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Al-Shifa Journal of Ophthalmology

A Journal of
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EDITORIAL

Teleophthalmology and use of Artificial Intelligence in Ophthalmic Care

Ume Sughra

Telemedicine means ‘medicine from afar’ using a Greek prefix ‘tele’ meaning ‘from a distance’. The demand for telemedicine has suddenly boosted after the world was hit by Covid-19 pandemic. It has been used in a wide range of medical illnesses but eye care is probably the most benefitted one from telemedicine. Ophthalmology has a great potential to be benefitted by the technological advancements right from the remote evaluation to monitoring of patients for their illnesses. All these new ophthalmic care tools have their own utility, effectiveness and challenges towards their facilitation and implementation with artificial intelligence.[1]There is a wide spectrum of eye diseases which can be benefitted from telemedicine during health emergencies, disasters and pandemics.

Teleophthalmology is a subsection of telemedicine involving tools like smartphones, wireless devices, strong hardware, remote video tools and other telecommunication tools with applications of artificial intelligence. Applications of AI and devices provide great opportunity for eye diseases which need to be diagnosed early for prompt management, early referrals, self-monitoring, evaluation and prevention of complications. Diseases of Retina like wet age-related macular degeneration, diabetic retinopathy, retinopathy of prematurity and glaucoma can be easily diagnosed and monitored by using these AI applications.[2]

There are two different methods used in teleophthalmology for data recording, synchronous and asynchronous. In synchronous method eye photograph is taken on video calling, immediate diagnosis and counselling is done and data is recorded. While in asynchronous method eye photograph is taken followed by file uploading, consulting and delayed diagnosis and recording is done. Time difference is huge among these two methods for diagnosis and consultation although both are recording the data.[3]

In conclusion ever since there is provision of healthcare from the distance, teleophthalmology has been in the limelight of modern medicine which got further triggered by pandemic. No doubt teleophthalmology practices are important in remote rural areas, poorly resourced areas and also areas where accessibility to healthcare services is a challenge. However, there are few concerns which must be addressed and kept in mind. It can seriously affect the doctor-patient relationship and immediacy of the procedures. Also, thorough trainings are required to get familiar with the technology both for the healthcare professional and for the patients.

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ORIGINAL ARTICLE

Images of Defaced Ocular Anatomy and Malignant Blood Disorders: An Evaluation of Inter-Relationship

Muhammad Yousuf Khoso[1], Raja Faisal Zulfiqar[2], Sadia Sundus[3], Raheela Adil[2], Sayed Liaquat Ali[4], Tazeen Kohari[5]

Abstract:

Objectives: To document spectrum of fundoscopic ocular findings and their association with malignant blood disorders in order to develop better diagnosis and treatment guidelines.

Methods: From March 2022 to February 2023, this study was conducted by joint effort of ophthalmology and hematology departments of Sheikh Zayed Hospital and RYK Hospital & Medical College. Participants with leukemia, lymphoma and multiple myeloma were included in study. Detailed eye examination and extensive hematological assessments were performed for every participant.

Results: The retrospective observational study included 90 cases of malignant blood disorders. In 86.66% cases, ophthalmic pathologies of sub-conjunctival hemorrhage, intra-retinal hemorrhage, cotton wool spots and retinal detachment were observed. Most dominant malignant blood disorder was acute lymphocytic leukemia having 35.55% cases, acute and chronic myeloid leukemia both had equal number of cases, 20.00% each. Anterior segment was involved in 12.22% of cases. Posterior segment was involved in 74.44% of the cases. Multivariable logistic regression analysis to assess the association between hematologic parameters and presence of ophthalmic findings revealed that total white cell count (TWCC) ($p = 0.031$) and total thrombocyte count (TTC) ($p = 0.046$) had statistically significant correlation with ocular pathologies.

Conclusion: The results suggest that retina is often directly or indirectly affected by malignant blood disorders, most common pathology being intra-retinal hemorrhage. In light of present study, it's evident to conduct an eye examination as a compulsory part of initial diagnosis for malignant hematologic conditions and to continue these checks regularly to identify any ophthalmic pathologies. *Al-Shifa Journal of Ophthalmology 2024; 20(4): 130-137.*

1. *Al-Tibri Medical College Karachi.*
2. *RYK Medical College Rahim Yar Khan.*
3. *Liaquat College of Medicine &Dentistry Karachi.*
4. *Shahida Islam Medical and Dental College Lodhran.*
5. *Mohi-ud-din Islamic Medical College AK.*

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Correspondence to:
Tazeen Kohari
Mohi-ud-din Islamic Medical College AK.
jahkhurram0@gmail.com

Introduction:

Pathologies of the erythrocyte, leukocyte, platelet, and illnesses of the coagulation and plasma proteins are all considered hematologic pathologies.[1] The terms leukemia, lymphoma and myeloma refer to malignant blood disorders which affect different cell types.[2] After almost thirty years, the hematologic malignancy that Thomas Hodgkin initially described in 1832 was dubbed Hodgkin disease in his honor.[3] Malignant hematopoietic diseases may reveal themselves as ocular symptoms due to direct invasion of ophthalmic tissues or indirect ophthalmic involvement linked to hematologic malignancies or therapeutic side effects.[4]The central nervous system (CNS) may be involved in intra-ophthalmic, adnexal, orbital tissue or

neuro-ophthalmic manifestations. Liebreich was the first to report leukemic retinopathy, the most clinically evident of all the ophthalmic symptoms in the 1860s.[5]Primary leukemic infiltrates can cause proptosis, optic nerve infiltration, cranial nerve palsy and choroidal infiltration. The majority of ophthalmic findings in lymphomas arise from direct infiltration of the orbit or intra-ophthalmic tissue. These pathologies appear as vasculitis, retinitis, uveitis, or conjunctival mass.[6]Through extra-medullary plasmacytoma or direct infiltration, multiple myeloma affects the orbital and ophthalmic tissue, resulting in symptoms such as proptosis, pressure exerting mass tumors, pathological corneal accumulations and cysts of ciliary body. Hyperviscosity syndrome of multiple myeloma, which is brought on by increased monoclonal immunoglobulins can cause retinopathy, retinal micro-aneurysm, infiltration of choroidal layer, and venous occlusion of retina is another pathogenic pathway of ophthalmic involvement.[7]Ophthalmic findings frequently correspond with the advancement of the disease, but they can also frequently be the earliest indication of an underlying malignant blood disorder and appear before systemic pathologies do.[8]Eye symptoms can also represent as single, focused recurrent appearing pathology following full recovery from systemic pathologies.[9] Therefore, a detailed ophthalmological evaluation is required for the diagnosis, recurrence, and prognosis of any patient diagnosed with malignant blood disorders.

Our research was concentrated on examining the range of ophthalmic findings linked with malignant blood disorders, as well as their relationship to different blood parameters. Malignant blood disorders often have systemic manifestations, and ocular signs can be an early indicator of underlying hematological malignancies. Identifying specific ocular signs associated with these disorders may aid in early diagnosis and prompt intervention, potentially improving patient outcomes. It can also help to improve clinician's ability to recognize these signs as part of a broader diagnostic workup. This may be particularly valuable for ophthalmologists and hematologists who observe patients with unexplained ocular symptoms, also study can contribute to more comprehensive treatment strategies that address both systemic and ocular health, ultimately supporting a more holistic approach to patient care.

Methodology:

This study is a retrospective observational study carried out in a Southern Punjab's tertiary care hospital's department of Ophthalmology and Hematology between March 2022 and February 2023. Prior to the study institutional ethical committee approval was secured (ERC/MBBS/SZMCH/02/2022/Ophthalmology). Prior to their enrollment in the study, each patient provided written informed consent. In case if the involved individuals were under the age of 18, parental/guardian consent was obtained. The study included all newly diagnosed and previously diagnosed (while receiving treatment) cases of leukemia, lymphoma, multiple myeloma, and plasma cell dyscrasia who visited the Department of Ophthalmology between March 2022 and February 2023. There was no limit of age and no gender exception. Participants in the study who had systemic conditions such as cardiovascular disease (CVD), diabetes, hypertension, autoimmune diseases, chronic liver disease (CLD), human immune deficiency virus (HIV) positive, cataracts or history of intra-ophthalmic surgery within previous six (6) months were excluded from the study.

To confirm the diagnosis of malignant blood disorders we evaluated the patients by taking complete picture of blood (CP), peripheral blood smear examination, biopsy examination of bone marrow,

histo/pathologic study and immunocytochemistry.[10] Brief history of demographic information was obtained and recorded for all patients. Best corrected visual acuity by using Snellen's chart was calculated and recorded. Detailed examination of anterior segment was performed with the help of slit lamp and eye movements in nine cardinal gazes were also examined. Intra-ophthalmic pressure to rule out glaucoma was assessed using applanation tonometer by Goldmann. 10% phenylephrine and 1% tropicamide mixture was used to obtain dilation of eyes in order to examine the fundus and retina. Posterior segment examination was performed with 78 D and indirect ophthalmoscope using 20 D adjusted fundoscope. Pictures of both anterior and posterior segment were taken for records and study purpose. Raosoft.Inc sample size calculator was used to calculate sample size as it is recommended for sample size greater than 30 samples.[11] With 95% confidence interval, a sample size of 90 patients was declared satisfactory.

Depending on the data, continuous variables were displayed as either the mean (± standard deviation) or the median. Statistical package for social sciences (SPSS-24) software version 24 by IBM was used. For statistical analysis one way analysis of variance (ANOVA) and Independent*t*-test were applied. P value of $\leq$ 0.05 was appraised as statistically significant. Multivariable logistic regression analysis was also performed after obtaining P values to find out any possible inter-relation among hematological parameters and ophthalmic findings of researched diseases.

Results:

Ninety (90) cases of malignant blood disorders, either newly diagnosed or undergoing treatment, were included in this study. The cases had an average age of 39.35 ± 17.44 years (range: 9–70 years). Age bracket of 19–35 years was most affected with maximum number of patients. Malignant blood disorders noted in frequency of order were leukemia (74 cases, 82.22%), lymphoma (08 cases, 8.88%), and multiple myeloma (8 cases, 8.88%) (Table No 1). Majority of cases were referrals from hematology department for ophthalmic assessment with a notable count of Eighty six (86) patients out of 90. The number of patients who directly visited the ophthalmology department prior to the diagnosis of malignant blood disorders was very minimal with a total count of four (4) patients out of ninety (90).

Table No 1: Association of malignant blood disorders and age groups

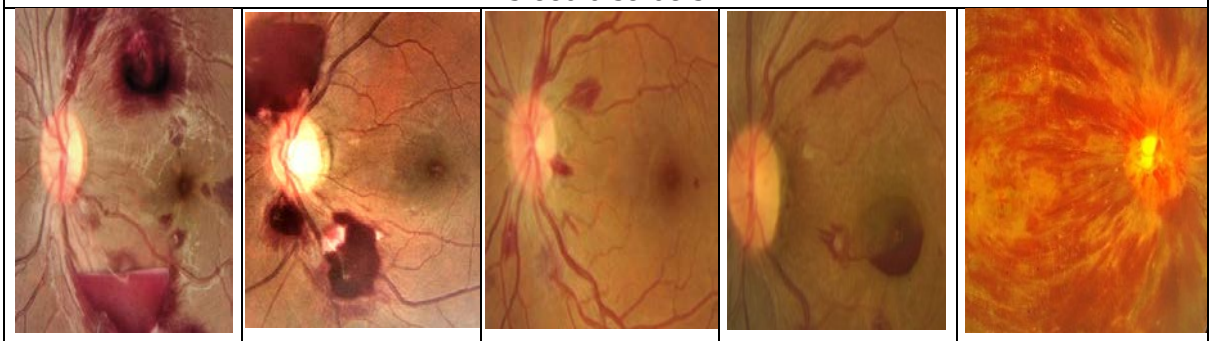
Age ranges	ALL (*n*=32)	CML (*n*=20)	AML (*n*=22)	Lymphoma (*n*=8)	MM (*n*=8)
<18 years	13 (40.62%)	0	4 (18.18%)	1 (12.50%)	0
19–35 years	13(40.62%)	11(55.00%)	11(50.00%)	4(50.00%)	1(12.50%)
36–55 years	6 (18.75%)	6 (30.00%)	7 (31.81%)	2 (25.00%)	5 (62.50%)
>56 years	0	3 (15.00%)	0	1 (12.50%)	2 (25.00%)

ALL: Acute lymphocytic leukemia; CML: chronic myeloid leukemia; AML: Acute myeloid leukemia; MM: Multiple myeloma

Images taken during the study provide a reasonably good idea of involvement of ocular tissue in malignant blood disorders. More or less all the malignant blood disorders showed similar pictures of variable intensity except Multiple Myeloma which showed numerous micro-bleeds and cotton wool spots.

(Figures (1) A, B, C, D & E)

Figure 1 (A,B,C,D & E) showing various ocular pathologies of fundus related to malignant blood disorders



A-Acute lymphocytic leukemia	B-Acute myeloid leukemia	C-Chronic myeloid leukemia	D- lymphoma	E- Multiple Myeloma

Figure A: Acute lymphocytic leukemia with massive intra-retinal hemorrhage.
Figure B: Acute myeloid leukemia with moderate intra-retinal hemorrhage.
Figure C: Chronic myeloid leukemia with moderate cotton wool spots.
Figure D: Lymphoma with mild cotton wool spots.
Figure E: Multiple myeloma with severe micro-bleeds and cotton wool spots.

Pathological findings in anterior segment were minimal around eleven (11) cases, nevertheless still not avoidable. With staggering number of pathological findings the posterior segment signs were dominant with around sixty seven (67) cases. Sub-conjuctival hemorrhage was found in eleven (11) cases in the examination of anterior segment. In decreasing frequency order the most frequent findings in posterior segment were intra-retinal hemorrhage thirty five (35) cases, at second we had pre-retinal hemorrhage sixteen (16) cases. (Table No 2- Malignant blood disorders and associated ophthalmic findings).

Table No 2: Malignant blood disorders and associated ophthalmic findings

Anterior segment					
Ophthalmic findings	ALL (n=32)	CML (n=20)	AML (n=22)	Lymphoma (n=8)	Multiple Myeloma(n=8)
Sub-conjuctivalHemorrhage	4	2	2	2	1
Normal	28	18	20	6	7
Posterior segment					
Intra-retinal Hemorrhage	13	9	10	1	2
Pre-retinal Hemorrhage	7	3	4	2	-
Cotton-wool spots	4	3	1	-	2
Retinal detachment Exudative	4	1	1	-	-
Normal	4	6	6	5	4

ALL: Acute lymphocytic leukemia; AML: Acute myeloid leukemia; CML: Chronic myeloidleukemia; MM: Multiple myeloma.

In order to find out any possible correlation among hematologic parameters of malignant blood disorders and ophthalmic pathologies we applied multivariable logistic regression analysis, the outcome variable for the multivariable logistic regression analysis was the presence of ocular pathology, coded as a binary variable (1 = presence of ocular pathology, 0 = absence of ocular pathology). This coding allowed for the examination of associations between various malignant blood disorders and the likelihood of ocular pathology, while adjusting for other covariates. Results demonstrated statistically significant correlation of total white cell count (TWCC) (p = 0.031) and total thrombocyte count (TTC) (p = 0.046) with ophthalmic pathologies (Table No 3). (Note: our dataset was not having large number of predictors/variables so we avoided univariate analysis).

Table No 3: Association of Hematological values with ophthalmic pathologies. (Multivariable logistic regression analysis)

Variables	Adjusted odds ratio (95% CI)	P- Value
TRBCC	0.39(0.15-1.10)	0.239
Hemoglobin	1.06(0.65-1.20)	0.700
TTC	0.994(0.980-0.995)	0.046
TWCC	1.065(1.002-1.002)	0.031

TRBCC: Total red blood cell count; TWCC: Total white blood cell count; TTC: Total thrombocyte count

Discussion:

In order to find a relation between malignant blood disorders and ophthalmic findings we thoroughly examined ninety (90) patients over the span of our research. The age distribution of the research population was 09–70 years old, with a mean (± SD) age of 39.35 ± 17.44 years, this is similar to the mean age of 39.73 ± 22.1 years and 41.62 ± 19.50 years that *Koshy J et al* and *Dhasmana R et al* reported respectively.[12,13]In agreement to the research by *Bukhari ZM et al.*, ours found that leukemia (ALL) and lymphoma were more common in younger age groups (<18 and 19-35 years of age), while multiple myeloma was primarily seen in 36-55 years of age.[14]According to our research, leukemia was the most common malignant blood disorder observed, with multiple myeloma and lymphoma following closely behind with similar frequencies, as reported by *Eze BI et al.*[15]In the current study, ophthalmic signs were present in 74.44% cases of malignant blood disorders, this is comparable to the 35.4% prevalence reported in a study by *Reddy SC et al* and the 43.8% prevalence reported in another study by *Bouazza M et al.*[16, 17]

It was observed that 67 cases (74.44%) had posterior segment ocular pathologies, whereas eleven (11) cases (12.22%) had anterior segment ocular pathologies. It was not uncommon to see multiple symptoms in one or both eyes. Acute leukemia was the most common cause of anterior segment symptoms.In 12.22% of cases,

there was anterior segment pathology of sub-conjunctival hemorrhage.In our study, posterior segment pathologies predominated, especially in leukemic subjects.We observed various pathologies, the most common of which were intra-retinal hemorrhages, pre-retinal hemorrhages and cotton-wool spots. Fairly identical observations were reported by *Rangel CM et al* in their study.[18] Increased total white cell count (TWCC) and decreased total thrombocyte count (TTC) values have been linked to an increased incidence of ophthalmic pathologies. Statistically both parameters showed significant p-value of(*p*-0.046) and (p-0.031) respectively. Hemoglobin's decreased mean value and decrease total red blood cell count (TRBCC) (p>0.05) showed no statistically significant association with development of ocular pathologies. Similar findings have been found in other studies, such as *Laimon DN et al.*'s study titled as "Highlights of ophthalmological manifestations in newly diagnosed acute leukemia: a correlation of hematologic parameters".[19] The most noticeable posterior segment pathologies of malignant blood disorders were retinal hemorrhages and cotton-wool spots. Cotton-wool spots appear when pre-capillary arterioles are blocked, causing retinal ischemia and retinal hemorrhages, which are linked to thrombocytopenia. This study has demonstrated that ophthalmic pathologies in patients of malignant blood disorders have significant correlation with decrease total thrombocyte count (TTC) and increased total white cell count (TWCC) and reasonably identical results were documented by *Thareja J et al.*[20]The blood parameters that were found to be significant predictors of ophthalmic manifestation on multivariable logistic regression analysis were total white cell count (TWCC) (with p-value of 0.031) and total thrombocyte count (TTC) (with p-value of 0.046). Adjusted odds ratio of multivariable logistic analysis revealed that chances of the occurrence of ophthalmic pathologies raised by 1.065 times (AOR: 1.065; 95% CI) with each unit (i.e. 1000/µL) rise in total white cell count (TWCC), on contrary the chances of the occurrence of ophthalmic pathologies declined by 0.35% (AOR: 0.994; 95% CI) with each unit (i.e. 1000/µL) rise in total thrombocyte count (TTC), these findings of present study are in agreement with *Soman S etal'*sstudy.[21]

Few limitations were noticed with current study, small demographic group was selected, even though this sample size was adequate but still a larger number of the cases would have produced more reliable results, this is a dual centeredhospital basedcross-sectional research and larger number of participating hospitals and health care providers would have provided benefit of more specific and reliable results. Severity or stage of diseases was not considered in this research and this may be considered as shortcoming of the research work.

Conclusion:

Present study demonstrates a strong association between malignant blood disorders and the prevalence of ocular pathologies, highlighting the importance of routine ophthalmologic evaluations in patients with these conditions. The findings suggest that early detection and management of ocular complications could play a critical role in improving the quality of life and outcomes for patients with malignant blood disorders. Further research is warranted to explore the underlying mechanisms and to establish clinical guidelines for integrating ophthalmologic assessments into standard care for this patient population.

Conflicts of interest: All authors declare no conflicts of interest.

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Lymphoid Blast Crisis of Chronic Myeloid Leukemia. Case Rep Ophthalmol. 2021 Jun 17;12 (2):555-561. doi: 10.1159/000516861.

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Authors Contribution
Concept and Design: Muhammad Yousuf Khoso
Data Collection / Assembly: Raja Faisal Zulfiqar
Drafting: Sadia Sundus
Statistical expertise: Raheela Adil, Sayed Liaquat Ali
Critical Revision: TazeenKohari

ORIGINAL ARTICLE

Analysis Of Corneal Endothelial Cells Post Pars Plana Vitrectomy And Silicon Oil Tamponade Treatment for Rhegmatogenous Retinal Detachment

Muhammad Hannan Jamil[1], Bilal Ashraf[2], Asmatullah Khan[3], Aneeb Ashraf[3], Nida Amin[4], Taha Sahar[4], Ferheen Shahbaz[5]

Abstract:

Objective: To examine the effects of pars plana vitrectomy (PPV) with silicone oil tamponade on corneal endothelial cell density in patients with rhegmatogenous retinal detachment (RRD).

Methods: The study was conducted at Ali Fatima Hospital in Lahore, Pakistan, 120 individuals with RRD diagnoses between the ages of 30 and 70 participated in a quasi-experimental design. Consecutive non-probability sampling was used. Pre- and post-PPV corneal endothelial cell density was assessed.

Results: There were notable differences in the quantity of corneal endothelial cells among the groups. Before surgery, no discernible changes were discovered. However, following surgery, there were significant differences in mean change between genders ($p = 0.001$) and age groups ($p < 0.0001$). The mean change between phakic and pseudophakic eyes varied significantly after surgery ($p < 0.0001$). The mean count was significantly different before and after surgery (-49.85 cells/mm2, $p = 0.005$).

Conclusion: This implies that PPV combined with silicone oil tamponade has a significant positive effect on the density of corneal endothelial cells. PPV combined with silicone oil tamponade has a good impact on RRD patients' corneal endothelial cell density. The mean change after surgery varied by gender and age, highlighting the significance of individualized treatment plans. *Al-Shifa Journal of Ophthalmology 2024; 20(4): 138-144.*

1. *Ali Fatima Hospital, Lahore.*
2. *LRBT Eye Hospital, Lahore.*
3. *Ali Fatima Hospital Lahore.*
4. *Green international university.*
5. *University of the Punjab*

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Correspondence to:
Ferheen Shahbaz
University of the Punjab.
ferheenshahbaz8@gmail.com

Introduction:

Retinal detachment is a serious disorder that threatens vision, with an annual frequency of 5 to 12 instances per 100,000 people.[1] The lifetime risk of getting this illness is approximately 0.6%, up to the age of 60. Although it is estimated that 6% of the general population have retinal fractures, the vast majority of these breaks are benign, atrophic, and cause no symptoms. These holes are not related to any pathology and do not result in retinal detachments.[2] The most common type of retinal detachment is rhegmatogenous retinal detachment (RRD), followed by tractional and exudative. This type of detachment occurs when fluid infiltrates beneath the retina through a hole in the neurosensory

retina.[3]The primary goal of retinal detachment treatment is to repair any retinal fractures and bring the sensory retina closer to the retinal pigment epithelium (RPE). The condition is often treated surgically in one of two ways. The first is exterior, sometimes known as standard. Scleral buckling is used in this method, which employs solid silicone material. It is recommended for cases with uncomplicated retinal detachment.[4] An alternate treatment for the problem is an internal operation that involves a vitrectomy and the use of silicone oil or long-acting gases. This technique is recommended for challenging cases of retinal detachment, such as grade C proliferative vitreoretinopathy (PVR),large retinal tears, choroidal coloboma, and ocular trauma. [5,6] Silicone oil is a common tamponade used during retinal detachment surgery. It is often left in the eye for at least three months before being removed, depending on the state of the posterior portion of the eye. However, the use of intraocular silicone oil has been associated with a number of problems.[7] Vitreoretinal surgery using silicone oil affects the corneal endothelium in both aphakic and pseudo-phakic individuals. Silicone oil is commercially available in compositions of 5000 and 1000 centistokes. Due to the decreased incidence of negative effects, 5000 centistoke silicone oil is now recommended. [8,9]

A recent study[10] recorded a loss in endothelial cells of the cornea of 30.48 ± 25.78 in phakic eyes and 77.52 ± 40.03 in pseudo-phakic eyes, indicating a substantial difference between the two groups. The findings of this study will provide vital information about the mean change in corneal endothelial cell density following PPV by analyzing a larger sample size and allowing comparisons between phakic and pseudo-phakic eyes. This information will be helpful to ophthalmologists as a primary reference when treating patients having rhegmatogenous retinal detachmen.[11]The purpose of the study is to determine the average change in endothelial cell density in the cornea after three months of pars plana vitrectomy with silicone oil tamponade in patients with rhegmatogenous type retinal detachment.

Methodology:

The study was carried out at the ophthalmology department of the Ali Fatima Hospital in Lahore, Pakistan from January 2022 to June 2023. The study employed a quasi-experimental design. A non-probability consecutive sampling technique was applied. A formula for determining sample size in a population when the predicted mean change is of interest was used to determine the sample size for the study. n=(E2Z2·σ2) formula was used for calculations with 95% of confidence interval. To accommodate any patient attrition or incomplete data, the sample size was rounded to 120. Thus, it was decided that 120 patients would be an adequate sample size for the study, yielding a 95% confidence level and a 5% margin of error. Patients between the ages of 30 and 70 who have been diagnosed with rhegmatogenous retinal detachment, are undergoing pars plana vitrectomy with silicone oil tamponade, and have either phakic or pseudo-phakic eyes are eligible for inclusion. Patients with tractional type retinal detachment, rhegmatogenous type retinal detachment, present corneal or retinal disease, and a history of ocular surgery other than cataract surgery were excluded. Before collecting data, informed consent was taken. A complete medical history and ophthalmic examinationwere done working under the guidance of a consultant ophthalmologist. Documented demographic information, such as age, gender, and status of the lens (phakic or pseudo-phakic). Finally, endothelial cell count using specular microscopy was obtained.

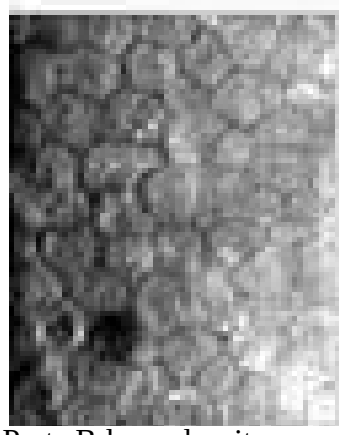
The surgeon and assistant starts with three sclerotomies to insert the vitrectomy

probe, followed by a core and peripheral vitrectomy to remove the vitreous gel and cure any retinal conditions. Following a fluid-air exchange, silicone oil is injected to tampon the retina, and sclerotomies are closed. Following surgery, topical antibiotics and corticosteroids are administered, and follow-up appointments are planned to monitor intraocular pressure, retinal health, and endothelial cell count. Potential complications, including cataract development, excessive IOP, and endothelial cell loss, necessitate close patient monitoring and management. Prior to and three months following pars plana vitrectomy, measure the density of corneal endothelial cells using a specular microscope. Recorded a small variation in the density of corneal endothelial cells. SPSS version 21.0 was utilized for data entry and analysis. Determined the mean and standard deviation for numerical data, including the age of the patient and the number of corneal endothelial cells. Calculated percentages and frequencies for qualitative factors like gender and eye status. After three months, compare the average changes in corneal endothelial cell density using an independent sample t-test. To account for potential effect modifiers, stratify data according to age, gender, and eye status. Use a post-stratification paired sample t-test with a $p < 0.05$ criterion to determine statistical significance. Participants informed permission and patient confidentiality are two ethical considerations.

Results:

Our research analyzed 120 cases, out of which 18 individuals (15%) were aged between 30-50 years while 85% (n=85) belonged to the age group of 51-70 years. We calculated the mean age as 59.2±23.92 years. Among the participants, 44 individuals (36.67%) were male, and 76 individuals (63.33%) were female. Mean corneal endothelial cell count before the surgery was 2555.19±71.71 which reduced to 2500.76±71.85 and the mean change was calculated as 54.4±23.11, p value was 0.

Part A: normal corneal endothelial cells in specular microscopy



Part B:low density corneal endothelial cells

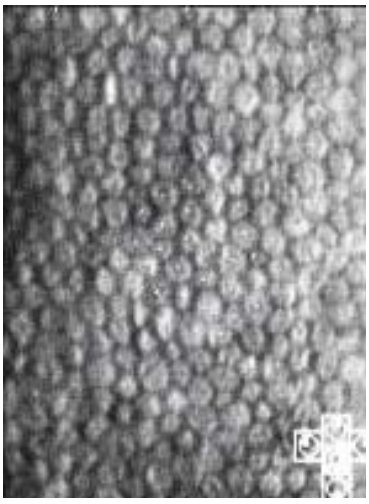


Table 1: demographic data by gender, and age group of people with retinal detachment.

Age	
30-50	24(20.08%)
51-70	96(80.12%)
Gender	
Male	44(36.67%)
Female	76(63.33%)

Table 2: Mean Corneal Endothelial Cell Density (cells/mm²) Before and After PPV + SO Surgery by Gender, Age Group, and Lens Status

Gender	Age Group	Lens Status	Mean Endothelial Density Before PPV + SO	Mean Endothelial Density After PPV + SO	Mean Change in Endothelial Density
Male	30-50	Phakic	2543.91	2508.64	35.27
		Pseudo-Phakic	2568.91	2491.13	77.78
	51-70	Phakic	2555.19	2500.76	54.43
		Pseudo-Phakic	2500.76	2450.00	50.76
Female	30-50	Phakic	2543.91	2508.64	35.27
		Pseudo-Phakic	2568.91	2491.13	77.78
	51-70	Phakic	2555.19	2500.76	54.43
		Pseudo-Phakic	2500.76	2450.00	50.76

Table 3: Inferential Statistics for Changes in Corneal Endothelial Cell Density

Lens Status	Mean Endothelial Density Before Surgery	Mean Endothelial Density After Surgery	Mean Change Standard Deviation (+/- SD)	p-value
Phakic Eyes	2554.55 (combined mean)	2504.70 (combined mean)	49.85 +/- 71.71	0.005
Pseudophakic Eyes	2567.84 (combined mean)	2470.06 (combined mean)	97.78 +/-52.56	<0.0001

Note: Single tailed t test was done

Discussion:

The quality of life associated with eyesight is significantly impacted by retinal disorders.[12] Although it is common knowledge that anterior segment surgery can lower the quantity of corneal endothelial cells, there hasn't been much research looking at how pars plana vitrectomy with internal tamponade affects the human cornea.[13] A common internal tamponade used during difficult retinal separation surgery is silicone oil (SO).[14] Removing SO after some time is the standard procedure to lessen its well-known complications.[15]

Although intraocular SO is generally well tolerated, a number of side effects, such as keratopathy, increased intraocular pressure, ocular hypotony, SO emulsification, cataract development, iritis, and endophthalmitis, have been observed. Several research have suggested that SO may harm the cornea in specific ways.[16] The detrimental effects of SO on the cornea were suggested to be due to SO forward migration to the anterior chamber and contacting the cornea.[17-20].Furthermore, endothelial cell toxicity has been linked to silicone oil (SO) in the eyes. Exposure of the cornea's endothelial cells to SO can cause physiological and morphological alterations. These alterations could result in SO-associated keratopathy, which may involve corneal thinning, the development of retro-corneal membranes, irreversible elimination of corneal endothelial cells and band keratopathy. The SO may

function as a barrier, depriving human corneal endothelial cells of the aqueous humor's usual source of sustenance.[21] However, because SO has been believed to be harmless in ocular tissues, Silicone oil's potential indirect cytotoxic effect on endothelial cells of cornea has not been adequately explored.

The current study was planned with the fact previous data include small sample size[7] less researches on in rhegmatogenous retinal detachment cases which was needed to be evaluated in pakistan, however, the results of the current study may be helpful to record mean change in corneal endothelial cell density following PPV on a larger sample size and compare phakic and pseudo-phakic eyes and set a primary data in this regard which will be helpful for ophthalmologists.

A recent study looked at corneal endothelial cell loss revealed that the loss was 30.482±5.78 in phakic eyes and 77.52±40.03 in pseudophakic eyes. There was a considerable difference between the two groups. [10]

A research on the effects of silicone oil on the cornea discovered that prolonged contact might result in significant endothelial cell loss and subsequent corneal decompensation.[18] The findings emphasize the importance of eliminating silicone oil in a timely way to avoid corneal issues Study by (Federman & Pang) Their findings, published in Ophthalmology, revealed that typical effects include increased intraocular pressure, cataract development, and keratopathy. These findings emphasize the importance of closely monitoring and treating patients with silicone oil tamponade.[19-20]

Farrahi et al. (2014) published a research in the Journal of Ophthalmic & Vision Research looking at corneal endothelial modifications in phakic and pseudophakic eyes after pars plana vitrectomy and silicone oil injection. Branisteanu, D.C in 2020discovered that phakic eyes experience more severe endothelial cell loss than pseudophakic eyes, demonstrating that lens status has a substantial influence on corneal health following surgery[21]. The findings corroborate our study.

The study investigated the effect of silicone oil (SO) on corneal endothelial cells in phakic and pseudo-phakic patients who had vitrectomy and were filled with SO. Although the presence of SO triggered a minor decrease in the amount of endothelial cells, it also caused a significant change in the shape.[22]

As a consequence, after the desired tamponade effect is achieved, the SO should be removed. Boscia et al. and Goezinne et al. discovered that after a 12-month vitrectomy with silicone oil tamponade in complex Gawaz et al. (2021) and Kunzman et al 2020 investigated rhegmatogenous retinal detachments in both phakic and pseudo-phakic eyes and found that the loss of endothelial cell density (ECD) was less than 5%. Furthermore, they discovered no obvious influence on the hexagonality or coefficient of variation of corneal endothelial cells.[22-23]

According to the findings of our research, we believe that silicone oil tamponade during vitreoretinal surgery has an positive impact on the corneal endothelium.

The results of the current study are helpful to with a larger sample size and also revealed that pseudo-phakic eyes had a significantly higher decline in endothelial cell count of cornea, however, some other trials are needed to validate our results.

Conclusion:

Our findings reveal a significant rise in the mean cell density of the cornea's endothelium three months following pars plana vitrectomy for individuals with rhegmatogenous retinal detachments.

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Authors Contribution

Concept and Design: Muhammad Hannan Jamil
Data Collection / Assembly: Bilal Ashraf
Drafting: Asmatullah Khan, Aneeb Ashraf
Statistical expertise:Nida Amin, Taha Sahar
Critical Revision: Ferheen Shahbaz

ORIGINAL ARTICLE

Association Between Dry Eye And Stress In Undergraduate Medical Students In Mirpur, Azad Jammu and Kashmir

Umair Tariq Mirza[1], Kanwal Ijaz[2], Filza Haqiq[3], Muhammad Luqman Ali Bahoo[4], Kashif Iqbal[5], Muhammad Umer Khan[6]

Abstract:

Objectives: To determine the correlation between psychological stress and dry eyes, and to assess gender distribution for the latter in undergraduate medical students.

Methods: This cross-sectional study was done at Mohi-ud-Din Islamic Medical College Mirpur, Azad Jammu and Kashmir, from June to September 2021. A final sample of 157 students were recruited. Dry eye symptoms were assessed using a 12-item questionnaire, the Ocular surface disease index (OSDI, Total Score 0 – 100), and Psychological Stress was measured using Perceived Stress Scale 4 (PSS-4) questionnaires (Total score 0-15). For the Ocular surface disease index, 0 -12 was taken as normal, 13 -22 as mild, 23 – 32 as moderate, and 33 – 100 as severe disease.

Results: Out of 157 students, 82(52.2%) were Male, and 75 (47.8%) were females with a Median age of 22 (21-27) years. 97 (61.8%) had dry eyes. Median OSDI score was 15.45(0-73) and Median PSS-4 score was 8(0-15). Subjects with DED (DED group) showed significantly higher OSDI& PSS scores compared to those without DED (non-DED group) (p<0.001, P=0.003 respectively). A strong correlation was found between the severity of dry eye disease & PSS-4 score in the study population $r_s = 1$ (p=0.001).

Conclusion: DED is prevalent among medical students, and it has different symptoms. Males predominated over females in the DED group. Factors involved in the correlation between dry eye disease and psychological stress among medical students should be evaluated to minimize the burden of the disease. *Al-Shifa Journal of Ophthalmology 2024; 20(4): 145-150. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

1. *Mohi Uddin Islamic Medical College, Mirpur AJK.*
2. *University of Health Sciences Lahore.*
3. *Retired from FJMU as Senior Demonstrator.*
4. *CMH Institute of Medical Sciences, Bahawalpur.*
5. *LRBT, Lahore.*
6. *Azra Naheed Medical College, Lahore.*

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Correspondence to:
Dr. KanwalIjaz
University of Health Sciences Lahore.
drkanwal81@yahoo.com

Introduction:

Dry eye disease (DED) is a disease of the ocular surface with multiple factors affecting it. In DED there is a loss of homeostasis of the tear film. Ocular symptoms appear mainly due to unsteadiness and hyperosmolarity of the tear film, inflammation of the ocular surface, and neurosensory abnormalities.[1]

DED presents with a wide range of ocular symptoms (e.g. dryness of eyes, pain in eyes, reduced visual quality) and signs (e.g. less production of tears, unsteadiness of tear film, inflammation of the surface of eyes). Symptoms of DED can be unbearable, restricting the capacity to do routine work and also affecting psychological well-being in an undesirable

way.[2]

DED is an ocular disease that is greatly widespread and is responsible for poor quality of life among communities. Studies have reported a frequency of 5–50% in several populations all over the world.[3]In the Asian population, DED was reported to be 20.1%prevalent.[4]

Studies reported the prevalence of DED in Pakistan to be around 2.4 to 11%[5],with the highest prevalence of 47.7% among computer programmers.[6]While using digital gadgets (mobile phones, laptops, desktops) for a longer period, the person experiences reduced blinking of eyes which is one of the prominent factors leading towards the development of DED.[7]

In daily routine life, such digital gadgets are equally used for entertainment as well as for work as there is an emerging trend of online classes and a preference for the use of digital libraries. Clerical staff, health care workers, and administrative professionals who work from indoors on such digital devices are explicitly at a higher risk of development of DED.[8]

A person is labeled to be suffering from stress when the degree to which the individual thinks his burden overrides his capacity to cope. One of the factors to gauge the health of the student is to assess the presence of stress, as it imparts its effect by disturbing the mental and physical health of the individual[9].Medical students face increased psychological stress mainly due to enormous amounts of academic burden and competition with peers.[10]

Many studies have attempted to identify the risk factors for the development of DED. This study was carried out to explore the correlation between DED & psychological stress among medical students at Mohi-ud-Din Islamic Medical College Mirpur.

Methodology:

This was a cross-sectional study carried out at the Mohi-ud-Din Islamic Medical College Mirpur from 2nd June 2021 to 5th September 2021 after approval by the Ethical Review Board (ERB) of Mohi-ud-Din Islamic Medical College Mirpur, Azad Jammu and Kashmir.

Sampling was done through a convenient technique. Undergraduate medical students from 3rd year, 4th year, and 5th-year MBBS were included in the study while students having ongoing medical illnesses, using contact lenses, history of refractive surgery, using screens > 4 hours daily, sleeping < 5 hours, using eye drops or having ocular disease were thereby excluded.

200 medical Students were selected for the study, of which 15 students did not give consent, while 28 students were excluded from the study as they did not meet the required inclusion criteria.

Pre-defined questionnaires for dry eye (a 12-item questionnaire, OSDI) and stress (PSS-4 including 4 questions) were distributed among medical students in their respective lecture halls. OSDI questionnaire comprised questions about dry eye symptoms that every student experienced one month prior. The OSDI was expressed as a sum score between 0–100.

The psychological stress was assessed using the Perceived Stress Scale 4 (PSS-4) questionnaire.

The questions in this scale are related to the feelings and thoughts of the candidate during the previous month. Quantification of the score is between 0 and 4 where 0 is referred to as never and 4 is very often. Higher scores reflected an increased perceived psychological stress. Participants also filled in demographic data like age and gender as mentioned on the given questionnaire.

Variables were identified as the dependent variable which was the presence of dry eye while independent variables were age, sex, PSS score, and OSDI score. The SPSS 22 program was used to determine the results.

Qualitative data were assessed using the Chi-square test and quantitative data by the t-test. The relation between dry eye

and stress was analyzed using Spearman's correlation coefficient.

Results:

A total of 157 students were evaluated. Dry eye symptoms were assessed using a 12-item questionnaire OSDI (Total Score 0 – 100)[10], and Psychological Stress was measured using Perceived Stress Scale 4 (PSS-4) questionnaires (Total score 0-15). Students having dry eyes were 97 (61.8%) and those without dry eyes were 60 (38.2%).Prevalence of dry eye was 61.8%.

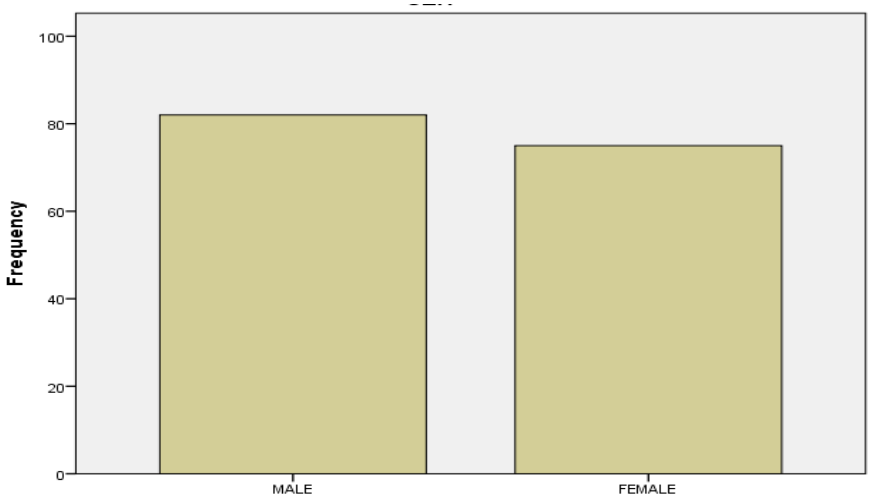

Figure:1 Gender distribution among all students (n=157)

Table 1: Perceived Stress Scale Questionnaire

In the last month, how often have you felt that you were unable to control the important things in your life?	0	1	2	3	4
In the last month, how often have you felt confident about your ability to handle your personal problems?	0	1	2	3	4
In the last month, how often have you felt that things were going your way?	0	1	2	3	4
In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?	0	1	2	3	4

0 = Never 1 = Almost Never 2 = Sometimes 3 = Fairly Often 4 = Very Often

The age, OSDI, and PSS-4 had non-normal distribution among the students with $p<0.001$, $p<0.001$ and $p=0.01$ respectively. Themedian(IQR) age was 22 (21 to 27)years. Median(IQR) OSDI score was 15.45(0-73) and Median(IQR) PSS-4 score was 8(0-15).

Mild disease was seen in 33.1%, Moderate Disease in 16.6%, and Severe diseasein12.7 % of students (per criteria given for OSDI). The most common complaint in dry eye was sensitivity to light followed by problems watching TV and problems at places or areas of low luminance.

Out of 97 students who had DED, 54 (55.67%) were Male, and 43 (44.33%) were females. On comparison of age, OSDI, and PSS-4 score between dry eye disease and non-dry eyes diseased groups, there was a significant difference in OSDI and PSS-4 score between the groups.

OSDI and PSS-4 scores were significantly higher in the DED group ascompared to the non-DED group (p=0.000, p=0.003 respectively).

Table 2: Comparison of the scores by presence and absence of dry eye disease

Variable	DED group	Non-DED group	p-value
Age	22(21-25)	22(21-27)	0.890
OSDI	20.83 (13-73)	6.25(0-16)	0.000*
PSS	8.00(2-15)	6.00(0-14)	0.003*

DED group: patients with dry eye disease. Non-DED group: patients without dry eye disease. All data are expressed as median (IQR). *P value was calculated using the Mann-Whitney test. A strong correlation was found between the severity of dry eye disease & PSS-4 score in the study population, r_s= 0.2 (p=0.001). There was no correlation between age and DED among the medical graduates, r_s= 0.01 (p=0.83).

Discussion:

In our study, we assessed the prevalence of DED in undergraduate medical students in Mohi Uddin Islamic Medical College, Mirpur, Azad Jammu Kashmir. Dry eye disease was defined as the presence of one or more dry eye symptoms included in the 9-item questionnaire often or all the time.

Dry eye disease is quite prevalent all over the world with a prevalence of 5–50%, it is variable due to diversity in ages and different study populations.[11]

Increased use of screens has impacted our daily routine life, and in the same way, the usage of gadgets has affected our vision in terms of visual problems like dry eye disease.[12]

The current study found that the prevalence of the DED was 61.8% among undergraduate medical students in Mohi Uddin Islamic Medical College, Mirpur, Azad Jammu Kashmir. The most common complaint in dry eye was sensitivity to light followed by problems watching TV and problems at places or areas at low luminance. A Pakistani study reported the prevalence of DED among IT students as high as 47%, possibly due to screen-related exposure to their relevant field.[11]

In our study, we could not find any correlation between age and OSDI score. Serwat et al. (2023) also reported no association between age and OSDI score among IT students of the age group 17-25 years. This finding is significant, as it indicates that in patients under 30 years of age, dry eye disease (DED) likely does not have a correlation with age

In the current study, there was a high percentage of males (55.67%) as compared to females (44.33 %) having dry eye disease with a non-significant difference in disease. In the study, done by Serwat et al (2023), more males among study participants had DED as compared to female study participants[11]. Alnahdi et al. (2022) reported a higher prevalence of DED among females[13]. The female study participants that were included in their study, were of post-menopausal age. This may be the reason for the difference from our study. As our female participants were of the young age group.

In our study, the most common complaint related to DED was sensitivity to light followed by problems watching TV and problems at places or areas of low luminance. However, other studies have reported variable findings, for instance, some research indicated that a burning

sensation and excessive tearing were the most common complaints among participants with DED.[11,14]

This study explored the correlation between psychological stress and dry eye disease among undergraduate medical students. The psychological stress was assessed by using the PSS-4 score, which has been considered a reliable tool.[10] We found a positive correlation between psychological stress and dry eye disease among study participants. Psychological stress may have some link with the risk of developing DED.[10]Numerous mechanisms may be involved in the linking the psychological stress and DED, although they are not clearly understood yet[10]. Psychological stress may lead to altered production of inflammatory mediators in the body which can lead to multiple problems, DED is one of them[15]. Psychological stress causes an increased production of the stress hormone, cortisol, in the body can lead to an increased perception of pain[16]. This suggests that individuals experiencing psychological stress may be more susceptible to developing dry eye symptoms.

In medical students' context, the high stress levels associated with their challenging academic demands could exacerbate these physiological responses. As medical students often face intense pressure, the potential impact of psychological stress on ocular health warrants further exploration. Understanding this association is crucial for developing effective interventions to mitigate DED symptoms in this population.

Conclusion:

In conclusion, this study supported the hypothesis that symptomatic DED is possibly prevalent in medical students. Psychological stress evaluated using the PSS-4 questionnaire had a significant correlation with the Ocular surface disease index (OSDI) score.

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Authors Contribution

Concept and Design: Umair Tariq Mirza
Data Collection / Assembly: FilzaHaqiq
Drafting: Kanwal Ijaz, Muhammad Luqman Ali Bahoo
Statistical expertise:Kashif Iqbal, Muhammad Umer Khan
Critical Revision: Dr. KanwalIjaz

ORIGINAL ARTICLE

Prevalence and Types Of Retinal Vein Occlusion in Patients Undergoing Green Laser Photocoagulation in Dera Ismail Khan Division, Pakistan

Muhammad Kamran Khalid[1], Muhammad Shoaib Khan[1], Muhammad Sharjeel[1], Muhammad Abdullah[1], Muhammad Sohail Arshad[2]

Abstract:

Objective: To determine the prevalence and type of retinal vein occlusion in patients undergoing green laser photocoagulation.

Methods: A descriptive cross-sectional study was performed at the eye unit of DHQ Teaching Hospital Dera Ismail Khan from January 2017 to December 2022. All patients of retinal vein occlusion (RVO) treated with green laser photocoagulation were included in the study. The sample was analyzed using frequencies and percentages in SPSS version 22.

Results: Out of 2058 patients having green laser, 86 (4.18%) had retinal vein occlusion, while 1972 (95.82%) had other retinal diseases. Out of 86 patients of RVO, 47 (54.65%) were female while 39 (45.35%) were male. A total of 20 (23.26%) were below 40 years and 66 (76.74%) were over 40 years. A total of 56(65.125%) were from urban areas and 30(34.88%) from rural areas. Out of 86 patients with retinal vein occlusion, 70 (3.40%) had branch retinal vein occlusion (BRVO) and 16 (0.78%) had central retinal vein occlusion (CRVO).

Conclusion: Retinal vein occlusion is more prevalent among females, particularly in older patients living in urban areas. These patients typically present with sudden, painless loss of vision. Additionally, branch retinal vein occlusion is significantly more common than central retinal vein occlusion. *.Al-Shifa Journal of Ophthalmology 2024; 20(4): 151-156. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

1. *Eye Department DHQ, Mufti Mehmood Teaching Hospital, Dera Ismail Khan.*
2. *Shahida Islam Medical and Dental College, Lodhran.*

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Correspondence to:
Muhammad Shoaib Khan,
Eye Department DHQ, Mufti Mehmood Teaching Hospital, Dera Ismail Khan.
dr.sohaibkhan527@gmail.com

Introduction:

Retinal vein occlusion (RVO) is one of the common ocular conditions leading to vision loss. It may occur in the form of central retinal vein occlusion (CRVO) or branch retinal vein occlusion (BRVO)[1]. If the obstruction is at the level of lamina cribrosa, then it is CRVO and when the obstruction is in one of the tributaries of the central retinal vein then it is BRVO.[1,2,3]There is an increased risk of RVO in cases of diabetes mellitus (DM), hypertension, hyperlipidemia, coagulation disorders, inflammatory disorders, glaucoma, hypermetropia, increase body mass index.[2,3,4,5,6].Ischemic CRVO is much more dangerous than non-ischemic CRVO as it may lead to permanent visual loss[7].A lot of other factors have been reported to be associated with poor visual outcomes including gender, old age, pre-existing macular disorders, epiretinal

membrane (ERM), glaucoma and long-lasting cystoid macular edema, and neo-vascularization on the retina.[7,8]Among the two types (CRVO vs BRVO) visual outcome is better in BRVO[9].Anti-VEGF injections have an established role in the management of RVO. After ranibizumab injection, vision improves significantly in cases of BRVO with macular edema[10].Other factors leading to loss of vision include ischemia to ganglion cells, pigmentary degenerations, and ERM[11].

Treatment options for macular edema due to RVO include anti-VEGF, steroids, and grid laser. For complications (macular edema/neovascularization) of RVO photocoagulation (PRP) is the standard treatment[12,13]. PRP is started when complications start to appear, but in some severe cases of retinal ischemia, it may be given prophylactically[14].In macular edema due to BRVO focal laser also shows significant visual benifits[15]but due to the availability of anti-VEGFs, focal laser is used in selected cases [16,17].

An extensive literature search, to the best of our knowledge, there is a lack of data on the prevalence and presentation of retinal vein occlusion in the local population of our division.

Methodology:

This descriptive cross-sectional study was performed at the eye unit, DHQ Teaching Hospital D.I.Khan from 2017 to 2022. All the patients having RVO receiving green laser treatment were included in the study. Permission from the institution's ethical review committee was obtained on 23 December 2016.

Pan Retinal Photocoagulationwas performed with a mono spot slit-lamp delivery system, Nidek GYC-1000,Japan. Procedures were performed under topical anesthesia, using a wide-field Mainster PRP contact lens. Energy level, spot size and duration was titrated from case to case to obtain the desired effects.

The population of the Dera Ismail khan Division is 1000000. Using Raosoft®14 online calculator sample size was calculated as 2058, taking the population of patients having green laser treatment as 6500, confidence level of 99%, margin of error of 0.3914, and prevalence of retinal vein occlusion as 0.7%[18] in the green laser treated population.

6500 Green laser treatment patients is our population of interest from which we have drawn a sample of 2058. In the green laser treatment sample of 2058 individuals, we have determined a prevalence of RVO of 84 (4.18%). A consecutive, non-probability sampling technique was employed. The sample was analyzed using frequencies and percentages in SPSS version 22. All the patients having RVO receiving green laser treatment were included in the study. Patients for whom green laser treatment was not possible due to any media opacity like dense cataract or dense vitreous hemorrhage were excluded from the study.

Results:

Out of 2058 patients of green laser, 86 (4.18%) had Retinal Vein Occlusion, while 1972 (95.82%) had other retinal diseases. The estimated prevalence in the population is shown below (Table I).

Table I: Prevalence of Retinal vein occlusion in patients receiving green laser treatment in D.I. Khan.

Variable	Attributes	Sample statistics		99% CI for Proportion for population	
		Total	Percentage	Lower	upper
Presence of retinal vein occlusion	Yes	86	4.18%	0.03162	0.05451
	No	1972	95.82%	0.08038	0.1139
Total		2058	100.0	Population parameters	

Among these 86 retinal vein occlusions, 47 (54.65%) were in female, while 39 (45.35%) were in male patients (Table II).

Table II: Distribution of RVO by Gender among green laser treatment in D.I. Khan.

Variable	Attributes	Size	Sample statistics %	99% CI for Proportion for population	
				Lower	Upper
Gender	Male	39	45.35%	0.3236	0.5901
	Female	47	54.65%	0.4099	0.6764
Total		86	100.00	Population parameters	

Out of a sample of 86 patients of retinal vein occlusion (RVO), 20 (23.26%) cases were in age group ≤40 years and 66 cases (76.74%) were in age group >40 years (Table III).

Table III: Distribution of patients of retinal vein occlusion undergoing green laser photocoagulation by age groups of D.I. Khan.

Variable	Attributes	Total	Percentage	95%CI for proportion	
				Lower	Upper
Age groups	≤40 years	20	20*100/86=23.26 %	14.33	32.18
	>40 years	66	66*100/86=76.74 %	67.82	85.67
Total		86	100%	Population parameters	

Out of a sample of 86 patients of retinal vein occlusion (RVO), 56 (65.12%) cases were of urban residence and 30 cases (34.88%) were of rural.

Among 2058 patients of green laser 86 were of retinal vein occlusion, among these RVO patients 70 (3.40%) were of BRVO and 16(0.78%) were of CRVO (Table IV).

Table IV. Distribution of RVO by Type (BRVO and CRVO)

Variable	Attributes	Sample statistics		99% CI for Proportion for population	
		Total	Percentage	Lower	Upper
Green laser treatment population (2058)	BRVO	70	3.4%	0.02512	0.04588
	CRVO	16	0.78%	0.00415	0.01461
RVO(BRVO+CRVO)		86	4.18%	Population Parameters	

Discussion:

Similar to our findings are from Sophie Roger, *et al*[19] showing prevalence was 5.2 per 1000 for any RVO. This study was comprised of a Pooled Data from Population Studies from the United States, Europe, Asia, and Australia. M

Laouri,*etal*[20]reported in a review, the age and sex standardized prevalence of 5.2 per 1000 published in May 2011.

Miho Yasuda, *et al*[21]findings suggested lower prevalence of RVO then our study 2.1%. Similar lower results were seen by Raba Thapa *et al*[22]in Nepal, September 2017, where overall population of RVO was 2.95% .

These patients usually presented with sudden painless loss of vision. The gender based distribution of RVO in our research was 45.35% for male and 54.65% for female . Ko Un Shin, *et al*[23] in 2018 observed that RVO distribution was more common among females, and it increases with age. After 50 years of age, the chances of RVO increased nearly 3 folds for both genders. While in a study by Joo Yong Lee*et al*[24]established that there is no difference in the prevalence of CRVO between males and females. K.A. Ponto*et al*[26] shows a contrast gender-based distribution of RVO to our study. In this study males were 1.7 times more frequently affected by RVO than females.

Age-based distribution of RVO in our research was 23.26% for less than or equalto 40 years and 76.74% for patients more than 40 years. Ko Un Shin *et al*[23] in 2018 observed that after 50 years of age, chances of RVO increased nearly 3 folds for both genders. In 2022, Yangjiani Li and colleagues demonstrated that the incidence of RVO increases with advancing age[26]. In our study the residence-based distribution of RVO showed that 65.12% of cases occurred in the urban population, while 34.88% were in the rural population. Similar findings regarding the impact of urbanization on RVO [27,28].

The type-based distribution of RVO in our study showed that BRVO accounted for 3.4% out of 4.18% of cases, while CRVO accounted for 0.78% out of 4.18% of cases. These findings are consistent with those of Sophie Roger *et al*, who reported a BRVO prevalence of 4.42 per 1000 cases and a CRVO prevalence of 0.80 per 1000 cases, indicating that BRVO is approximately four times more prevalent than CRVO.

No RVO patient included in our study required surgical intervention. Joo Yong Lee *et al*. (2010) reported that among 557 RVO patients, 36.4%had CRVO and 63.6% had BRVO, which aligns with the findings of our study.[24]Similarly, M. Laouri*et al*. reported in a population-based study that the distribution of BRVO ranged from 0.5% to 2.0%, while CRVO ranged from 0.1% to 0.2%, slightly lower than the rates observed in our study.[20]

Conclusion:

The findings of this study indicates that retinal vein occlusion is more prevalent among females, particularly in older patients living in urban areas. While branch retinal vein occlusion is reported more common than central retinal vein occlusion.

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Authors Contribution

Concept and Design: Muhammad Kamran Khalid
Data Collection / Assembly: Muhammad Sohail Arshad
Drafting: Muhammad Sharjeel
Statistical expertise: Muhammad Abdullah
Critical Revision: Muhammad Shoaib Khan

ORIGINAL ARTICLE

Prevalence Of High Myopia In Young Adult Patients Presenting To A Tertiary Eye Hospital In Rawalpindi, Pakistan

Waleed Ahmad[1], Saud ul Hassan Memon[2], Mehwish Ameer[2], Yasir Ahmad[1]

Abstract:

Objective: To determine how common high myopia is among the younger patients seen at a tertiary eye facility.

Methods: A descriptive Cross-Sectional study, carried out at the Department of Ophthalmology, Al-Shifa Trust Eye Hospital, Rawalpindi, from 1st June 2022 till 1st August 2022. Seventy participants aged 18 to 30 years old, were tested for refraction using nonprobability consecutive sampling and both automated and manual methods, if needed. Refractive error values reported in this study are based on Spherical Equivalent Refraction (SER), calculated using the formula: SER = Sphere ± ½ Cylinder. This method was applied to ensure standardized measurement of refractive errors across all participants. Data were analyzed using SPSS Version 22.0.

Results: The study found that 42.9% of participants had a refractive error between -7.0 to -7.9 D, 40.0% had -6.0 to -6.9 D, and 17.1% had -8.0 D or higher. Females exhibited a slightly higher prevalence of severe myopia than males.

Conclusion: This study assessed the severity of high myopia among young adults attending a tertiary eye hospital in Rawalpindi. The findings revealed a significant portion of participants with severe refractive errors, particularly among females. These results highlight the need for early detection and tailored interventions to manage the high degree of myopia effectively, aiming to reduce the risk of complications and improve vision-related quality of life. *Al-Shifa Journal of Ophthalmology 2024; 20(4): 157-162. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

1. *Al-Shifa Trust Eye Hospital, Rawalpindi.*
2. *Sindh Institute of Ophthalmology and Visual Sciences (SIOVS), Hyderabad.*

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Correspondence to:
Waleed Ahmad
Al-Shifa Trust Eye Hospital, Rawalpindi.
kwaleed232@gmail.com

Introduction:

Myopia is an escalating health concern. The World Health Organization reports that 30% of the global population is already myopic, and by 2050, this figure is projected to rise to 50%.1,2 The highest frequency of myopia is observed in East and Southeast Asian nations. Myopia, also known as nearsightedness, occurs due to a mismatch between the optical power of the eye and its axial length, often resulting from aberrant emmetropization. Axial elongation is a primary contributor in cases of axial myopia, but other optical factors can also play a role[3].In a non-accommodating myopic eye, light rays coming from an object at infinity converge too much and focus in front of the retina. It is common practice to classify myopia as either non-pathologic or pathologic. High myopia is typically defined as a spherical

equivalent refractive error of -6.0 diopters (D) or greater. Pathologic myopia, on the other hand, refers to a subset of myopia that is associated with structural changes in the retina, such as myopic maculopathy or choroidal neovascularization, which may occur even in cases of moderate myopia. This distinction is based on the classifications provided by the International Myopia Institute (IMI).[4] Myopia diminishes vision-related quality of life and exacerbates challenges in executing vision-dependent tasks.[5] The medical implications of extreme myopia encompass pathological consequences like myopic retinal degeneration, choroidal neovascularisation, cataracts, and glaucoma. [6] Older people exhibit a heightened risk of myopia. Research indicates that elevated educational attainment, advancing age, extensive near labour, familial predisposition, and reduced engagement in outdoor activities are associated with an increased risk of myopia.[8] Following the global COVID-19 pandemic, screen usage has escalated across all age demographics. A study conducted on Pakistani people over the age of 30 has revealed a prevalence of high myopia (RE < -6.0D) at 4.6%.[10] Research on the frequency of high myopia in Pakistan is scarce. It is essential to assess the current severity of high myopia to evaluate its impact on visual quality of life in Pakistan. This study aims to evaluate the severity of high myopia among young adults attending a tertiary eye hospital in Rawalpindi, Pakistan, rather than determining its overall prevalence, considering the increasing global incidence of myopia, especially within Asian demographics, and the absence of local data. Comprehending this burden is essential for implementing early intervention methods and mitigating potential long-term problems that affect vision-related quality of life.

Methodology:

This cross-sectional study was conducted at Al Shifa Trust Eye Hospital, Rawalpindi from June 1, 2022, to August 1, 2022. The research was carried out at the Outpatient Department (OPD). Anon-probability consecutive sampling method was employed for participant selection. This method guaranteed that all patients fulfilling the inclusion criteria who visited the outpatient department throughout the study period were incorporated. Based on a previous study by Shaheen P Shah et al., which found a prevalence of high myopia of 4.6% in the adult population of Pakistan, the sample size was estimated using the WHO sample size calculator. At a 95% confidence level, with an expected population proportion of 0.046 and an absolute precision of 0.05, the determined sample size was 70 people. After the approval from the Hospital Ethical Committee was obtained, data collecting could begin. High myopia, defined as a Spherical Equivalent Refraction (SER) of -6.0 diopters (D) or more, was examined in patients diagnosed with the condition. The SER was calculated using the formula: SER = Sphere ± ½ Cylinder. These patients ranged in age from 18 to 30 years. Subjects of either sex who were prepared to take part and who supplied written informed consent were considered for inclusion. Patients were excluded if they met any of the following criteria: age younger than 18 years or older than 30 years; a current or previous history of ocular injury or ocular surgery; the presence of systemic or ocular diseases known to affect refraction (e.g., diabetes, keratoconus); or inability or unwillingness to provide informed consent.

Before recruiting participants, we made sure they understood the study's goals and benefits and got their written informed consent. After undergoing a comprehensive eye examination, individuals who were deemed suitable were recruited from the eye outpatient department. The TOPCON Kerato-

Refractometer KR-800, which does not require cycloplegic testing, was consistently used for all participants to ensure uniform data collection. To minimize inter-observer variability, a single expert ophthalmologist conducted all refraction measurements. Manual retinoscopy and subjective refraction were not utilized, ensuring that the data remained consistent across all participants. Name, age, gender, address, and refractive defect were some of the vital pieces of information that were recorded using a standardized data collection form. With a refractive error of -6.0D or above defined as high myopia, the prevalence of this condition was the primary outcome measured.

Data were analyzed using SPSS version 22.0. Frequencies and percentages were calculated for categorical variables such as age, gender, and refractive error. Continuous variables were analyzed to determine the mean and standard deviation. Post-stratification involved the application of Chi-square tests to compare different groups, with a p-value of less than 0.05 considered statistically significant. The data were presented using tables and charts.

Results:

The average age of participants was 23.4 ± 2.9 years, indicating a relatively young group. The average refractive error in participants was -7.1 ± 0.6 diopters (D), reflecting the study's focus on individuals with high myopia. (Table 1).The age distribution indicated that the largest proportions of participants were in the 21-23 years and 24-26 years age groups, accounting for 32.9% and 31.4% of the sample, respectively.

The gender distribution was balanced, comprising 50% male and 50% female participants. In the analysis of the severity of high myopia, 42.9% of participants exhibited a refractive error between -7.0 and -7.9 D, which was the most frequently observed range. This was followed by 40.0% with refractive errors ranging from -6.0 to -6.9 D, and 17.1% with refractive errors of -8.0 D or greater (Table 2).

The 18-20 years age group exhibited the highest prevalence of refractive error between -6.0 to -6.9 D at 58.3%, whereas the 27-30 years age group showed the lowest prevalence at 15.4%. The highest prevalence of severe myopia (-8.0 D and above) was observed in the 27-30 years age group, reaching 30.8%. The Chi-square test revealed no statistically significant differences in the distribution of high myopia across age groups (p-value = 0.24) (Table 3).In the male cohort, 45.7% exhibited a refractive error within the -6.0 to -6.9 D range, whereas 17.1% presented with a refractive error of -8.0 D or greater. Conversely, in the female participants, the predominant refractive error range was -7.0 to -7.9 D, impacting 48.6% of the female cohort, while 17.1% exhibited a refractive error of -8.0 D or greater. The Chi-square test indicated no statistically significant differences in the prevalence of high myopia between male and female participants (p-value = 0.71) (Table 4).

Table 1: Descriptive Statistics of Quantitative Variables (n=70)

Variable	Mean	Standard Deviation (SD)
Age (years)	23.4	2.9
Refractive Error (D)	-7.1	0.6

Table 2: Distribution of Qualitative Variables (n=70)

Age Groups

Age Group (years)	Frequency (n)	Percentage (%)
18-20	12	17.1%
21-23	23	32.9%
24-26	22	31.4%
27-30	13	18.6%

Gender Distribution

Gender	Frequency (n)	Percentage (%)
Male	35	50.0%
Female	35	50.0%

Prevalence of High Myopia

Refractive Error (D)	Frequency (n)	Percentage (%)
-6.0 to -6.9 D	28	40.0%
-7.0 to -7.9 D	30	42.9%
-8.0 D and above	12	17.1%

Table 3: High Myopia Stratified by Age Group (n=70)

Age Group (years)	Refractive Error (D)	Frequency (n)	Percentage (%)	Chi-Square (χ^2)	p-value
18-20	-6.0 to -6.9 D	7	58.3%	6.71	0.24
	-7.0 to -7.9 D	4	33.3%		
	-8.0 D and above	1	8.3%		
21-23	-6.0 to -6.9 D	10	43.5%		
	-7.0 to -7.9 D	10	43.5%		
	-8.0 D and above	3	13.0%		
24-26	-6.0 to -6.9 D	9	40.9%		
	-7.0 to -7.9 D	9	40.9%		
	-8.0 D and above	4	18.2%		
27-30	-6.0 to -6.9 D	2	15.4%		
	-7.0 to -7.9 D	7	53.8%		
	-8.0 D and above	4	30.8%		

Table 4: Prevalence of High Myopia Stratified by Gender (n=70)

Gender	Refractive Error(D)	Frequency(n)	Percentage(%)	Chi-Square (χ^2)	p-value
Male	-6.0 to -6.9 D	16	45.7%	1.37	0.71
	-7.0 to -7.9 D	13	37.1%		
	-8.0 D and above	6	17.1%		
Female	-6.0 to -6.9 D	12	34.3%		
	-7.0 to -7.9 D	17	48.6%		
	-8.0 D and above	6	17.1%		

Discussion:

This study aimed to assess the severity of high myopia in young adults attending a tertiary eye hospital in Rawalpindi, Pakistan. The results indicated a mean refractive error of -7.1 D among participants. Although the data showed a slightly higher proportion of females with severe myopia (-7.0 to -7.9 D), this difference was not statistically significant (p-value > 0.05). These findings offer significant insights into the prevalence of excessive myopia among this group and correspond with recent global trends.

Numerous studies undertaken in the last five years have indicated analogous trends in the prevalence of high myopia, especially among Asian populations. A study in China including university students revealed a mean refractive error of -6.8 D, with females exhibiting a somewhat greater prevalence of severe myopia compared to males, consistent with our findings[11]. A separate study conducted in South Korea indicated a mean refractive error of -7.2 D in young people, with a considerable segment of the population displaying high myopia[12]. The findings align with the rising incidence of myopia observed in East and Southeast Asia, where lifestyle variables such extended near employment and restricted outdoor activities are believed to contribute to the elevated prevalence of myopia[13].Conversely, research in Western nations has indicated reduced prevalence rates of high myopia among young adults. A study in the United States indicated a mean refractive error of -5.5 D among young people, which is considerably lower than that seen in our research and others involving Asian populations[1]. This disparity may be ascribed to differing genetic predispositions and environmental influences between Western and Asian people.[15]Our study did not demonstrate statistically significant variations in the stratification of high myopia prevalence by age, while the 27-30 years age group exhibited a greater prevalence of severe myopia (-8.0 D and above). This observation aligns with data from are search in Singapore, indicating that older young individuals exhibited greater degrees of myopia[1]. This may result from the cumulative impact of sustained exposure to risk variables, such as continuous near work over time[1].Previous studies have found gender differences in myopia prevalence, with some indicating a higher incidence in females, especially for more severe cases of myopia[1]. Our study observed a slightly higher frequency of severe myopia among female participants compared to males; however, this difference was not statistically significant (p-value > 0.05), and thus cannot be interpreted as a true gender difference in the severity of myopia. This may result from behavioral differences, including prolonged near work and reduced outdoor activities, which have been more commonly found in females[1].This study has some limitations that must be recognized. The sample size was limited, and the study was performed at a single tertiary care hospital, thereby restricting the generalizability of the results to the wider population. The cross-sectional form of the study precludes the evaluation of temporal variations in myopia prevalence or the determination of causative linkages. The study ultimately depended on non-cycloplegic refraction, which may not correctly represent the underlying refractive error, especially in younger individuals who may have residual accommodation[2].

Conclusion:

In conclusion, the incidence of high myopia among young people in Rawalpindi is analogous to that observed in other Asian populations, with a considerable percentage of persons displaying severe myopia. The marginally elevated prevalence in females and the tendency for greater severity in older young adults underscore the necessity for focused public health measures. These

findings emphasize the significance of early detection and management techniques to alleviate the long-term consequences linked to high myopia. Additional studiesutilizing larger, more heterogeneous samples and longitudinal methodologies are essential to elucidate the underlying reasons and formulate viable preventative interventions.

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Authors Contribution

Concept and Design: Waleed Ahmad
Data Collection / Assembly: Saud ul Hassan Memon
Drafting: Yasir Ahmad
Statistical expertise: Mehwish Ameer
Critical Revision: Waleed Ahmad

LETTER TO EDITOR

Ethics in Clinical Trials

Muhammad Rafay Imran[1]

Sir,

With their correspondence to the human health and wellbeing – which is a major constituent in determining the socio-economic growth of the particular nation –, clinical trials hold immense significance in modern times. The invention and the potential benefits of any drug or medicine requires significant research and testing, both of which are achieved by clinical trials; testing being the pre-requisite and testing being the major aim of it. Hence clinical trials require testing subjects (humans), and with this requirement comes the need of medical ethics in research and trial.[1] Ethics, broadly, includes ensuring the well being of the test subjects; taking into account the unsaleable importance of human life. Declaration of Helsinki, Nuremberg Code, and Fair subject selection are amongst the most influential code of conduct in clinical trials.[2]

The aspects of ethics (the right to make informed decisions, equity, and Scientific validity) are global, no matter where in the world, they mostly follow the same principles. To keep a check on whether these principles are followed the research needs to be approved by the Independent Review Board; this is to remove any biasness or friction between opposing interests. These boards observe selection of subjects; are they eligible and is there is any vulnerability in the subjects that can enhance the potential risks? In addition, they also make sure that the risks are minimized (by using the default medicines present in Medicare already) to avert or minimize any possible adverse outcomes.[3,4]

Perhaps the most overriding facet of ethics is the 'informed consent'. A person (subject) must have the right to have the potential risks displayed in front of him, along with the societal benefits they can contribute to. After explaining the aspects, risks, benefits, methodology, and the purpose of the trial, the subject has the right to choose whether he wants to participate or not, and if participate then he also has the right to leave the trial during the procedure. Their privacy protection should be the team's top priority. In addition, the government's supervisory must be watchful of the above-mentioned criteria to ensure the ethical activity is uninterrupted.[5]*Al-Shifa Journal of Ophthalmology 2024; 20(4): 164-165.*

1. *The Science School Rawat Campus, Rawalpindi.*

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Correspondence to:
Correspondence to:
Muhammad Rafay Imran,
The Science School Rawat Campus,
Rawalpindi.
mrafayimran290@gmail.com

Competing Interest:

None to declare.

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Authors Contribution

Concept and Design: Muhammad Rafay Imran
Drafting:Muhammad Rafay Imran
Critical Revision: Muhammad Rafay Imran

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