age, 13(54.16%) eyes had CD between 1801-2500 cells/mm^2. At the same time, 7(29.16%) eyes had CD of 2501-3000 cells/mm^2 and only 1(4.16%) eye had CD between 1201-1800 cells/mm^2.Out of 2 eyes from donor age >=81 years, 1(50%) eye was having CD between 1801-2500 cells/mm^2. However there was 1(50%) eye with CD between 2501-3000 cells/mm^2. Though the CV varies from 1 having <40% 1 having >40%, 2(100%) tissues showed good morphology with HEX >50%.By taking into consideration above specular microscopy findings and applying the modified criteria for grading as stated in 'methods and instrumentation', the tissue grading that changed from lower to higher grade after specular microscopy

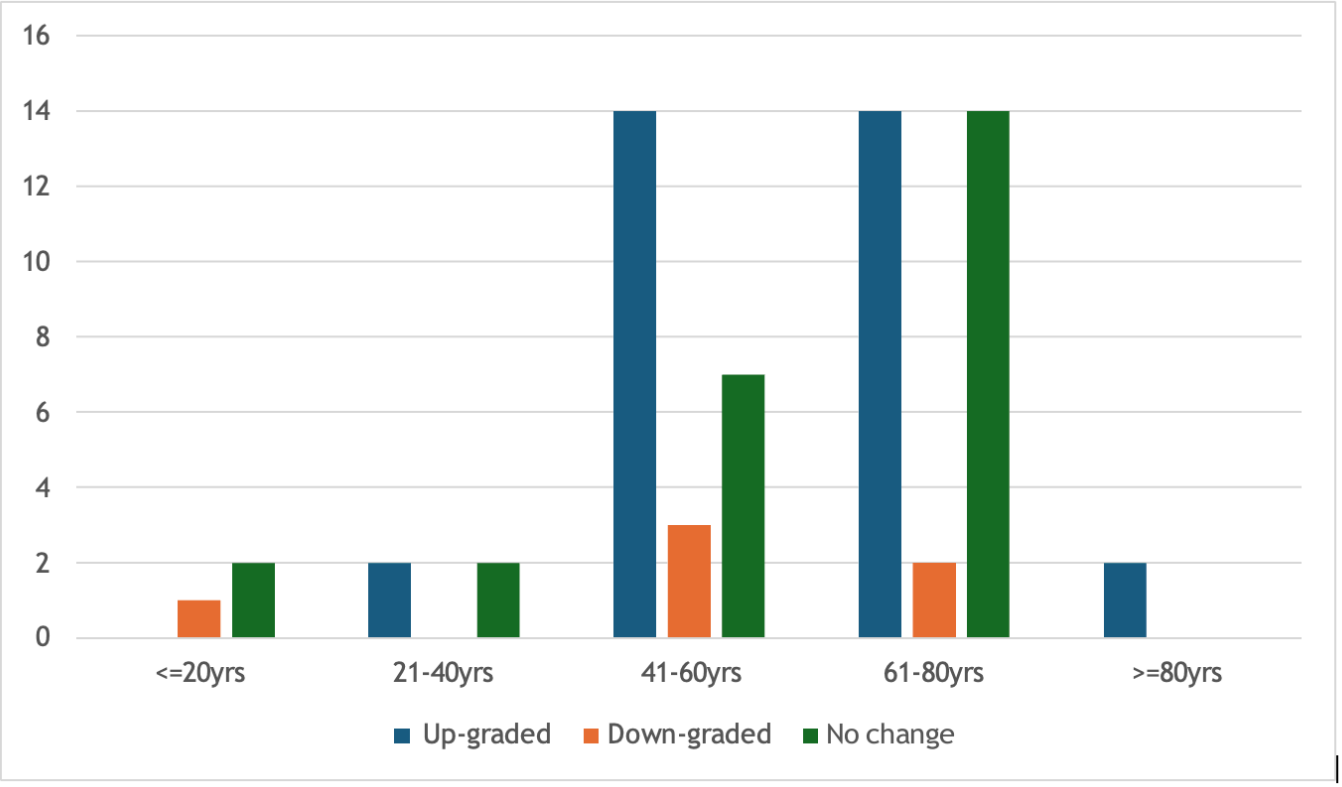


Fig. 3: No of donors in different age groups with change in final tissue grading

from its clinical grading (as done on slitlamp examination) is shown in **Table-3 and Chart-3.**

This reveals that out of 63 eyes there was change in tissue grading in 38(60.31%)eyes which is statistically significant (According unpaired T test $p<0.05$). Out of 38 tissues, 32 (84.21%) were up- graded and 6(15.79%) were down-graded from their clinical grading. Even in eyes with >-81 years 2 out of 2 tissues were up-graded.

3.1 | Endothelial cell analysis in relation to death to enucleation time (DTET)

Due to longer (more than 4 hours) death to enucleation time, general perception remains that the tissue may not remain good enough for optical or good prognosis transplantation. So, such tissues may not be used for optical or good prognosis transplantation or may be used for therapeutic penetrating keratoplasty. However whether the quality of donor cornea remains good or not also depends upon surrounding ambient environment at the time of death.so, it is worth debatable whether to do enucleation or defer it if death to enucleation time is more than 4 hours.

The endothelial cell density **(Table-4 and Chart-4)** and its morphology **(Table-5 and Chart-5 and Chart-6)** in relation to variable death to enucleation time as found on analysis of the 63 eyes that we stadied is analysed below.

This shows that 34(53.96%) eyes were enucleated 2 hours after death. Out of these, no tissues showed CD >3000 cells/mm^2, 10(15.87%) tissues showed CD 2501-3000 cells/mm^2, 19(30.15%) tissues showed CD 1801-2500 cells/mm'whereas 5(7.93%) tissues showedCD 1201-1800 cells/mm^2. 21(33.33%) eyes were enucleated within 2-4 hours-from death and in this group, 2 tissues showed CD <1800 cells/mm^2. Even 8(12.69%) eyes enucleated > 4 hours after death, showed a CD between 2501-3000 cells/mm^2.

Table 5. The endothelial cell Morphology

DTET (hrs)	Eyes with endothelial cell count >3000 (c/mm^2)	2501-3000 (c/mm^2)	1801-2500 (c/mm^2)	1201-1800 (c/mm^2)	Total Eyes
<=2	0	10	19	5	34
2-4	3	7	9	2	21
>=4	0	3	4	1	8
Total Eyes	3	20	32	8	63

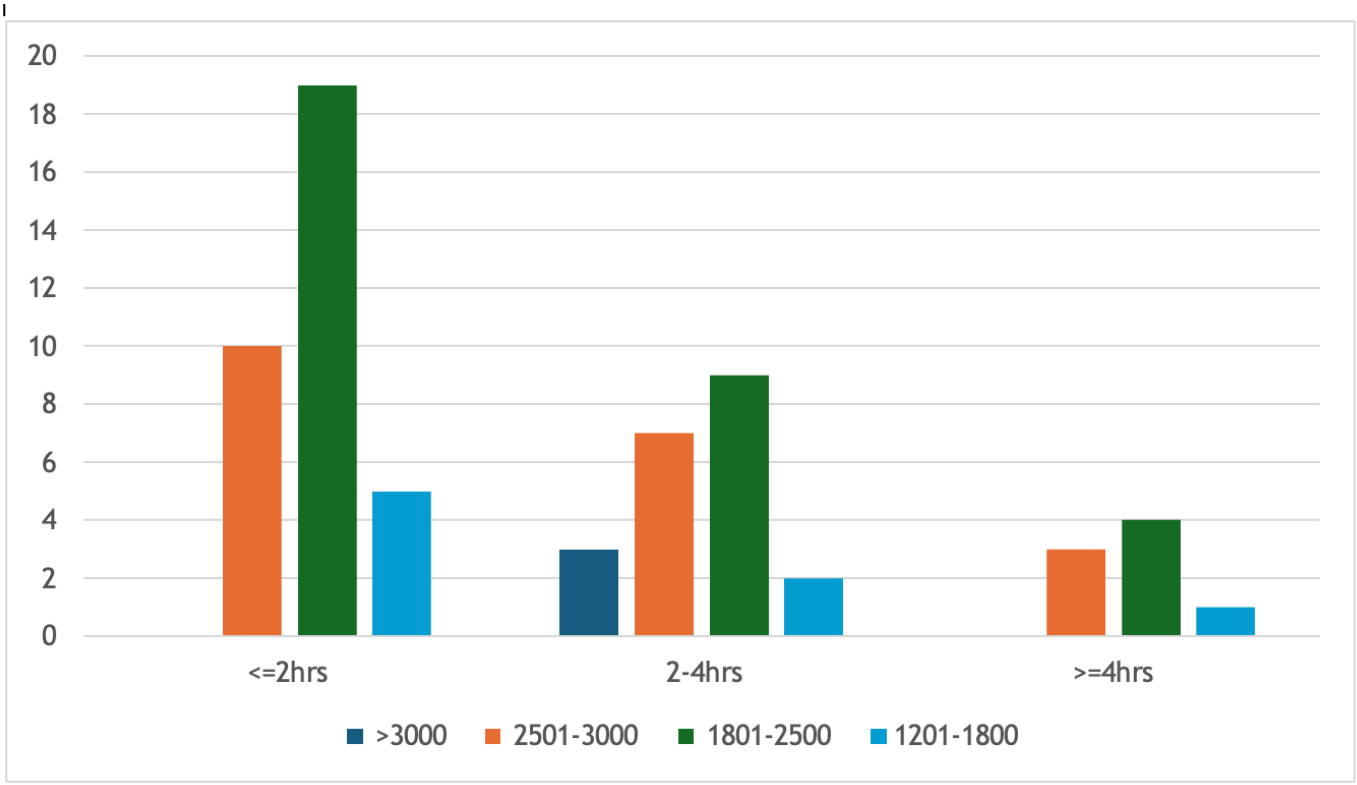


Fig. 4: No of donors with different endothelial cell density in variable DTET

3.2 | Endothelial cell analysis in relation to death to preservation time (DTPT)

Due to longer death to preservation time (DTPT), general perception remains that the tissue may not remain good enough for optical or good prognosis transplantation (irrespective of the death to enucleation time). So, such tissues may not be used for optical or good prognosis transplantation or may be used for therapeutic penetrating keratoplasty or experimental use.

Endothelial cell density **(Table-6 and Chart-7)** and its morphology **(Table-7 and Figure 8 (1 and 2)** in relation to death to preservation time are shown as below.

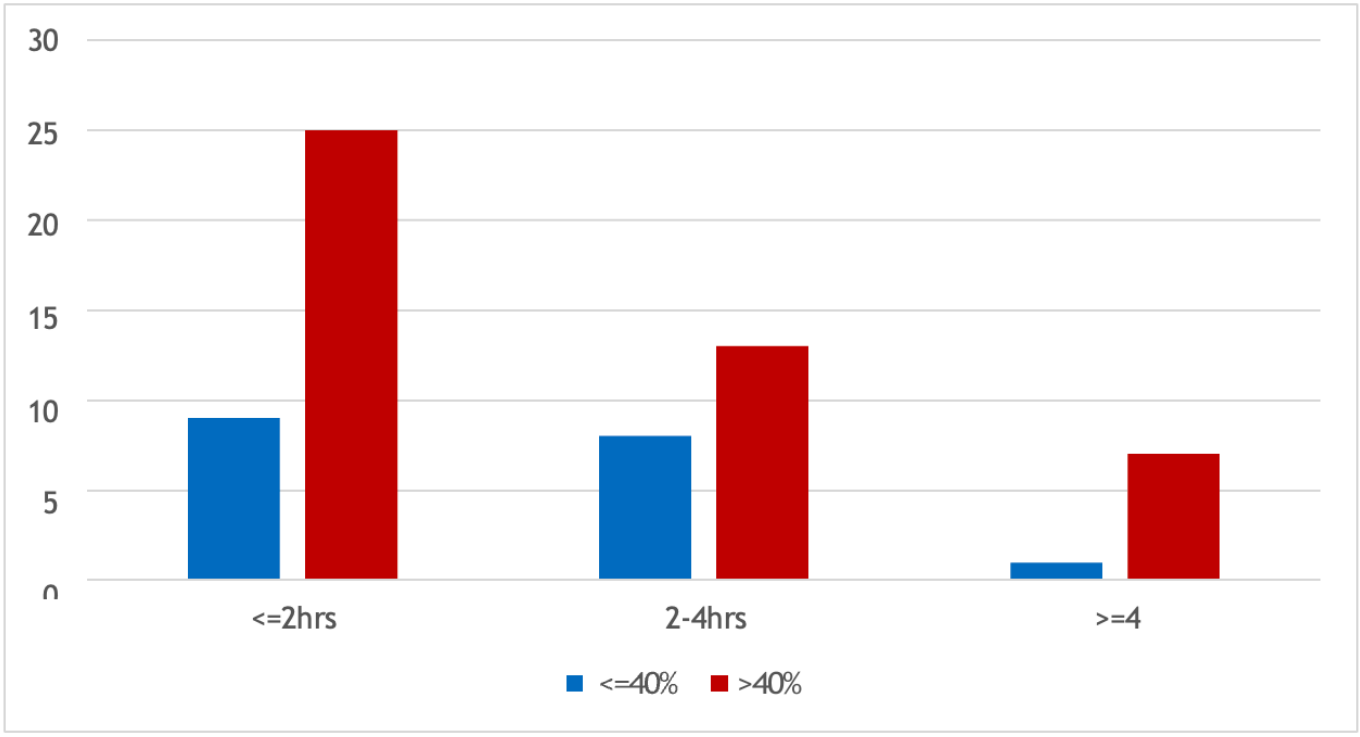


Fig. 5: No of donors with CV <=40% &>-40% in variable DTET

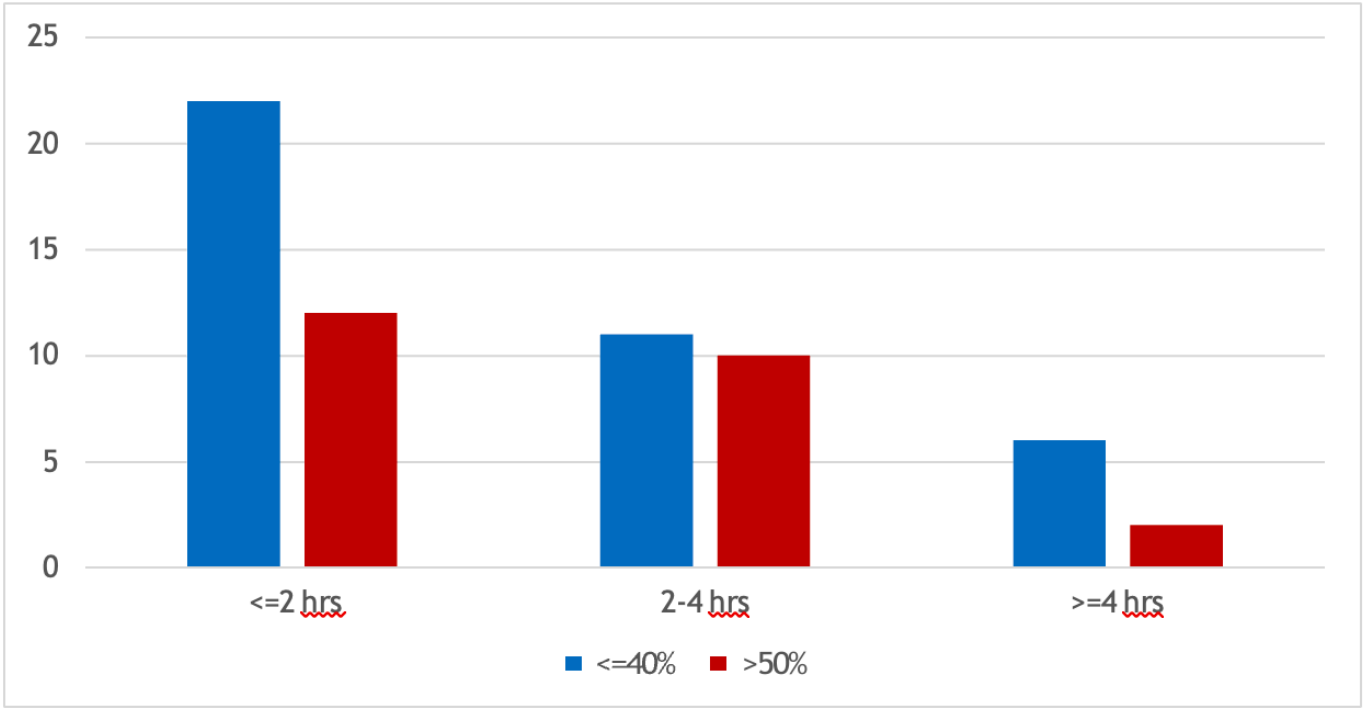


Fig. 6: No of donors with HEX <=50% &>50%/ in variable DTET

Table 6. Eyes with different endothelial cell density in tissues with different DTPT

DTPT (hrs)	Eyes with endothelial cell count				Total Eyes
	>3000 (c/mm^2)	2501-3000 (c/mm^2)	1801-2500 (c/mm^2)	1201-1800 (c/mm^2)	
<=6	2	11	24	5	42
6-11	0	2	8	3	13
11-14	1	4	2	0	7
>=14	0	1	0	0	1
Total Eyes	3	18	34	8	63

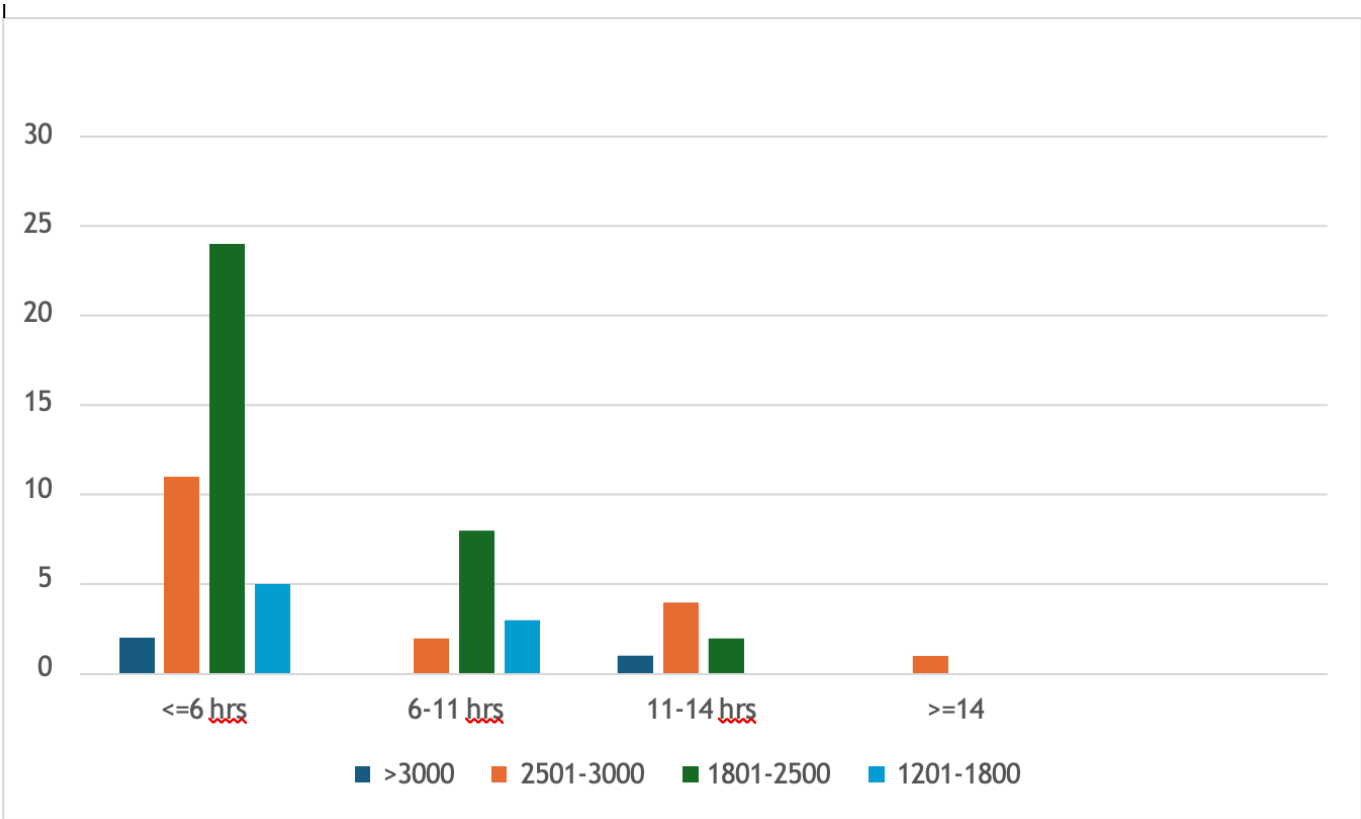
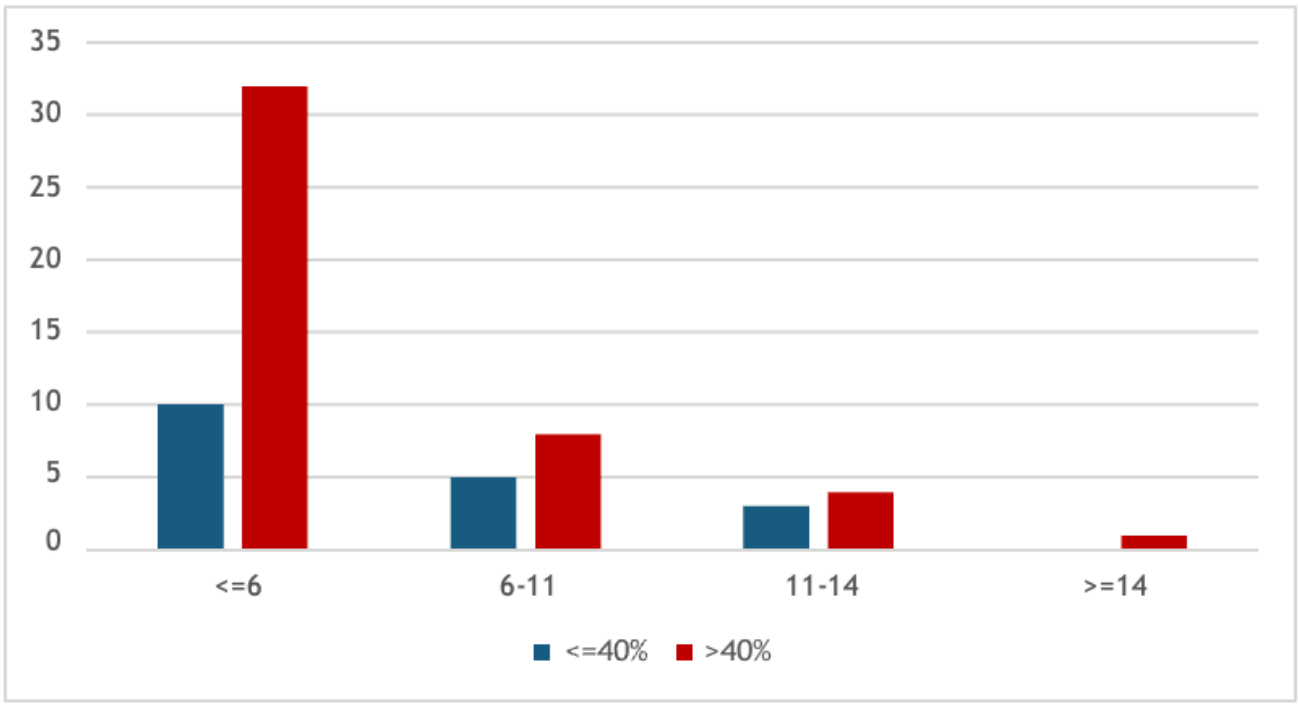


Fig. 7: No of donors with different endothelial cell density in variable DTPT

Above figures show that 42 (%) tissues had death to preservation time<=6 hours. Even with <-6 hours of DTPT, 5(7.93%) tissues amongst them showed CD between 1201-1800 cells/mm^2. 13(20.63%) tissues were preserved 7-11 hours after death. Out of them, 8(61.53%) showed CD 1891-2500 cells/mm^2, and 2(15.38%) tissues showed CD between 2501-3000cells/mm^2. One tissue with >=14hours of DTPT showed CD between 2501-3000cells/mm^2.

Table 7. Endothelial cell morphology in terms of CV & HEX with different DTPT

DTPT (hrs)	Endothelial cell morphology			
	Eyes with CV		Eyes with HEX	
	<=40%	>40%	<=50%	>50%
<=6	10	32	26	16
6-11	5	8	7	6
11-14	3	4	5	2
>=14	0	1	1	0
Total Eyes	1	62	39	24



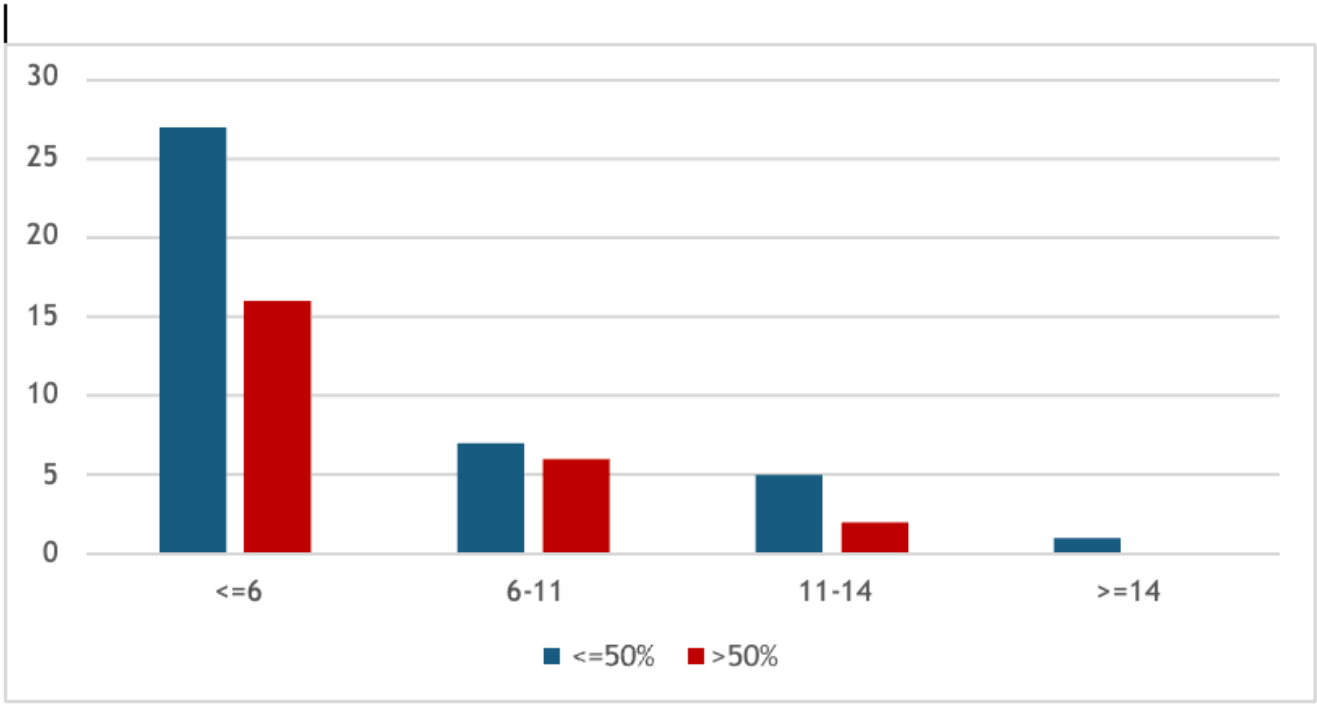


Fig. 8: 1. Distribution of donorshaving <-40% &>40% in variable DTPT 2. Distribution of donorshaving HEX<=50% &>50% in variable DTPT

3.3 | Endothelial cell analysis in relation to lens status of donor

Quantitative and qualitative assessment of endothelial cells as reflected by CD **(Table-8 and figure 9)** and CV and HEX respectively (**Table-9 and Figure 10 (1 and 2),** in phakic and pseudophakic eyes, was studied as below.

Table 8. Endothelial cell density in phakic & pseudophakic eyes

Endothelial cell Density(cells/mm2)	Phakic	Pseudophakic Eyes
>3000	3	0
2501-3000	12	6
1801-2500	17	17
1201-1800	4	4
<1200	0	0
Total Eyes	36	27

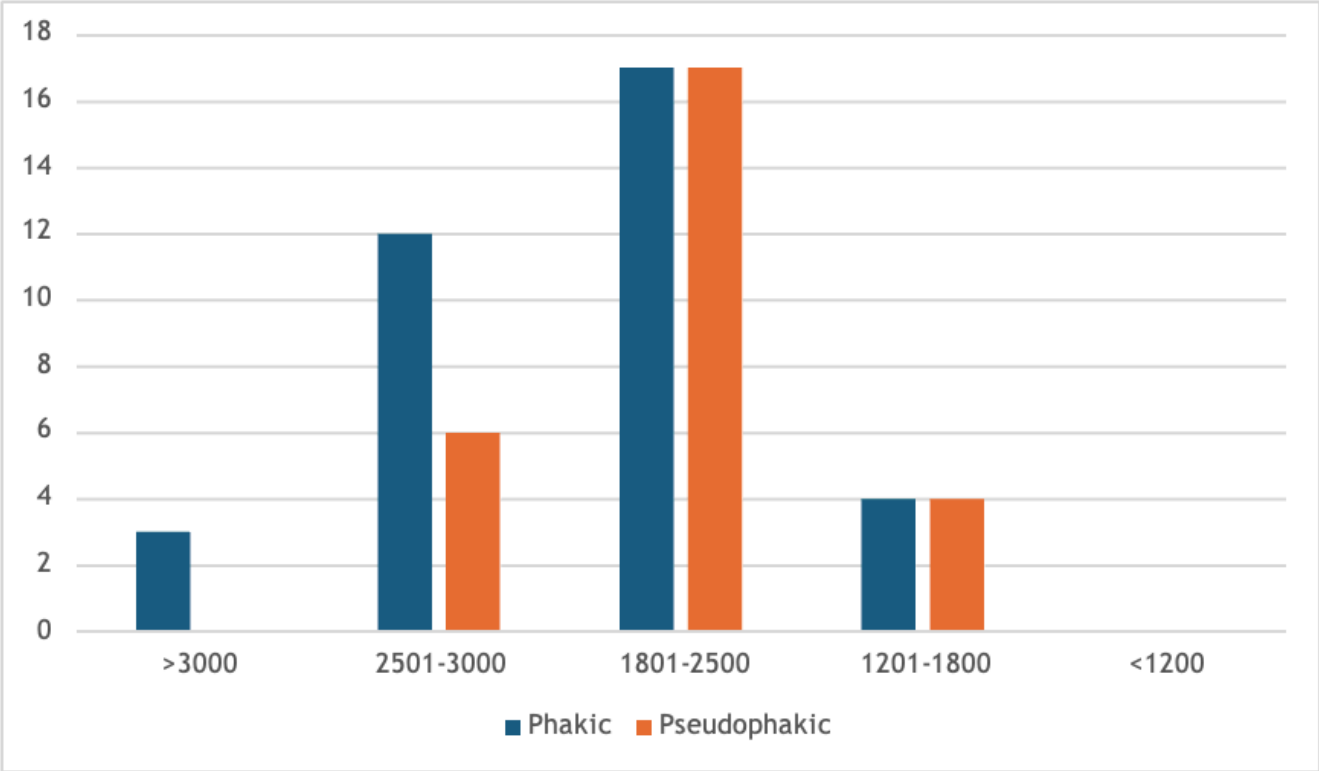


Fig. 9: No of donors with different endothelial cell density in phakic and pseudophakic eyes

As analysed, out of 36 eyes in the phakic group, 3(%) eyes showed CD >3000 cells/mm^{2}and none from the pseudophakic group showed CD >3000 cells/mm^2. There were 12(%) phakic eyes with CD between 2501-3000 cells/mm^2 and 17(%) phakic eyes showed CD 1801-2500 cells/mm^2. Out of 27 pseudophakic eyes, 6(%) showed CD between 2501-3000 cells/mm^2 17(%) showed CD 1801-2500 cells/mm^2, 4(%) tissues showed CD between 1201-1800 cells/mm^2 and none of pseudophakic eyes showed CD <1200 cells/mm^2.

Table 9. Endothelial cell morphology in phakic & pseudophakic eyes

Lens status	Endothelial cell morphology			
	Eyes with CV		Eyes with HEX	
	<=40%	>40%	<=50%	>50%
Phakic	10	26	22	14
Pseudophakic	7	20	17	10
Total Eyes	17	46	39	24

General perception, that the tissues from pseudophakic eyes may not have good endothelial morphology and density and should not be used for optical transplantation, is still its vogue in certain centers despite refinement in cataract management techniques over the years.

As analysed, there change in tissue grading in 38 eyes **(table-3 and chart 3, table 10 and chart 11)**

Table 10. Change in tissue grading in 38 eyes

Lens status	Eyes with change in clinical grading		Eyes with no change in clinical grading
	Up-graded	Down-graded	No change
Phakic	18	3	15
Pseudophakic	14	3	10
Total Eyes	32	6	25

As shown above, out of 38 tissues with change in final grading. 14 pseudophakic and 18 phakic eyes were upgraded and 3 pseudophakic and 3 phakic eyes were downgraded.

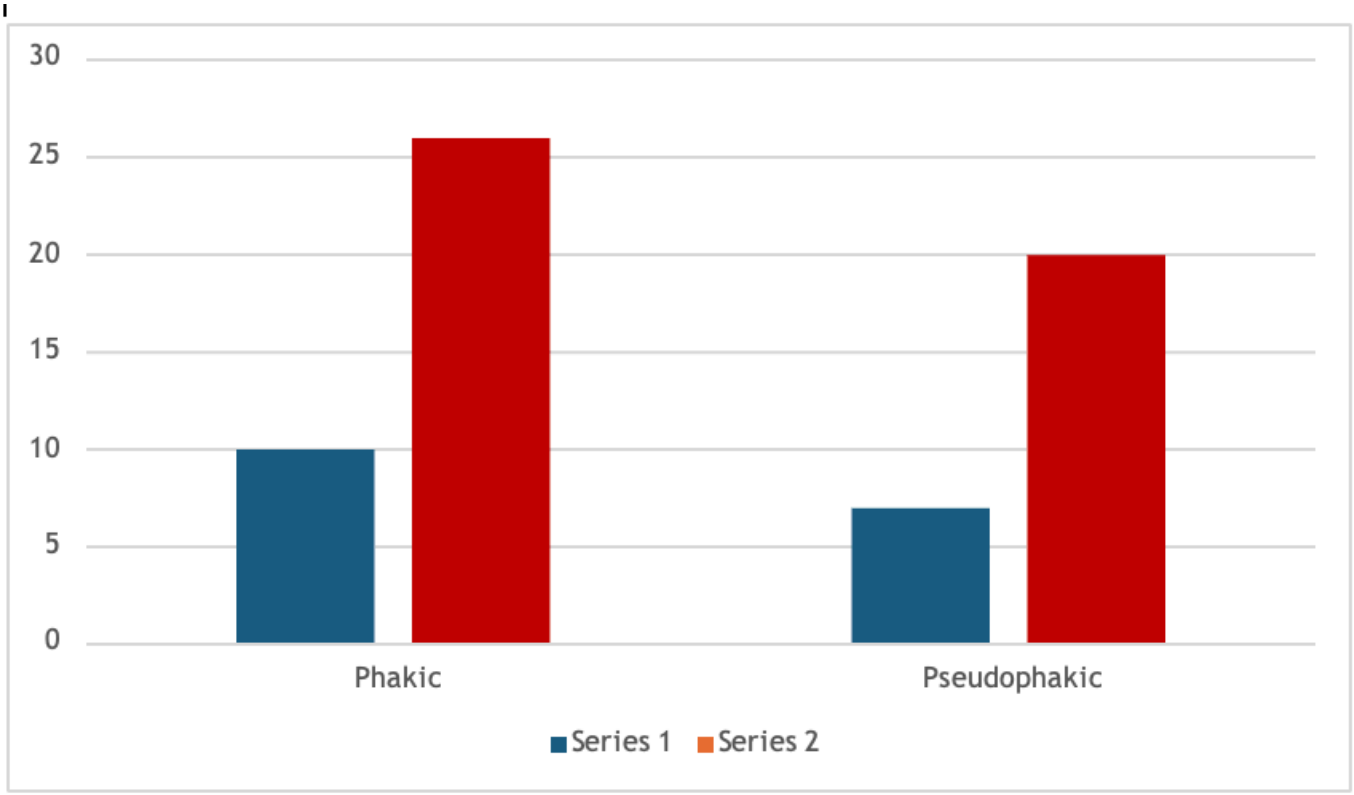
4 | DISCCUSION

In our study there were 30 tissues between 61-80 years. Out of these, only 7(23.33%) showed CD between 120)-1800 cells/mm^2, out of which two tissues with CD 1675 celts/mm'were clinically graded as good having a HEX 61% and CV 57%, and were utilised for penetrating keratoplasty. One with CD 1443 cells/mm^2, CV 71% & HEX 47% was clinically graded as good had to be changed in grading to poor & was utilised for therapeutic penetrating keratoplasty. Out of 6 tissues with CD between 2501-3000 cells/mm 2 tissues were used for optical penetrating keratoplasty because of had low CV and high HEX, 3 tissues were utilised for therapeutic penetrating keratoplasty because of high CV and low HEX.In age group 41-60 years 14(22.22%) tissues showed upgrading from their clinical grade & out of these, 6 were used for optical penetrating keratoplasty, 3 were used for DSEK, I was used in cosmetic penetrating keratoplasty, I was used for therapeutic penetrating keratoplasty and I was used for therapeutic penetrating koratoplasty with cataract extraction surgery.Between 61-80 years of age 2(3.17%) tissues showed change in grading from good to very good. Out of these, one was used for descement's stripping endothelial keratoplasty, one for optical penetrating keratoplasty.

Mattern RM et al (1995) studied how frequently specular microscopy results affect the outcome of eye bank judgment as to the transplantability of donor corneas. In his study it was found that there were no cell count <2000 cells/mm^2 for any donor age <40 years. Above age 40 years, the percentage of cell counts <2000 cells/mm^2 ranges from 3.9% for donor in their fourties& 6% for donors in their seventies. For donors aged above 40 years, specular micrioscopy

criteria were used to rule out unacceptable tissues. His study shows that corneas from donor over age 69 years were initially presumed to be unacceptable for transplant and that routine specular microscopic examination helped to clear transplant of 31 comcas from donors of this group (12)

Study by Chow et at1995) showed that large numbers



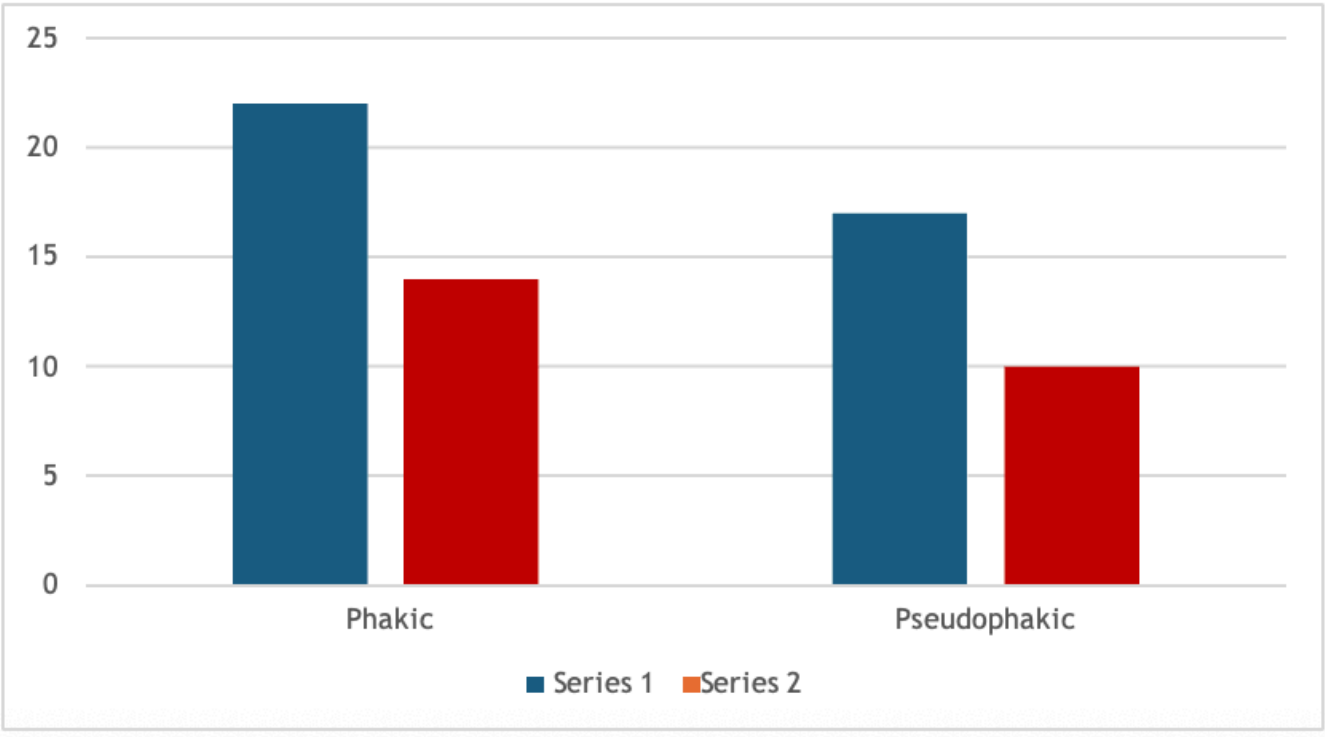


Fig. 10: 1. Distribution of donors with CV <-40% &>40% in phakic & pseudophakic eyes 2. Distribution of donors with HEX -50% &>50% in phakic & pseudophakic eyes

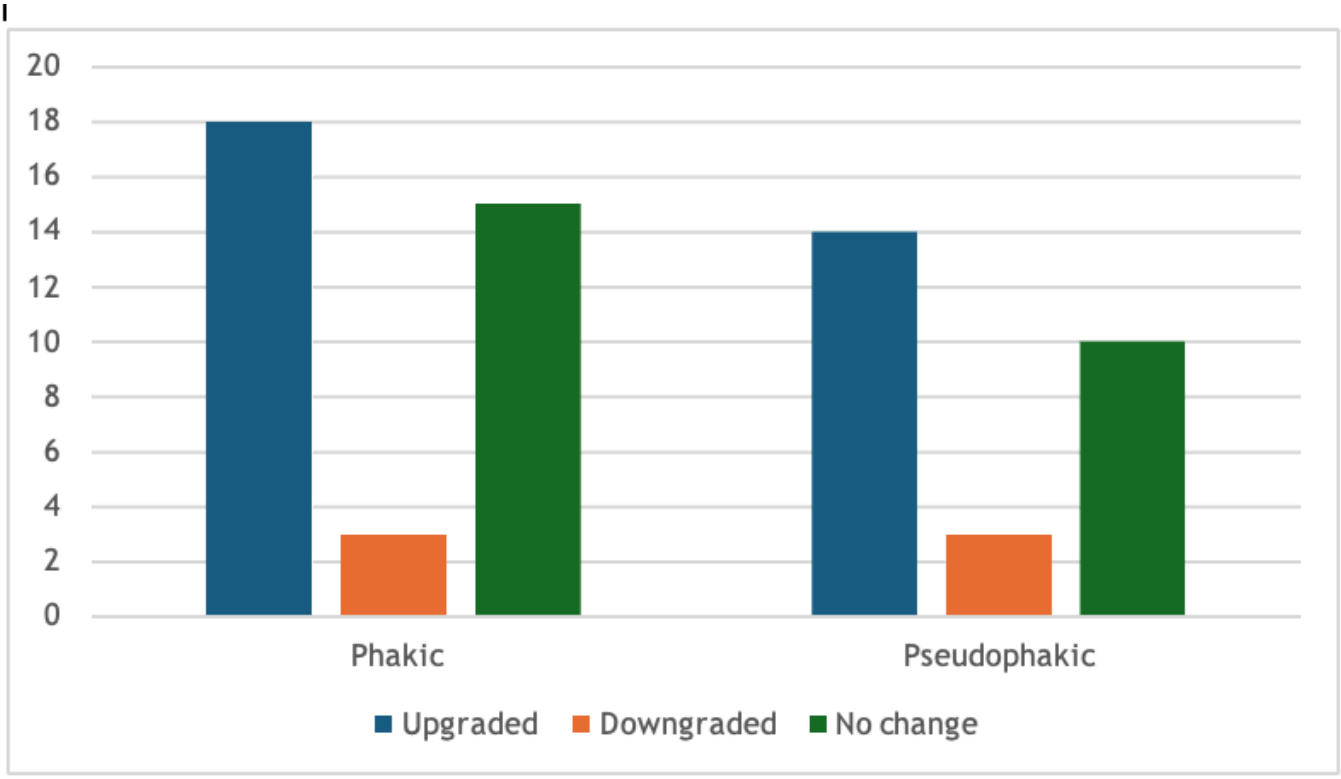


Fig. 11: No of donors with phakic & pseudophakic eyes showing change in final grading

of corneas from donors over age of 65 years can be used successfully to restore vision by doing quantitative and qualitative assessment of comes by specular microscopy. (13)

In our study, the tissues were preserved in M-K medium. After doing specular microscopy we found 2(3.17%) tissues from age 81 years age group were having endothelial count between 1801-3000 celis/mm^2 and both of them were used for transplantation in relatively age match patients. And in our country sizeable number of patients which require therapeutic there penetrating keratoplasty & tectonic penetrating keratoplasty.

Gain Pet al (2002) studied the suitability of corneas from very old donors for graft afler organ culture and their clinical and endothelial outcomes in recipients aller penetrating keratoplasty. Study showed that no statistically significant difference found in overall suitability for transplantation between two groups of donors with <85 years and 85 years, but elimination for low endothelial density was more frequent in donor with >85 years. In addition, this study also reports that there no co-relation between donor-receiver age and cornea from donors with 85 years were slightly more frequently allotted to younger receiver. (14)

In our study out of 7 tissues from younger age donors (<-40 years), 3(42.85%) tissues showed CD between 1801-2500 cells/mm^2 and out of 32 tissues from older aged (>60 years) donors, 17(53.12%) tissues showed CD 1801-2500 cells/mm^2. This shows that younger aged donor may have density below 2500 cells/mm^2 and older aged donors may show better values on evaluation.

Farias RJ et al (2007) had evaluated203 corneas sed showed that younger aged donor had significantly better evaluation then older aged donors. (15)

Only on the basis of slitlamp examination (and at some places only on torch light examination) and donor's age criteria, the tissue with higher age group have been, in general, considered by many eye banks and transplant centers as useful for only therapeutic and tectonic transplantation. Significant no of such tissues which are not being subjected to specular microscope examination may not be utilised for better prognosis transplantation due to lack of proper analysis.

This shows that very meticulous application of quantitative and qualitative criteria of routine specular microscopic examination makes a difference to proper utilisation of tissues.

In our study out of 63 eyes 8(12.69%) eyes were enucleated more than 4hours after death. 3 tissues showed CD between 2501-3000cells/mm^2 and all of them were used for penetrating keratoplasty, and Tissues showed CD between 1801-2500cells/mm^2, amongst them 3 were used for penetrating keratoplasty

In contrast with what was seen by Grabska-Liberek et al in their study, in our study there were 3(4.76%) eyes with DTET 4 hours and yet all of them showed CD>2500cells/mm^2. Out of these one was used for optical penetrating keratoplasty.

Grabska- Liberek et al (2003) (5) showed that overall rating of the tissues which were obtained in a very short time after death (to Shrs) was higher as compared with corneas removed 8-12hours after donor's death. (16)

This showed that after doing specular microscopy and assessing endothelial cell morphology, overall rating of the tissues which were obtain even at longer time after death (>4 hours) was found to be good.

In our study, we had no difficuhy in endothefist cell analysis by specular croscopy in Hasues with longer DTPT. There were 1(1.58%) tissue with DTPT ofurs. This tissue showed CD betwem 2501-3000cells/mm^2 was used for optical penetrating keratoplasty.

There were 7(11.11%) tissues with 11-14hrs of DTPT out of these 7 tissues, 3 wereused for descernment's stripping with endothelial keratoplasty, 3 for optical penetrating keratoplasty and I was used for therapeutic penetrating keratoplasty.

General perception has been that longer the death to preservation time poorer will be the tissue quality, Cernak M (2002) studied the vitality of the endothelium in relation to the death to preservation time. If the vitality of the endothelium is poor, the corneal edema persists at room temperature. His study showed that comeas with longer than 10 hus of DTPT require longer time at room temperature to get rid of edema and on specular microscopic evaluation it was very difficult to find a group of endothelial cell for evaluation and such tistues are less suitable or unsuitable for transplantation. (17)

This shows that without use of specular microscopy there may be wastage of reasonable poot of good quality tissues if they were utilized only on the basis of our assumption regarding DTPT and the clinical grading.

In our study out of 27 pseudophakic tissues (table 8, chart 8), 17(62.69%) listurs showed CD between 1801-2500cells/mm^{2}with good cell morphology Among these tissues, 3 were used for optical penetrating kerstoplasty, 1 was used for descemet's stripping with endothelial keratoplasty, I was used for triple (penetrating keratoplasty with cataract extraction) surgery, 5 for therapeutic penetrating keratoplasty, I for therapeutic penetrating keratoplasty with cataract extraction. I tissue used for

As we know, as compared to cataract surgeries done in older era, to advances in amicresurgical teclniques and use of viscosurgical protective devices for the endothelium, there will be less endothelial cell damage during the cataract surgery when done with proper precaution. The advantage of these advances can be carried forward in-to improving the utility of tissues by doing specular microscopy, whereby, even pseudophakic eyes can be found to have good cell quality and quantity and can be used for good prognosis transplantation.

Probst IE et al (1997) studied the quality of donor corneal tissues in >75 years age group. Study showed that 17 of 35 phakic eyes that age group were suitable for transplantation and none of 15 pseudophakic eyes was found suitable for transplantation (18, 19)

5 | CONCLUSION

Very meticulous application of the quantitative criteria of the donor corneal endothelial cells as analysed by specular microscopy shows significant change (60.31%) in final grading of the tissues.

Majority of the tissues were up graded (84.21%), which led to its utilisation in transplantation.

Supplies of quality donor corneas continue to lag behind the demand which appears to be partly due to the custom in many centers to use only tissues from younger donors, tissues with very short death

time to enucleation time and death time to preservation time, tissues with phakic status of eyes and those with excellent to good bio-microscopic grading.

In our study, it was found that the Eye Rank Specular Microscopy can Significant alter the final grading of tissues and cause a vital different in its subsequent utilization for various transplant surgeries.

In reality there exists a sizable pool of the good quality tissues amongst the available tissues which with improved evaluation techniques can add to the supply of available corneas.

Thus for an eye bank, the eye bank specular microscope by providing variable quantitative and qualitative data becomes an indispensable tool for optimizing the availability of tissues for surgery and should be made mandatory analysis in all banks.

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