

ISSN 1990-3863

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# Al-Shifa Journal of Ophthalmology

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Vol. 18, No. 1, January – March 2022

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**QUARTERLY PUBLISHED**

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- **Editorial: Capsular Tension Rings**
- **Relationship Between Central Retinal Thickness and Neovascular Glaucoma After Intravitreal Bevacizumab**
- **Asthenopia and Coping Strategies Among University Students**
- **Responsiveness Towards Patients Seeking Eye Care**
- **Incidence of Endophthalmitis after Intravitreal anti-VEGF injections**
- **Early Onset Presbyopia**
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# **Al-Shifa Journal of Ophthalmology**

**A Journal of  
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## Capsular Tension Rings – Merits and Demerits

Mahmood Ali

Capsular tension rings (CTR) or modified capsular tension rings have been developed to facilitate in-the-bag implantation of a posterior chamber intraocular lens (PC IOL) when the zonules are deficient. Using a CTR may reduce capsule fibrosis, phimosis, and late dislocation of IOL. CTR places centrifugal forces against the entire capsular equator by recruiting strength from the stronger zonules and supporting the compromised areas of the capsular bag.

These rings are more suitable for use in cases where the zonulopathy is less than 4 clock hours and the pathology is non progressive in nature like traumatic zonular dialysis or iatrogenic zonular loss during routine phacoemulsification. However, long-term centration of IOL in patients with progressive generalized zonular weakness, such as that caused by pseudoexfoliation, is uncertain. There are reported cases of complete posterior dislocation of a CTR and PC IOL within the capsular bag occurring years after the original surgery in patients with pseudoexfoliation syndrome.<sup>1</sup>

In comparison to conventional CTRs, modified CTR incorporate a fixation hook that courses anteriorly and centrally in a second plane, 0.25 mm above the plane of the tension ring. The fixation hook wraps around the capsulorrhexis edge and rests on the residual anterior capsular rim. At the free end of the hook is the eyelet through which a suture can be passed and used for scleral fixation without violating capsular bag integrity.<sup>2</sup>

CTR can be implanted at any step of phacoemulsification; however, the optimal timing remains controversial. A limited number of studies have compared early and

late CTR implantation. One study reported a 9.5% incidence of significant extension of zonular dialysis with the use of CTRs in eyes with mild to moderate zonular dialysis in which the CTR was implanted before phacoemulsification.<sup>3</sup> Another problem with early CTR placement is that it can make cortical removal more challenging and tedious. A study showed that late CTR implantation after lens extraction resulted in minimal capsular bag displacement and zonular stress in cadaver eyes.<sup>4</sup>

It is not advisable to use CTR of any model if a complete continuous capsulorrhexis is not attained or if a posterior capsule tear occurs, as the expansile forces of the rings will likely induce complete bag rupture. It may be possible to place a capsular tension segment (CTS) in selected cases, as the CTS does not induce an expansile force.<sup>5,6</sup>

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# Relationship Between Central Retinal Thickness and Neovascular Glaucoma In Cases of Central Retinal Vein Occlusion Treated with Intravitreal Bevacizumab

Waleed Ahmad<sup>1</sup>, Tahira Afzal Khan<sup>1</sup>, Saad Bin Yasir<sup>1</sup>, Fawad Ahmad<sup>1</sup>

## Abstract:

**Introduction:** Non-ischemic and ischemic are two categories of Central retinal vein occlusion. The purpose of this research study is to ascertain changes in the central retinal thickness and possible risk for developing NVG as a result of intravitreal bevacizumab in CRVO patients.

**Objective:** To determine changes in central retinal thickness and risk of neovascular glaucoma after intravitreal bevacizumab injection in patients with central retinal vein occlusion treated with intravitreal bevacizumab.

**Methodology:** The study design was prospective comparative study. Groups for the study were made on the basis of neovascularization as Neovascular group and control group. A total of 50 patients (25 patients in each group) were included. Patients meeting inclusion criteria i.e., age between 60 to 90 years having CRVO and treated with IVBs were enrolled through nonprobability consecutive sampling technique. Changes in central retinal thickness and occurrence of neovascular glaucoma were noted.

**Results:** Final mean CRT thickness in neovascular group was  $410.31 \pm 69.02$  um whereas in control group mean CRT thickness  $368.08 \pm 72.51$  um. Mean difference between both the group was 42.23 um (P Value < 0.001). However, as per binary logistic regression, ischemic type and CRT thickness at final follow up was not significantly associated with the development of NVG in patients with CRVO who were treated with IVBs (p value 0.914).

**Conclusion:** This study demonstrated that ischemic-type CRVO and CRT thickness at the time of final follow up was not significantly related to the development of NVG in CRVO patients who were treated with IVBs. @ *Al-Shifa Journal of Ophthalmology* 2022; 18(1): 7-13. © *Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

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Originally Received: 17 January 2022

Revised: 13 February 2022

Accepted: 6 March 2022

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## Introduction:

Vision loss due to macular oedema (MO) attributed to central retinal vein occlusion (CRVO) is mainly the disease of elderly people<sup>1,2</sup>. Some serious complications like Neovascular glaucoma (NVG) has been reported to occur in ischaemic type<sup>3,4</sup>. Anterior chamber angle or iris neovascularization with eventual angle closure is responsible for NVG<sup>5</sup>. MO and neovascularisation has been associated with the release of vascular endothelial growth factor (VEGF)<sup>6</sup>. Funk et al<sup>7</sup> reported significant elevation of aqueous humour VEGF levels in CRVO patients with MO. For the management of NVG and MO in



CRVO, intravitreal anti-VEGF injection has been declared gold standard therapy<sup>8,9</sup>. Severity of MO has been found linked to aqueous and vitreous VEGF levels<sup>10</sup>. Previous literature is rampant with low incidence of NVG especially in those patients who have earlier been treated with intravitreal anti-VEGF injections for MO in CRVO<sup>11,12,13</sup>. But some of the recent studies have concluded otherwise, as it has merely delayed the development of NVG<sup>14,15</sup>. Rong et al<sup>16</sup> reported the initial MO presentation and initial anti-VEGF injection were not the predictors of NVG in CRVO but, relative afferent pupillary defect and history of systemic hypertension were reported predictors of NVG in CRVO in his study. Though initial anti-VEGF injections might not mitigate the risk of developing NVG in CRVO patients, the MO or the central retinal thickness (CRT) changes that can reflect the amount of VEGF might be useful for predicting the risk of NVG development in these patients. Thus, we aimed to evaluate the CRT changes and risk for development of NVG in CRVO patients treated with intravitreal bevacizumab injections (IVBs).

### **Materials and Methods:**

The study design was prospective comparative study carried out at Al-Shifa Trust Eye Hospital, Rawalpindi. The study was approved by the Hospital's Ethical Committee. Prior to the conduct of study, informed consent forms were received from all patients. This study was conducted from 1<sup>st</sup> July 2021 to 31<sup>st</sup> December 2021. Following were our inclusion criteria; patients with CRVO who had received IVB with presence of MO (CRT > 300  $\mu$ m) or foveal cyst lesions and distortion of foveal contour. Exclusion criteria were, patients with previous history of steroid treatment, change of treatment options during the follow-ups and history of pars plana vitrectomy or cataract surgery within 6 months preceding the start of the trial and age-related macular degeneration. The diagnosis of NVG in our study was

confirmed through slit lamp examination and gonioscopy confirming presence of neovascularisation of the iris or angle with high IOP assessed through Goldman tonometry. Once diagnose was confirmed patients were divided into neovascular and control groups. Subsequently, characteristics and risk factors involved thereof were also properly examined.

At the very outset, patients' demographic data which included, their age, gender, laterality, presence of hypertension, diabetes mellitus, cerebrovascular attack, and hyperlipidaemia were recorded. Similarly, data about duration of visual disturbance was also recorded. Baseline lens status, baseline and final BCVA, and IOP were recorded. The presence of SRF and CRT was measured using optical coherence tomography. The CRTs at the one, two- and six-months follow-up were assessed and the total number of IVBs after 6-month follow-up were recorded. The interval between the doses was also recorded.

Data was collected, entered, and analyzed using SPSS software version 23. Mean and SD were calculated for numerical variables like age, number of eyes, baseline and final IOP, BCVA and CRT thickness. Frequencies and percentages were calculated for categorical variables like gender, affected eye, baseline lens status, presence of systemic diseases, type of CRVO and presence of baseline SRF. Chi square test was used for comparing categorical variables while independent t test was used for comparing numerical variables such as age, baseline and final BCVA, baseline and final IOP, baseline, one month, two-month, six month and final CRT keeping P value  $\leq$  0.05 as significance. Furthermore, for identification of factors associated with NVG development, we used binary logistic regression analysis.

## Results

In Neovascular Group, mean and SDs for age was  $77.60 \pm 7.0$  years. Mean and SDs for duration of visual disturbance was  $2.72 \pm 1.30$  months. Mean and SDs for interval between the doses was  $1.88 \pm 0.66$  months. Mean and SDs for total number of intravitreal injections was  $2.40 \pm 1.00$ .

In Control Group, mean and SDs for age was  $73.68 \pm 6.45$ . Mean and SDs for duration of visual disturbance was  $4.00 \pm 1.63$ . Mean and SDs for interval between the doses was

$2.040 \pm 0.67$ . Mean and SDs for total number of intravitreal injections was  $2.30 \pm 0.90$ . Mean and SDs for final CRT thickness in the two groups is shown in Table No. 1. Mean difference between both the group was  $42.23 \mu\text{m}$ . (P Value  $< 0.001$ ). (Table No. 2).

As per binary logistic regression, final CRT thickness at final follow up was not significantly associated with the development of NVG in patients with CRVO who were treated with IVBs ( $p=0.914$ ). (Table No. 3).

**Table No. 1 Descriptive Statistics of Study (n=50)**

Group		Mean	Std. Deviation
Neovascular Group (n=25)	Age (Years)	77.640	7.0527
	Duration of visual disturbance (days)	2.720	1.3077
	Interval between the doses	1.880	.6658
	Total number of intravitreal injections in past six months (n)	2.400	1.0000
	Baseline best corrected visual acuity (LogMAR)	1.1728	.09847
	Baseline intraocular pressure (mmHg)	15.7164	.45770
	Baseline CRT ( $\mu\text{m}$ )	537.6512	31.03730
	Final best corrected visual acuity (logMAR)	1.4168	.00748
	Final intraocular pressure (mmHg)	18.1620	1.50069
	Final CRT thickness ( $\mu\text{m}$ )	410.3164	69.02714
Control Group (n=25)	Age (Years)	73.680	6.4532
	Duration of visual disturbance (days)	4.000	1.6330
	Interval between the doses	2.040	.6758
	Total number of intravitreal injections in past six months (n)	2.320	.9000
	Baseline best corrected visual acuity (LogMAR)	.7204	.04315
	Baseline intraocular pressure (mmHg)	14.8128	.70989
	Baseline CRT ( $\mu\text{m}$ )	471.4440	48.32423
	Final best corrected visual acuity (logMAR)	.7396	.13542
	Final intraocular pressure (mmHg)	16.5648	1.21925
	Final CRT thickness ( $\mu\text{m}$ )	368.0852	72.51246

**Table No. 2 Comparison of various variables between the two groups (n=50)**

Numerical Variables	Group	Mean	SDs	Mean Differences	P Value
Age (Years)	Neovascular Group	77.64	7.053	3.960	0.044
	Control Group	73.68	6.453		
Baseline BCVA (LogMAR)	Neovascular Group	1.1728	.09847	0.452	0.000
	Control Group	.7204	.04315		
Baseline IOP (mmHg)	Neovascular Group	15.7164	.45770	0.903	0.000
	Control Group	14.8128	.70989		
Baseline CRT (um)	Neovascular Group	537.6512	31.03730	66.207	0.000
	Control Group	471.4440	48.32423		
Final BCVA (logMAR)	Neovascular Group	1.4168	.00748	0.677	0.000
	Control Group	.7396	.13542		
Final IOP (mmHg)	Neovascular Group	18.1620	1.50069	1.59	0.000
	Control Group	16.5648	1.21925		
Final CRT thickness (um)	Neovascular Group	410.3164	69.02714	42.23	0.000
	Control Group	368.0852	72.51246		

**Table No. 3 Factors Associated with Development of Neovascular Glaucoma in patients with CRVO treated with IVBs (n=50)**

Parameters	OD Ratio	95% C.I.		P Value
		Lower	Upper	
				0.176
Age	1.101	0.958	1.265	0.976
Interval between the doses	.984	0.341	2.836	0.931
Total number of intravitreal injections in past six months	1.033	0.494	2.160	0.812
Baseline best corrected visual acuity	0.393	0.000	880.966	0.876
Baseline intraocular pressure	0.890	0.205	3.855	0.408
Baseline CRT	0.992	0.973	1.011	0.618
Final best corrected visual acuity	3.812	0.020	735.354	0.920
Final intraocular pressure	0.972	0.565	1.674	0.649
Final CRT thickness	0.996	0.981	1.012	0.914

## Discussion:

Over the years, the injection of IVB has been widely used for the treatment of MO in patients presented with CRVO<sup>17</sup>. It is worth mentioning here that the injection of IVB has also been used in patients with NVG for inducing regression of anterior segment neovascularisation<sup>18,19</sup>. In this study, we assigned the patients presented with NVG to neovascular group while without NVG to control group in order to draw comparison between both groups in terms of various variables.

It was interesting that at the baseline, patients in the neovascular group showed a worse logMAR for BCVA. This was mainly because the presence of SRF and ischaemic CRVO that was frequently examined in the neovascular group. Similarly, Celik et al.<sup>20</sup> reported that poor VA prognosis is related to SRF as it occurs in CRVO as a result of external limiting membrane breakdown with movement of intraretinal fluid into the subretina. And due to the severe structural damage in ischaemic CRVO it is related to a higher incidence of SRF and worse logMAR BCVA. The final logMAR BCVA has also been poor in the neovascular group.

Rong et al<sup>16</sup> reported mean interval between the last injection and NVG beginning was about 7 months. Risk factors for the development of NVG is due to the presence of an ischaemic-type CRVO and subsequently a higher CRT at the 1-month follow-up. BCVA is known to be the most accurate predictor of NVG development in CRVO<sup>3</sup>. Similarly, poorer BCVA was noted in the neovascular group in this study but was not a risk factor. The reason was that we enrolled those patients who were having CRVO with MO and were administered with IVB treatment at the initial visit. Hayreh et al.<sup>21</sup> reported higher incidence NVG in cases with ischaemic CRVO (40%) compared to cases with a non-ischaemic CRVO (10%). It is interesting that the association between

higher CRT at 1 month and the NVG development is closely interrelated but, in our study, as per binary logistic regression, ischemic type and final CRT thickness at final follow up was not significantly associated with the development of NVG in patients with CRVO who were treated with IVBs (P= 0.914).

The mean CRT was final CRT thickness in neovascular group was  $410.31 \pm 69.02$   $\mu\text{m}$ , however, some patients showed CRT  $\geq 300$   $\mu\text{m}$ . This finding was in contrast to our expectations since NVG is related to high levels of VEGF, and a higher CRT should be observed at the time of NVG diagnosis. Several reports have mentioned that vitreous VEGF levels correlate with CRT in diabetic macular oedema (DMO) and VEGF diffusion from the posterior toward the anterior segment<sup>6,22,23</sup>. However, a contradiction between MO and neovascularization has also been observed in the relationship between DMO and diabetic retinopathy (DR). In the VIBIM study<sup>24</sup>, which used a treat-and-extend regimen trial with aflibercept for treating DMO, DR was aggravated in some cases with a reduced number of anti-VEGF injections, although the DMO was successfully controlled, suggesting that anti-VEGF may not suppress the aggravation of DR for more than 4 months, consistent with Protocol S at DRCR<sup>25</sup>.

The main limitation of this study was its small sample size and single centered study due to which its results cannot be generalized to overall population. Multi centered randomized control trials are recommended for robust results across the country.

## Conclusion:

This study demonstrated that ischemic-type CRVO and CRT thickness at the time of final follow up was not significantly related to the development of NVG in CRVO patients who were treated with IVBs.

**Conflict of Interest:**

Nil

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# Asthenopia and Coping Strategies Used Among University Students of Islamabad Attending Virtual Classes

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## ABSTRACT

**Objectives:** To outline the asthenopic symptoms found in students due to virtual classrooms and the severity of visual discomfort in them, the association between asthenopia and digital working hours of students and to find out the coping strategies used by students to relief this visual discomfort.

**Methodology:** A cross-sectional study was carried out at 4 different universities of Islamabad from May 2021 to September 2021. A total of 380 students were studied who met inclusion criteria during this research. The visual symptoms were assessed using a structured questionnaire developed by Conlon et al. with some modifications according to the need and limitations of the study.

**Results:** The results showed that out of a total of 380 students, asthenopia was found in significant number of respondents .i.e., 60.3% (N=229) amid use of digital screens for attending online classes and studying purposes. Among coping strategies, taking regular breaks (41.30%) and use of adjustable screen (28.70%) were prominent. The results also showed an association of asthenopia with refractive error and digital working hours.

**Conclusion:** The present study concluded that asthenopia is a common ocular finding in university students attending online classes. Efforts are needed to make students aware of the importance of public health to overcome this problem and perform their studies better. *Al-Shifa Journal of Ophthalmology* 2022; 18(1): 14-22. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.

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Originally Received: 12 January 2022

Revised: 22 February 2022

Accepted: 3 March 2022

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## Introduction:

Asthenopia or eye strain is one of the main public health issues that students experience during their academic years<sup>1</sup>. More than 65% of computer users have symptoms of Asthenopia at some stage, such as eye discomfort, dry eyes, headache, and double vision after prolonged exposure to digital screens or near work<sup>2,3</sup>. With the consolidation of new advances, the Internet and electronic games became instruments of limitless use. Lockdown and social removing during the COVID-19 pandemic caused expanded utilization of digital devices, representing a more danger of creating digital eye strain-related side effects<sup>4</sup>. The "Computer Vision Syndrome" is another expression for asthenopia that has been characterized by the American

Optometric Association (AOA) <sup>5, 6</sup>. In general, impacts rely on the time of use, posture, and the type of gadget used<sup>7</sup>.

The term asthenopia describes several incidental effects related to the visual framework, especially during near work<sup>8</sup>. Previous assessments showed that the most notable reasons for Asthenopia are uncorrected refractive errors, accommodative dysfunctions' vergence characteristics, lighting conditions, and muscle imbalance<sup>9</sup>. Thus, Asthenopia can be internal and external. Internal Asthenopia is by and large a direct result of uncorrected refractive errors and accommodation issues, while deficient including lighting is responsible for external Asthenopia<sup>10, 11</sup>.

Asthenopia is a common complaint among patients attending eye care settings<sup>12</sup>. Research shows that as many as 90% of people using computers for more than 2 h a day face vision-related symptoms. The people who spend 4 h a day or more working on computer screens suffer a much higher severity of asthenopic symptoms as compared to those working for less than 4 hours<sup>13, 14</sup>. These symptoms may be associated to other problems of workstations, jobs, and vision issues such as convergence insufficiency, refractive error, accommodation, visual skills, ocular physiology, or problems with spectacle lens design<sup>15, 16</sup>.

Treatment for Asthenopia exists; however, the first step is the proper diagnosis<sup>17</sup>. Many of us experience Asthenopia once in a while; however, we never accept it as a major issue that might lead to serious issues later. Home-imprisonment during this pandemic has brought with it certain negative lifestyle practices. Previous studies have shown that eye strain is directly related to the duration of screen time as also observed in the current study. However, we found that the median Digital eye strain (DES) scores were higher in

those who had a higher jump in screen time during the pandemic.

Because of the increasing use of digital devices (I.e., mobile phones, tablets, computers, and so on) and reducing physical activity, Asthenopia is rising. The WHO (World Health Organization) public statement (1998) clearly stated that glare and reflections from digital devices can cause eye fatigue and brain pain. The prevalence of Asthenopia was 57% in Chinese students<sup>18</sup>. Besides workload, excessive time spent on PC and time spent on handheld digital devices we suppose was significantly related to eye fatigue/asthenopia in this review.

DES (digital eye strain) is an extremely normal issue influencing a huge number of people. The 2016 Digital Eye Strain report, which included study reactions from more than 10,000 US grown-ups, noticed prevalence of 65%, with females more frequently affected than males<sup>19</sup>. DES is more pronounced among people who use two devices at the same time. A review of various examinations in children shows that the predominance of Asthenopia and certain indications range from as low as 15% to more than 80%. Migraine is one of the most widely recognized side effects listed in many investigations<sup>20</sup>. Although many studies are led on computer users to show the presence of Asthenopia, but barely any reports are available in regard to university students. Eye fatigue/eye fatigue involves a rare problem that causes eye discomfort. An Intensive load of close work, extended academic burden, and PC/screen use can affect eye fatigue<sup>21</sup>.

Public health research in relation to Optometry has continued to evolve during the COVID-19 pandemic<sup>22</sup>. However, awareness of the associations between ocular health and digital devices practice is still necessary to develop protection protocols and to provide awareness regarding guidelines. When most eye care



practitioners are unaware of how to protect our vision, the global pandemic will rapidly ignite an era of prominent increase in ocular health problems in the society.

### **Materials and Methods:**

The study was conducted at 4 universities of Capital; Bahria University Islamabad, Air University Islamabad, National University of Modern Languages (NUML) and Ira University Islamabad. Sample size for this study was 380 with age range within 18 to 29 yrs. The study population included Students from these four universities who have attended or were attending online classes for the last 6 months. Convenient sampling technique was used to choose universities offering virtual classes during pandemic and students were also chosen by convenient sampling method. Before beginning with the study, ethical approval was obtained.

Data was collected using structured questionnaire adapted from previous studies<sup>23,24</sup>. The questionnaire was distributed both online and in person to students. The study was conducted after approval has been accorded by institute's ethical committee and permission from respective universities. As four universities of Islamabad were taken, students were selected for the study by convenient sampling method taking into consideration of the inclusion and exclusion criteria. Moreover, that the confidentiality was ensured in their consent form and purpose of the study was explained as well. The content validity of questionnaire was checked before starting data collection by circulating it to experts in the field including Supervisor and pilot study (Cronbach's alpha 0.753). The questionnaire was divided in 4 sections. The first section consisted of Demographic profile that includes Age, gender of respondent and university. Second section consisted of assessment factors and ocular history that includes pattern of use of digital device and history of using glasses

previously. Third section consisted of symptoms and severity of asthenopia. The last portion consisted of understanding and coping strategies used to overcome the problem.

Data analysis was done in two phases; Descriptive analysis and Inferential Statistics. Categorical data was presented in the form of percentages and frequencies. All the data were entered and analyzed by using Statistical Package for Social Sciences (SPSS) V .17. Before beginning of analysis data cleaning was done and errors were omitted by reconsidering questionnaires. Next step was data transformation in which multiple continuous variables were transformed into categorical ones (Assessment, symptoms and coping). Then the descriptive analysis and inferential statistics analysis was done in end. Chi-square test of independence was used for finding association between asthenopia and different independent variables. This test was applied on all applicable independent variables. A significance level of 5% was used for all inferential statistics.

### **Results:**

Out of total 380 students, 229 (60.3%) appeared to be asthenopic due to use of digital screen while attending online classes and study (Table 1). For maximum respondents, severity of discomfort was mild i.e., 45.8% (N=174), while some reported as moderate i.e., 37.1% (N=141). The most reported symptom according to structured questionnaire was headache (66.30%) and watery eyes (67.90%). Rather than these many students complained of blurry vision (58.2%) and jumbling / missing words (52.5%).

Chi square test was used to find out the association between asthenopia and underlying factors. There was strong association seen between asthenopia and duration of taking classes online, similarly

use of digital screen for studying was also found associated with asthenopia as the results were significant ( $p=0.057$ ). There was also seen strong association between presence of refractive error in students using digital screen and asthenopia ( $p=0.000$ ). (Table 2).

Respondents were found using some coping strategies to ease their complaints related to asthenopia among which the highest ratio was of taking regular breaks i.e., 41.30%, and using adjustable screen (28.70%). Adjustable chair, antiglare glasses and eye drops were also contributory factors. (fig.1)

*Table 1. Frequency of asthenopia*

<b>Asthenopia</b>	<b>frequency</b>	<b>Percent</b>
<b>Absent</b>	151	39.7%
<b>Present</b>	229	60.3%

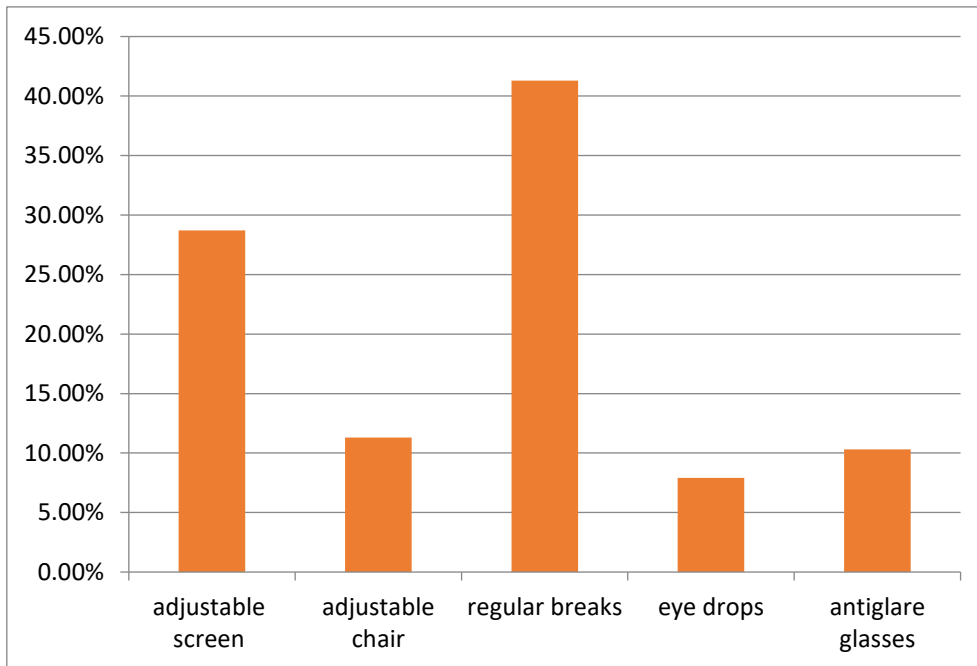


Figure 1. Coping strategies for Asthenopia

Table 2. Association of asthenopic symptoms with underlying factors

	No Asthenopia	Asthenopia	Df	P value
Factors	Frequency			
<b>Lightening conditions:</b>				
Bright	47	63	2	0.690
Dim	55	92		
Dark	49	74		
<b>Device used :</b>				
Mobile	24	22	3	0.259
Laptop	65	115		
PC	56	84		
Tablet	6	8		
<b>Working /study hours:</b>				
<4hrs	37	37	3	0.057
4-5hrs	65	115		
6-7hrs	18	41		
>7hrs	31	36		
<b>Routine :</b>				
Interrupted	72	116	1	0.322
continuous	79	113		
<b>Time :</b>				
1 year	40	41	2	0.014
2 years	76	105		
>2 yrs.	35	83		
<b>Classes schedule :</b>				
Daily	16	109	2	0.000
Alternate days	17	106		
weekends	118	24		
<b>Work/study time:</b>				
Day	78	104	1	0.139
Night	73	125		
<b>Classes preferred:</b>				
Online	71	98	1	0.240
On campus	80	131		
<b>Need of eye exam felt:</b>				
No	129	27	2	0.000
Yes	14	95		
Sometimes	8	107		
<b>Felt effect on lifestyle:</b>				
No	118	24	2	0.000
Yes	17	96		
Sometimes	16	109		
<b>Refractive error</b>				
No	111	58	2	0.000
Yes	12	107		
I don't know	28	64		
<b>Wearing glasses/lenses</b>				
No	129	27	2	0.000
Yes	14	95		
Sometimes	8	107		

## Discussion:

Asthenopia or digital eye strain is an emerging public health risk and it is directly proportional to the duration of exposure or use of digital screen. The present study on the association of asthenopia with virtual classes tells that asthenopia is a typical visual finding in a significant number of respondents. This review is the first of its sort to characterize the frequency of asthenopia and adapting systems among college students going to virtual classes in Pakistan. The results displayed the frequency of asthenopia to be 60.3% in a sample of 380 in University students due to computerized gadget use. In the review in Lebanon, which embraced a similar meaning of Asthenopia as this review, the prevalence of asthenopia was 67%. A high prevalence of asthenopia was additionally found among other few nations: Malaysia 89.9%, China 53.5%, Egypt 86%, and as of late in Iran 70.9%<sup>25</sup>.

Out of 10 basic symptoms, headache (66.3%) and dry eye (67.9%) were the most well-known in our population. Unfortunately, no studies assessing the prevalence of headache/dry eye among the Pakistan population were found, making it an interesting point to look at in future. Of the symptoms of asthenopia, dry eye or watering from eyes turned out to have the highest prevalence 67.9%. Numerous different authors have claimed that headaches or migraines are related with uncorrected refractive errors. In this study maximum, students were using laptops for reading and for taking classes. No significant association was found between asthenopia and lightning conditions. Furthermore, no significant affiliation was found between the kind of computerized gadget and asthenopia. The study shows that in university students attending online classes, there is a statistically significant association between digital study hours and visual distress, which strengthens the statement that near and prolonged work on-screen accounts for the majority of

asthenopic symptoms. There was no affiliation found between educational level and asthenopia.

There was an important relationship between working hours and asthenopia ( $P = 0.05$ ). During the study, it was noticed that a few students had no subjective complaint but after filling, a questionnaire was classified as asthenopic. It implies that possibly they are having those symptoms yet are not accepting them as a significant issue or that the patients can't clarify their subjective symptoms identified with asthenopia or perhaps they are unaware of the term asthenopia. A strong association was seen between asthenopia and glasses/contact lens wearers and as well as the presence of refractive error. Like our outcomes, contact lens users in India were viewed as at significantly higher risk of encountering blurred vision, headache, and dry eyes as in CVS<sup>26</sup>.

A strong association was seen among asthenopia and glasses/contact lens wearers and furthermore with the presence of refractive error. According to results, 147 students out of 380 reacted that they for the most part invest their energy working in the dim lighting environment. More than half of the students were indulged in working at evening time as compared to day which may likewise be the genuine aim for some symptoms. People who utilized the gadget for less than 4 hours were at 2.3 times less chances to develop asthenopia than the individuals who used it for longer ( $P = 0.05$ ; Table 2). This finding is like the Shanghai study, which also showed that students using digital devices for 3 hours or more were at more risk of developing asthenopia like people who utilized the gadgets for less than 3 hours<sup>27, 28</sup>.

The most common complaint amongst students was a headache. Astigmatism was found to be the most common cause of asthenopia. Female patients were more likely to complain of asthenopia than

males. The people who have been utilizing their gadget for under a half year were less likely to develop asthenopia than the people who have been using devices for longer (Table 2). No clear association was found among asthenopia and digital devices use in dark despite contrasting evidence. In this study, 43% of the students embrace taking regular breaks in the middle of work as preventive measures. Our outcomes showed a significant relationship between preventive measures and asthenopia. Hence, taking consistent breaks is protective for eye strain from digital device use that is by the American Optometric Association that promotes the 20-20-20 standard<sup>29</sup>.

At long last, our outcomes show that utilizing adjustable screens is likewise a regularly utilized preventive measure for asthenopia. One study presented that asthenopia was minor in subjects whose looking distance was more than 30 cm and highest when it was under 30cm<sup>30</sup>. As, that only 28.70% of the students in our study use an adjustable screen and there is a likelihood that students who felt most of the eye strain were the ones who were using adjustable screens trying to limit their eye symptoms.

Likewise, as this was a cross-sectional study so temporality couldn't be established. Standard breaks were more usually utilized by 41.3% of our population. Further studies to associate asthenopia with binocular anomalies are needed for better understanding of the relationship between asthenopia and vision anomalies. In spite of the high presence of asthenopia in our population (60.3%), there is absence of knowledge about common strategies that are probably going to reduce their eye symptoms and thus there is the need to spread awareness about asthenopia and its coping strategies.

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# Responsiveness Towards Patients Seeking Eye Care in a Tertiary Eye Care Hospital of Rawalpindi

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## ABSTRACT

**Objectives:** To assess the level of responsiveness in a tertiary eye care hospital in Rawalpindi city and to find out the association between different domains of responsiveness and demographic variable.

**Methodology:** Study design was cross-sectional and carried out at OPDs of Al-Shifa Trust Eye Hospital of Rawalpindi. It included patients from three categories i.e., free, subsidized and private. A total of 358 respondents (<18 years of age) who came to hospital for follow-up checkup or who were admitted in hospital. Independent t test and one-way ANOVA was applied to check the relationship between different domains of responsiveness and demographic variables.

**Results:** Out of total 358 respondents, there were 175 males (48.9 %) and 183 females (51.1%). Three different categories of patients were selected to check responsiveness. Mean scores of different domains of responsiveness was calculated for each category. Mean scores of quality of basic amenities ( $24.89 \pm 2.45$ ) was highest. Choice of care ( $5.611 \pm 2.38$ ) had lowest mean scores which mean there was no freedom to choose a specialist. Different domains of responsiveness and average responsiveness vary between different OPDs.

**Conclusion:** Responsiveness was almost equal in private, semi-private and free patients which shows that patients are treated equally in health care facility. Although choice of care provider was low in free patients which needed to be improved and equal opportunity of selection of specialist should be given to them or either counselling should be done that they have to go through whole procedure to get checked from specialist. All the programs that aim to improve the quality of health care services responsiveness is a valuable contribution. Weaker domains of performance should be prioritized through activities and patient's perspective should be kept in mind. *Al-Shifa Journal of Ophthalmology 2022; 18(1): 23-29. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

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Originally Received: 11 February 2022

Revised: 28 March 2022

Accepted: 3 April 2022

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## Introduction:

National health systems well-recognized key objective is responsiveness. World Health Organization's new framework for health system performance includes fairness of financing, health and responsiveness as the three goals of the health system. "Responsiveness in the context of a system can be defined as the outcome that can be achieved when institutions and institutional relationships are designed in such a way that they respond properly to the universally legitimate expectations of the individuals"<sup>1</sup>. The capability of a health system to meet the population's



expectations regarding non-financial and non-medical aspects of the care is considered as health system responsiveness. A responsive health system is considered to contribute to individual and collective health enhancement by being more encouraging for individuals to seek medical care.<sup>2</sup> Health system responsiveness concept was first developed and empirically studied by the WHO in international comparative analysis in the early 2000s, i.e., Multi Country Survey Study (MCSS) and World Health Survey.<sup>2</sup>

Health systems responsiveness is particularly important for many underdeveloped and developing countries which are experiencing fast-paced social and economic development. A responsive health systems antedate and adapt to changing needs, improve quality of health service, eventually leading to better results related to health services.<sup>3</sup>

In year 2000, “WHO called this concept as responsiveness and considered it as an inherent goal for the evaluation of health systems”. In the literature it is also known as ‘patient experience’.

WHO proposed model of health system responsiveness consists of seven domains of non-medical aspects of health care; they fall in 2 categories: Respect for individuals (interpersonal), Customer oriented (structural).<sup>4</sup> The concept of responsiveness has been operationalized in seven domains:<sup>5</sup> Dignity, Autonomy, Privacy and confidentiality, Prompt attention, Quality of basic amenities, Access to social support networks, Choice of medical providers.<sup>6</sup>

In the developing countries most patients let their caregivers decide about their treatment rather than themselves being involved with the treatment and care.<sup>7</sup> A WHO survey highlights that dignity and prompt attention had the highest importance rates across 35 and 41 countries and a summary of responsiveness score highlights large variability worldwide from

(3.69 to 8.10, on a scale 1 to 10). Coulter et al., Higher variability was found for patient’s involvement and on doctor-patient communication, decisions related to treatment and choice of healthcare provider around 8 countries (Italy, Poland, Slovenia, Switzerland, UK, Sweden, Germany and Spain).<sup>8</sup>

Based on general health system performance and responsiveness level World Health Report ranked 191- member states. Based on this report, Pakistan ranked 122 on the overall health system performance score 121 on the responsiveness level. However, it is worth mentioning that these figures were not directly measured for Pakistan because they were imputed from the data from the other countries.

In the developed countries of Europe or in the United States and Canada, most research studies have been undertaken and corresponding research in the developing countries is lacking. Due to difference in the way they organize, finance and deliver healthcare research conducted in the developed countries cannot be generalized to the developing countries. Secondly, due to the differences in socio-demographic characteristics including disability, disease patterns and prevalence of poverty in the populations of developed versus developing countries.<sup>9</sup>

For assessing some of the quality aspects of eye health care system in Pakistan WHO’s responsiveness concept can be applied. The aim of study was to find how domains of responsiveness are performing in the eye care facilities. There are several demographic variations among the patients, which influence the degree of responsiveness from patients.

Pakistan is facing massive burden of eye diseases and hence increase in number of eye disease related patients. This requires effective and efficient measures to be taken

at all socio-ecological levels. One of the many ways to build up eye health systems is to increase responsiveness and eye care at primary level is almost non-existent in most developing countries. The production of data that can help doctors and people at upper level to identify and address unsatisfactory factors in the care they provide this study hopes to fill this void.<sup>10</sup> Main objectives were to assess the barriers that limit the responsiveness of patients to hospital. To assess the level of responsiveness in a tertiary eye care hospital in Rawalpindi city. To find out the association between different domains of responsiveness and demographic variable.

### **Materials and Methods:**

A cross sectional study was conducted in OPDs of Al Shifa Trust Eye Hospital Rawalpindi. Study duration was from September 2021 to March 2022. Sample size was calculated using  $N = \frac{z^2 (p \times q)}{e^2}$  including prevalence 67% as good responsiveness and margin of error as 5%, sample size came out was 340 and by adding 5% non-response total sample size was 358.<sup>11</sup> Patients were selected conveniently from three categories i.e. free, subsidized and private were selected. Data was collected from all the patients coming to the hospital OPD; interview-based questionnaire was used. Data was collected during OPD timings using WHO standard responsiveness questionnaire that has 36-items, demographic variables (6 Items) and questions related to seven domains of responsiveness. All the data collected from participant was analyzed by using statistical

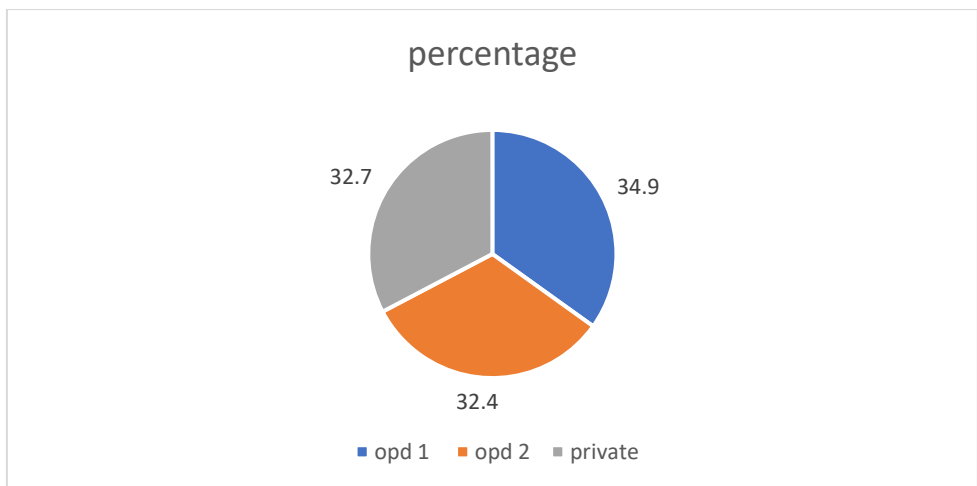
package for social sciences (SPSS). Categorical variables were analyzed using percentages and frequencies. Continuous variables were analyzed using mean and standard deviation. One way ANOVA test was used to find associations.

### **Results:**

A total of 358 who were fulfilling the criteria were interviewed. Majority of the respondents were females (51.1%). Equal numbers of patients were selected from all OPDs Figure 1.

Lowest mean scores were related to choice of care ( $5.611 \pm 2.38$ ) which means there was no freedom to choose a specialist. Highest mean scores were related to quality of basic amenities ( $24.89 \pm 2.45$ ) Table 1. Mean scores of different domains of responsiveness was calculated for each category also. Dignity was highest in OPD 2(subsidized) patients and was least in OPD 1(free) patients. Autonomy was highest in private patients and lowest in free patients. Confidentiality was almost same in three categories. Prompt attention was much lower in private patients as compared to OPD 2(subsidized) patients. Social support network was lowest in free patients. Quality of basic amenities was almost same in three categories was relatively good in free patients. Choice of care provider was very low in free patients as compared to private patients Table 2.

One-way Anova was used to find out the significance level between the length of stay and responsiveness domains Table 4.



**Figure 1 Patients in different OPDs**

**Table 1: Mean scores of different dimensions of responsiveness**

Sr no	Dimensions	Mean ± SD
1	Dignity	15.15 ± 1.707
2	Autonomy	6.66 ± 1.373
3	Confidentiality	7.64 ± .799
4	Prompt attention	7.80 ± 2.29
5	Social support network	7.15 ± 1.34
6	Quality of basic amenities	24.89 ± 2.45
7	Choice of care	5.611 ± 2.38
8	Overall responsiveness (self-reported responsiveness)	7.71 ± 1.245
9	Total responsiveness	74.91±6.36

**Table 2: Mean scores of responsiveness on the basis of three types of OPDs**

Category	Dignity	Autonomy	Confidentiality	Prompt attention	Social support network	Quality of basic amenities	Choice of care
	Mean ±SD	mean±SD	mean ± SD	Mean ± SD	mean ± SD	mean ± SD	mean ± SD
Free	14.87±1.81	5.92±1.329	7.55±.928	7.600±2.055	6.84±1.303	25.60±2.09	3.53±1.90
Subsidized	15.37±1.466	6.77±1.244	7.57±.825	9.232±2.099	6.92±1.653	24.87±2.52	6.09±1.96
Private	15.17±1.77	7.35±1.139	7.80±.575	6.615±1.946	7.717±.763	24.15±2.54	7.35±1.36
F(df)	2.737(2)	40.7(2)	3.604(2)	49.16(2)	16.69(2)	11.05(2)	146.7(2)
P-value	0.66	.000	.028	.000	.000	.000	.000

**Table 3: Independent t test gender and overall responsiveness**

Gender	N	F	t(df)	P value
Male	175	.364	2.624(356)	<b>.009</b>
Female	183			

**Table 1: Total length of stay at hospital and different domains of responsiveness**

Length of stay at hospital	Dignity Mean ±SD	Autonomy Mean± SD	Confidentiality Mean ± SD	Prompt attention Mean ± SD	Social support network Mean ± SD	Quality of basic amenities Mean ± SD	Choice of care Mean ± SD
OPD patient	15.50±1.196	6.700±1.17	7.83±.592	9.133±2.27	6.84±1.303	25.60±2.09	3.53±1.90
1-2 hrs	15.2±1.64	6.80±1.32	7.74±.638	8.04±2.221	6.92±1.653	24.87±2.52	6.09±1.96
2-4 hrs	14.7±1.890	6.4±1.51	7.51±.954	7.30±2.18	7.717±.763	24.15±2.54	7.35±1.36
4-6 hrs	14.6±1.86	6.32±1.334	7.07±1.18	6.71±2.20	7.17±1.27	24.7±2.36	4.82±2.19
More than 1 day	15.2±1.50	7.50±1.0	8.00±.000	4.75±.95	7.50±1.0	25.2±1.7	7.25±1.5
P-value	0.66	<b>0.000</b>	<b>0.001</b>	<b>0.000</b>	<b>0.002</b>	<b>0.000</b>	<b>0.000</b>

### Discussion:

In the present study responsiveness towards patients in Al Shifa Trust Eye hospital was studied. Among the population studied responsiveness was checked in three different categories of patients coming to the hospital. Three categories were 1) Private 2) Subsidized 3) Free or deserving patients.

The present study, it was seen that lowest mean scores were related to choice of care ( $5.611 \pm 2.38$ ) followed by Autonomy ( $6.66 \pm 1.373$ ) and Social support network ( $7.15 \pm 1.34$ ). Highest mean scores were related to quality of basic amenities ( $24.89 \pm 2.45$ ). The findings of current study are somewhat different from the previous study. A study conducted in Pakistan measured the responsiveness of 18-45-year-old adults with physical disabilities of Federal Health system. Contrary to the present study which

showed lowest score were related to choice of care provider.<sup>9</sup>

Over-all and total responsiveness was also calculated. Over-all responsiveness was self-reported given on the score from 0 to 10. Over-all responsiveness was found out to be ( $7.71 \pm 1.245$ ) and total responsiveness was ( $74.91 \pm 6.36$ ). On the whole patients were satisfied and self-reported responsiveness was good.

Independent t test was used to check responsiveness of males and females. There was significant difference between responsiveness of males and females. The results of this study were consistent with another study that was conducted in Iran.<sup>12</sup>

In present study length of stay at hospital was also compared to domains of responsiveness and it showed that dignity was lowered with each duration but other

domains were consistent with the duration. Longer stay at hospital and increased waiting time will make patient anxious and will reduce their cooperation and hence this will create negative view of the hospital so this finding can be justified by this logic.

Frequency of each question in each domain was also found. Patients were satisfied about how they are treated in the OPD they told they were treated with respect in the OPD and they were encouraged to discuss their concerns freely. Dignity was a bit lower in free patients as compared to other categories but as comparison to another study dignity was not the lowest. In the field of disability management, the dignity of physically disabled persons was compromised due to lack of proper healthcare provider training.<sup>9</sup>

Autonomy was on the second lowest number which means patients are not properly provided with the information on alternative treatment options by HCP. Patients of free OPD and subsidized had the lowest mean value for autonomy and were partially satisfied by first question of autonomy which asked about information on alternative treatment but private patients were satisfied with the question asked. This domain response was consistent with another study conducted in Iran which showed autonomy was lowest in the patients.<sup>12</sup>

Patients showed very positive response about confidentiality questions. Patients of each OPD were satisfied that their information was kept confidential by the doctor. In another study conducted in Ethiopia results were same about confidentiality domains and this domain got the highest scores.<sup>13</sup>

Prompt attention was lowest in private patients and then in free patients and it was a bit better in subsidized patients. About 29.3% patients said that it was not easy for them to access the healthcare facility when

needed. About 30.4% complained about waiting time for consultation. Some private patients said that they even took online appointment but on reaching the facility they have to wait for their turn.

Choice of care was lowest of all of the domains. It was very low in free patients as compared to subsidized and private patients. About half of the patients complained that they are not given choice to select between health care providers and they are referred directly to a room or counter without being asked about their own choice. about 25.7% complained that they are not given chance to see a concerned specialist if they want to even though they are referred from different hospital to a specialized department but they have to go through a long procedure to reach that department or even given date to come for checkup. Our study showed the consistent results with another study conducted to check the health system responsiveness in patients admitted to west of Iran hospital, after the choice of care provider, independence and autonomy was lowest.<sup>12</sup>

### **Conclusions:**

In this study it is seen that choice of care provider and autonomy had lowest mean scores. Responsiveness was much better than other studies conducted. Responsiveness was almost equal in private, semi-private and free patients. Weaker domains of performance should be prioritized through activities and patient's perspective should be kept in mind. It is suggested that, for improving the health system patient's point of view should be considered and more attention should be paid to patient's rights by giving them information and policies should be planned by using local points of view.

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Data Collection / Assembly: Sidra Masood Shah,

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# Incidence of Infective Endophthalmitis in Patients Administered Intravitreal anti-VEGF injections in Clinical Settings at Polyclinic Hospital, Islamabad

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## Abstract:

**Purpose:** To assess the rate of Infectious Endophthalmitis after anti-vascular endothelial growth factor injection, and to evaluate incidence of infection rate in clinic-based setting.

**Method:** A prospective study was conducted under aseptic clinical conditions at the Ophthalmology department, Polyclinic Hospital in order to assess occurrence of infective endophthalmitis amongst patients who were injected with intravitreal Bevacizumab (Avastin). All patients were consecutively treated by a single surgeon with Intravitreal Bevacizumab using aseptic technique and sourced from the same supplier over a three-year period from January 2019 to December 2021.

**Results:** This is a recent advancement for the cure of one of four clinical indications; Diabetic Retinopathy found in 58% of studied patients, Retinal vein occlusion found in 12% of studied patients, Vitreous hemorrhage found in 23% of studied patients and Age-Related Macular Degeneration found in 7% of studied patients. Total number of patients included in the study were 500. During this period only one patient developed Infective Endophthalmitis who presented within 48 hours and was treated accordingly.

**Conclusion:** No increase in Infective Endophthalmitis was observed when administering Anti Vascular Endothelial Growth Factor (anti-VEGF); Avastin in clinical settings under sterile conditions. *Al-Shifa Journal of Ophthalmology 2022; 18(1): 30-36.* © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.

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Originally Received: 23 January 2022

Revised: 9 March 2022

Accepted: 24 March 2022

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## Introduction:

Retinal disorders such as proliferative diabetic retinopathy, diabetic macular edema, retinal vein occlusion's, age related macular degeneration and neurovascular glaucoma are now all being treated using intravitreal injections of anti-vascular endothelial growth factor (anti- VEGF).

Fortunately, endophthalmitis after anti-VEGF is rare. However, it being rare means it is all the more important to document and prevent the causes and detect slight variation in procedures that may be the cause of infection.

Recently, the number of cases of endophthalmitis occurring as a result of intravitreal anti-VEGF injections has increased, largely due to the dramatic increase in the number of injections

performed annually <sup>(11)</sup>. The number of injections has increased so much that intravitreal injection is now second to cataract surgery as the most common treatment procedure across most tertiary centers in Europe and the United States <sup>(5)</sup>. Indications of anti-VEGF injections has multiplied during the last few years so much that it is now considered a routine procedure in the ophthalmology departments of hospitals worldwide. <sup>(12)</sup>

With an increase in intravitreal procedures, administrative applications have also evolved, conditions and circumstances have changed and with an increased emphasis on creating better sterilization in clinics there has been seen an increasing trend towards clinical based procedures. This relieves burden on operation theatres. It also relieves patients from the stress of being taken to the theater whilst giving them a sense of calm and comfort. Office-based intravitreal therapy is now routinely performed as a set practice in the developed countries <sup>(4)</sup>. Such interventions are also possible in a country like Pakistan where poor hygiene is a major concern. The injections can be administered safely in a clinic-based setting while following standardized sterilization protocols <sup>(12)</sup>.

### **Material & Methods**

A three-year prospective case study was conducted at the Ophthalmology Department at Polyclinic Hospital Islamabad, Pakistan from January 2019 to December 2021. Routine history and data were collected from patients as per hospital protocols. For the purposes of this study, data related to patients who received intravitreal anti-VEGF injections included their Name, Age, Gender, Serial number on OPD Ticket, diagnosis of disease and treatment.

Patients presenting themselves at the OPD with one or more of the 5 inclusion criteria were included in this study. These were; 1. Macular edema, 2. Diabetic Retinopathy, (proliferative or advanced), 3. Vitreous

Hemorrhage, 4. Central/Branch retinal vein occlusion 5. Age Related Macular Degeneration. For qualifying patients, one type of anti-VEGF injections were used. The injected amount was 0.1 ml of 1.25 mg Bevacizumab (Avastin).

Patients excluded from this study were those with 1. tractional retinal detachment, 2. fibrovascular proliferation, 3. non-resolving vitreous hemorrhage and 4. patients who had already received at least 3 injections and had shown no sign of improvement. The patients were prepared for the injection after taking verbal/ written informed consent. The affected eye of the patient was then marked and instilled with topical anesthetic Proparacaine Hydrochloride 0.5% (Alcaine) eye drops given 3 times at 5-minute intervals and pre injection antibiotic Moxifloxacin (Vigamox) eye drops. The surface and exterior of the eye was cleaned using 5% Povidone- Iodine (pyodine solution) from the forehead to side of nose and half cheek.

Standard sterilization protocols were followed. Data was documented for each administration. Injections were prepared by Shifa International Hospital, Islamabad every Friday Morning and brought in the same day by patient on Ice pack. Before injecting the following steps were taken. Visual Acuity using Snellen chart, IOP measurement with Topcon air puff tonometer, slit lamp examination of the anterior segment. Fundus examination using 90 D lens. Once the eye was prepared, the patients were injected at the site of inferotemporal region, 3.5 mm from the limbus. After injection antibiotic eye drops were given for 5 days and self-care instructions were explained. The patients were counseled and given written instructions regarding the symptoms of Infective Endophthalmitis and it was emphasized to report back immediately in case any symptom appeared; i.e., sudden onset of ocular pain, sudden decrease in visual acuity, swollen or puffy eyelids,



conjunctival redness. During follow up visit, the patient was examined on slit lamp and posterior segment with 90 D lens. Visual acuity was taken by Snellen's chart, IOP measured by air puff tonometer and B scan was done.

### Results:

Post injection endophthalmitis was based on typical signs and symptoms including pain, decreased visual acuity, conjunctival hyperemia, anterior chamber reaction, hypopyon and vitritis which was managed accordingly. B scan ultrasound was also done to confirm activity present in the vitreous.

This study is based on a smaller sample size due to low flow of patients during Covid-19 Pandemic. Patients presented with indications of Diabetic Retinopathy were 58%, Vitreous hemorrhage 23%, Age Related Macular Degeneration 7%, and Retinal Vein Occlusion were 12% (Table 4). A total of 500 Injections were administered with no complication rates reported for Photophobia, Cataract or Retinal detachments. Subconjunctival hemorrhage was at 1.6% and raised IOP at 0.4%, there was a single case of Infective Endophthalmitis 0.2%. No systemic complications arose for acute hypertension, myocardial infarction or asthmatic attacks. There was 1 (0.2%) acute hypotensive episode and 2 (0.4%) hypoglycemic episodes, both of which were brought under control without incidence. (Table 1).

Most patients (73.8%) received 3 doses of Avastin, 4.8% found relief with less than three, whereas 7% required more. 14.4% of patients required Avastin and Photodynamic therapy (Pan Retinal Photocoagulation- PRP) (Table 5). Injection protocol was strictly followed for 100% of the patients with no deviation (Table 2). In terms of Demographics, patients age ranged from approximately 40 to 70 years of age and were almost equal for male and female. 55.4% of procedures were

done on the left eye and 44.6% on the right eye. 96.4% of patients were known diabetics. 37% were hypertensive and 11.6% suffered from ischemic heart disease (Table 3) There was 1 (0.02%) case of Infective Endophthalmitis, while no patient developed sterile inflammation or traumatic cataract (0%) (Table 1).

The lone Infective Endophthalmitis case was aged 56 years male with 14 years of diabetic history but none for hypertension. Indication for Avastin was Moderate Non-Proliferative Diabetic Retinopathy with Macular edema. This was his first intravitreal injection. He reported back within 48 hours complaining of sudden decrease in vision and conjunctival redness. When examined on slit lamp, there was corneal haze/ edema. Anterior chamber reaction, cells +++. Hypopyon 2mm. Pupil mid – dilated fixed with fibrin layer. Limited posterior view. B-Scan showed activity in the vitreous. Retina flat. IOP 22mmhg. Visual acuity was hand movement. Vitreous tap was taken and he was given intravitreal Vancomycin (0.1ml/2mg) and intravitreal Ceftazidime (0.1ml/2mg) along with topical moxifloxacin, cycloplegics and anti-glaucoma. He was then called for a follow up 48 hours later. On follow- up the vision had improved to Finger counting at 4 meter. Anterior chamber reaction showed cells ++, Hypopyon was 1mm, pupil mid-dilated with cyclopen. B scan showed slight improvement. Retina flat. IOP 18mmhg.

Vitreous tap showed no activity. However, the patient opted for vitrectomy and underwent surgery the following day. Upon follow-up visual acuity on Snellen's chart was 6/36 on 2nd post-op day. The patient was asked to report back in 2 weeks with continuing the prescribed post op medications (antibiotic + steroid combination eye drops, cycloplegics, anti-glaucoma). On follow-up visit, his symptoms had improved and he was comfortable. Visual acuity 6/24.

Table 1: Complications arising from the procedure

OCULAR	
Photophobia	0
Endophthalmitis	1 (0.2%)
Sub conjunctival hemorrhage	8 (1.6%)
Raised IOP	2 (0.4%)
Floater	1 (0.2%)
Retinal Detachment	0
SYSTEMIC	
Acute Hypotensive Episode	1 (0.2%)
Acute Hypoglycemic episode	2 (0.4%)
Acute Hypertension	0
Myocardial Infarction	0
Asthmatic attack	0

Table 2: Distribution of Injection protocol

Povidone Iodine	500 (100%)
Sterile Eye Towel Drape	500 (100%)
Sterilized instruments	500 (100%)
Sterilized gauze	500 (100%)
Surgeon Mask	500 (100%)
Office based	500 (100%)
Pre-op Antibiotics x 3 times	500 (100%)
Pre-op Alcaine x 3 times	500 (100%)
Post-op Antibiotics (moxifloxacin)	500 (100%)

Table 3: Patient Demographics

AGE	
<40 yrs	10 (2%)
41-50 yrs	68 (13.6%)
51-60 yrs	204 (40.8%)
61-70yrs	193 (38.6%)
>70yrs	25 (5%)
GENDER	
Male	267 (53.4%)
Female	233 (46.6%)
CO-MORBIDS	
Diabetes	482 (96.4%)
Unknown diabetic status	62 (12.4%)
Hypertensive	185 (37%)
Stroke	2 (0.4%)
Asthma	0
Ischemic heart disease	58 (11.6%)
LATERALITY	
Right	223 (44.6%)
Left	277 (55.4%)

Table 4: Indications at time of patient presentation

Diabetic Retinopathy	290 (58%)
Macular Edema	170
Advanced disease	120
Vitreous hemorrhage	115 (23%)
Wet AMD	35 (7%)
Retinal Vein occlusion	60 (12%)

Table 5: Hospital Management

<3 doses Avastin	24 (4.8%)
3 doses Avastin	369 (73.8%)
>3 doses Avastin	35 (7%)
Avastin + PRP	72 (14.4%)

**Discussion:**

At the Islamabad Polyclinic hospital, a specific day of Friday and time of 9 to 11 am was scheduled for intravitreal anti-VEGF Avastin injections. It allowed a controlled environment and controlled administration of the drug. General OPD was not conducted by the surgeon performing Injections.

The procedures were performed following standard guidelines as previously used in operation theatre settings. There was no learning curve for the consultant. Results were very promising. Outcomes were comparable to other similar studies. The incidence reported at the Polyclinic Hospital was 0.2%. Dossarps<sup>(2)</sup> et.al reported the incidence to be 0.025%, Fileta<sup>(3)</sup> et.al as 0.056% and Lyall<sup>(8)</sup> as 0.021%, whereas a study in Lahore by Haider<sup>(4)</sup> et.al

reported incidence at 0.028% and another in Islamabad by Shaheen<sup>(12)</sup> et.al as 0.01%. One study by Tabandeh<sup>(13)</sup> et.al reported no difference in the Infective Endophthalmitis incidence between the two settings in a comparative study.

It should also be noted that application of topical Povidone-Iodine for at least 180 seconds before each intravitreal injection could effectively reduce conjunctival bacterial counts and has become the standard of care for prophylaxis of intraocular infection<sup>(7)</sup>.

Other studies that evaluated risks of Infective Endophthalmitis during administration of Intravitreal Injections only in the operation theatre reported rates of 0%, 0.021% and 0.028%<sup>(16,19)</sup> which were close to findings done by doctors in clinical based setups.<sup>(4)</sup> The advantages clearly outweigh the risks, which are present even within operation theatre setup. With growing indications, the procedure has shifted from surgical operation theatre setting to a clinic-based setting in a number of hospitals<sup>(12)</sup>. The superiority of such a clinical setting cannot be denied in terms of logistics and time.

However, anti-septic protocols may vary in clinic-based settings. Surgeons must keep in mind the risks of infective endophthalmitis and evaluate constantly what is mandatorily required to keep the endophthalmitis rate low.

### Conclusions:

We found that the rate of clinically suspected endophthalmitis after anti VEGF injections is low when the procedure is performed in clinical settings under aseptic conditions. The findings have implications in terms of the patient convenience, efficiency and cost of administering these treatments. This also helps take the burden of using an Operation Theatre for simple techniques, saving time labor and infrastructure. As the number of such

procedures increase, ophthalmologists must maintain a rigorous approach, remain vigilant for sources of contamination and perform proper follow-up to prevent infection rates from increasing.

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# Incidence of Early Onset Presbyopia in Pakistan: A Population Based Descriptive Review

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## Abstract

**Purpose:** To study the incidence of early onset presbyopia before age of 40 years in a population group of Pakistan

**Study Design:** Descriptive study

**Place and Duration:** Department of Ophthalmology, Mufti Mehmood Teaching Hospital (Gomal Medical College), Dera Ismail Khan, Pakistan from 1<sup>st</sup> January 2021 to 31<sup>st</sup> March 2021

**Materials and Methods:** After obtaining IRB approval, a prospective review of 30 patients with near vision difficulty was done. Patients having hypermetropia, pseudophakia or media opacity were excluded. All patients underwent extensive history taking and ocular examination especially near vision refraction and prescribed spectacles accordingly. Data was saved and analyzed later with SPSS v 25.0.

**Results:** Out of 30 patients, 12 (40%) were male and 18 (60%) female. All patients ranged from 31 to 39 years with mean age of 35.3 years. Patients were divided into three age groups. Patients between age of 31 to 33 years were 8 (26.6%), between 34 to 36 years were 13 (43.3%) and between 37 to 39 years were 9 (30.0%). Final near vision correction ranged from +0.50 DS to +2.50 DS with mean correction of +1.22 DS.

**Conclusion:** Incidence of early onset presbyopia is fairly common before age of 40 years. It is more prevalent in females as compared to males and may develop as early as 31 years of age with required spherical correction as high as +2.50 diopters. *Al-Shifa Journal of Ophthalmology* 2022; 18(1): 37-42. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.

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Originally Received: 11 March 2022

Revised: 28 March 2022

Accepted: 7 April 2022

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## Introduction

*Presbyopia* is physiological age related insufficiency of accommodation that results in progressive deterioration of ability to focus on near objects.<sup>1</sup> It is thought to be caused by either weary ciliary muscles or loss of crystalline lens elasticity.<sup>2</sup> Although underlying mechanisms are not completely understood, increased lens rigidity is believed to play a vital role in development of presbyopia.<sup>3</sup> Worldwide data analysis shows an estimated population of about 1 billion were presbyopic in 2005 while this number grew to 1.8 billion in 2015. These studies also flashed out the fact that more than 50% of individuals older than 50 years of age have near vision related problems.<sup>4</sup> Results of a Pakistan based cross-sectional multi-center study show prevalence of

presbyopia to be at 27.6% at 40-49 years of age while these numbers grow to 81.8% at 60-69 years of age. Interesting fact is that only 51.5% of these individuals use spectacles.<sup>5</sup> Estimated global cost related to presbyopia correction have been estimated to be around \$30.8 billion.<sup>6</sup>

At present, no single treatment modality can reverse the presbyopic changes i.e., age related lens changes, thus restoring natural accommodative power of eye.<sup>7</sup> Presbyopia can be treated in a number of ways. Firstly, there is near work spectacles (bifocals, trifocals and progressive) and contact lenses, often thought to be first choice in long range of treatment modalities.<sup>8</sup> Surgical procedures like corneal refractive surgeries (e.g. PresbyLASIK), refractive lens exchange and corneal inlays with introduction of the concept of ‘monovision’ offer a whole lot of other modes of management.<sup>9</sup> A number of disadvantages associated with all these methods led to introduction of topical drops to treat presbyopia, mostly using pinhole effect.<sup>10</sup> A number of drugs regimens are being researched, a few of which even got FDA approval recently like Pilocarpine 1.25%.<sup>11,12</sup>

Generally speaking, presbyopia usually develops after age of 40 years. In premature (early onset) presbyopia, near vision accommodation power of eye becomes insufficient at an age earlier than expected, due to nutritional, environmental, drug-related or disease-related causes. Some of the risk factors include excessive near work like mobile phone and computer usage. Hypermetropia with additional accommodation demand may also lead to early onset presbyopia. Risk also increases with trauma and some systemic diseases like diabetes which causes changes in the lens, cardiovascular events altering accommodation innervation and vasculature, multiple sclerosis and myasthenia both of which bring about lens changes.<sup>13</sup> Alcohol and smoking pose a universal threat. Some drugs like anti-depressants, anti-psychotics, anti-

histamines and diuretic are also linked to premature presbyopia. The earlier onset of presbyopia in females correlates with short stature and menopause.<sup>14</sup>

In this study, we aim to demonstrate the prevalence of early onset presbyopia before the age of 40 years in a population group of Pakistan.

### **Materials and Methods:**

This descriptive study was carried out at outpatient department of Ophthalmology, Mufti Mehmood Teaching Hospital affiliated with Gomal Medical College, Dera Ismail Khan, Khyber Pakhtunkhwa, Pakistan from 1<sup>st</sup> January 2021 to 31<sup>st</sup> March 2021 (3 months duration). The study was approved by Ethical Review Committee of above-mentioned hospital and proper informed consent was taken from patients through standardized questionnaire. A total of 30 patients were selected from the OPD. All patients included in this study were under age of 40 years having normal far vision. All the patients had chief complaint of decreased near vision. Majority of patients complained of difficulty in using sewing needles, using mobile phones and reading newspapers. Patients having any ocular disease affecting ocular media transparency like corneal opacities, cataract, uveitis, vitreous degenerations or any retinal pathology, hypermetropic patients, patients having intraocular lenses implanted previously, patients with diabetes, pregnancy, or on drugs such as aspirin and sulfonamides which are known to affect ciliary muscle tone were excluded from this study.

All patients underwent extensive history taking regarding patient’s occupation, any previous ocular surgery, any systemic disorders, smoking and alcohol use. As expected, all patients also had to undergo complete ophthalmic examination including slit lamp examination, visual acuity charting, accommodation assessment, retinoscopy and near vision refraction and dilated fundus and posterior

segment evaluation in selected cases. Examination of all patients was done by one experienced ophthalmologist. Patients were properly refracted and prescribed appropriate glasses.

Data readings were saved on Excel Sheet and then comprehensive analysis of data was performed using Statistical Package for Social Sciences version 25.0.

### Results:

Out of 150 patients with presbyopia, 30 (20%) with early onset presbyopia were included in this study in which 12 (40%) were male and 18 (60%) were female. (Table 1) All patients included in study were aged less than 40 years with age range from 31 to 39 years and mean age of 35.3

years. Patients were divided into three age groups. Patients between age of 31 to 33 years were 8 (26.6%). Patients between age of 34 to 36 years were 13 (43.3%) and patients between age of 37 to 39 years were 9 (30.0%). (Table 2)

All 30 patients were prescribed near vision glasses ranging from +0.50 DS to +2.50 DS with mean correction of +1.22 DS. 17 (56.6%) patients were given near vision correction up to +1.0 DS. 11 (36.6%) received near vision correction ranging from +1.25 DS to +2.0 DS and beyond that only 2 (6.6%) patients received prescription of +2.50 DS. (Table 3) One thing worth mentioning is that younger patients received less corrective prescription while older patients were given higher correction.

*Table 1: Frequency Distribution of Gender*

<b>Gender</b>	<b>Frequency (n=30)</b>	<b>Percentage (%)</b>
<b>Male</b>	12	40.0
<b>Female</b>	18	60.0
<b>Total</b>	30	100

*Table 2: Frequency Distribution of Age*

<b>Gender</b>	<b>Age of Patients (years)</b>			<b>Total</b>
	31-33	34-36	37-39	
<b>Male</b>	0	6	6	12
<b>Female</b>	8	7	3	18
<b>Total</b>	8	13	9	30



*Table 3: Frequency Distribution of Presbyopic Correction*

Gender	Correction Prescription (Diopter Spheres)			Total
	≤ +1.00	+1.25 - +2.00	> +2.00	
Male	4	6	2	12
Female	13	5	0	18
Total	17	11	2	30

**Discussion:**

Presbyopia a naturally occurring aging process resulting in gradually worsening near vision, literally means ‘old eye’.<sup>15</sup> Although currently there is no widely accepted formal guideline or consensus regarding classification, presbyopia can be roughly classified into mild, moderate, or advanced severity based on spherical correction required.<sup>16</sup> This classification aims to provide consistency of diagnosis among ophthalmologists and optometrists and help in managing patients. Waring et al. proposed that the onset of presbyopia is the first chapter of age-related changes known as dysfunctional lens syndrome, which ultimately progresses towards cataract formation.<sup>17</sup>

Generally, presbyopia is considered to be a process of forties but in a modern digital world, due to changing trends worldwide leading to increased near work in younger individuals, presbyopia is developing in ages groups younger than 40 years.<sup>18</sup> This change is more prominent in females as compared to males. Untreated presbyopia can result in remarkable visual disability and thus can hamper patient’s daily life activities and adversely affect their quality of life. Luckily, due to availability of spectacles and different treatment modalities, majority of patients do not encounter significant disability.

In our study, proportion of premature presbyopia to presbyopia was found to be 20% in contrast to another study which had this percentage at 12.03%.<sup>14</sup> Male patients were 40% and females were 60% which was similar to Mishra et al as 43% and 57% respectively<sup>19</sup> and exactly same to that of Fasih et al.<sup>13</sup> Mvogo et al also reported female dominance.<sup>20</sup> Age range in our selected population was from 31 to 39 years with mean age of 35.3 years, again exactly similar to Fasih et al at 35.6 years. Mean correction required in our study was +1.22 DS. Priyambada et al also reported mean correction of +1.22 DS.<sup>14</sup> The lowest age of presentation was 31 years in our study. Fasih et al had lowest age of 31 years while Priyambada et al had 32 years in her study. Identification of risk factors is a major task in assessment of early onset presbyopia. Mobile phone/ screen usage is a major risk factor as picked out by Shamaila et al and Doggar et al.<sup>4,5</sup> Fasih et al reported a number of associated factors with tobacco use (35%), gastritis (21%), hypertension (7%) and diabetes mellitus (6%) as top picks.<sup>13</sup> In uncorrected hypermetropia where there is extra accommodative demand is also key factor in identifying premature presbyopia.<sup>14</sup>

As this observational study covers only prevalence of early onset presbyopia in a low population group, so there are a number of limitations to this study. The foremost limitation is very small sample size.

Another one is that in this study, no risk factors or oculosystemic associations were identified or described. Thirdly, rest of treatment modalities other than spectacles and contact lenses were not considered in this study.

Since uncorrected presbyopia is worrisome for any individual and adversely affects quality of life, proper screening methods must be introduced and people should be encouraged to get themselves checked regularly for eye straining issues. Moreover, emphasis should be given on long term follow up and patient compliance too.

### **Conclusion:**

Although presbyopia usually develops after age of 40 years, incidence of early onset presbyopia is on the rise prematurely before 40 years. It is more prevalent in females as compared to males and may develop as early as 31 years of age with required spherical correction as high as +2.50 diopters. Major risk factors need to be addressed in order to prevent and control early onset presbyopia. We emphasize that every pre-forty patients with complaints of eye straining and difficulty focusing near objects must be screened for premature presbyopia.

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# Rhino-Orbital Mucormycosis With Concurrent COVID-19 Infection

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## Abstract

The COVID-19 pandemic has redefined life as we know it and is still an ongoing battle in terms of disease presentation and its complications. It has caused widespread mortality, morbidity, social and economic turmoil of an unprecedented magnitude. The varying presentations require continuous update of knowledge and a global concentrated effort to document these varied clinical presentations so that a cohesive management plan can be made. We are reporting a series of cases that developed rhino-orbital Mucormycosis and were seen recently in our clinical setting. The cases were diagnosed with COVID-19 and were under hospital care when they developed ocular signs and symptoms which are being presented in this report. *Al-Shifa Journal of Ophthalmology 2022; 18(1): 43-48. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

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## Introduction:

The global pandemic of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) first reported in China has a myriad of clinical presentations ranging from mild to life threatening symptoms with superimposed bacterial or fungal infections.<sup>1,2</sup> A large proportions of these patients develop opportunistic infections due co morbidities and treatment induced immunocompromised conditions secondary to corticosteroid therapy, ventilation and intensive care unit stay. In the recent months an increasing number of patients have been diagnosed with rhino-orbital mucormycosis in COVID-19 disease.<sup>3,4</sup> A sizeable proportions of these patients develop mucormycosis during their course of treatment however there have been reports of concurrent COVID-19 and mucormycosis at admission.

Originally Received: 14 March 2022

Revised: 2 April 2022

Accepted: 7 April 2022

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## Cases:

We hereby report a cluster of 3 patients who have been admitted in the Covid 19 ward at Lahore General Hospital, Lahore all diagnosed with Covid 19 after a positive Reverse transcriptase-polymerase chain reaction (RT-PCR) test and developed

features of orbital mucormycosis. The clinical features of orbital mucormycosis along with their demographic and clinical profile are mentioned in Table 1.

All patients in our series were known diabetics with uncontrolled diabetes. They were treated with an injection of Remdesivir, intravenous dexamethasone and broad-spectrum antibiotics for the management of Covid 19 illness. During their stay they developed oral and nasal signs of fungal infections. This was confirmed by nasal and oral swabs and microbial diagnosis of mucormycosis was confirmed in all three cases through Potassium hydroxide (KOH) wet mount

and fungal culture/sensitivity. This was treated with Amphotericin B for mucormycosis. During this time period they developed ocular involvement. This included painless decrease or loss of vision, mild proptosis, ophthalmoplegia and retinal changes included diabetic retinopathy changes and central retinal artery occlusion, documented in Table 2.

The patients developed diabetic ketoacidosis and eventually required placement on mechanical ventilation owing to the deteriorating condition. However, owing to pulmonary involvement and sepsis they could not recover and died.



Figure 1: Oral Mucormycosis with Ophthalmoplegia

TABLE 1: Demographic and Clinical Profile.

Case No	Age/Sex	BCVA	Diagnosis	Ocular Presentation	Comorbidities
1	Female/50 years	Right 6/12 Left HM	SARS COVID 19 Infection	Ophthalmoplegia, Treated Proliferative Diabetic Retinopathy	Diabetes Mellitus, Chronic Renal Failure
2	Male/45 years	Right HM Left 6/9	SARS COVID 19 Infection	Ophthalmoplegia, Non-Proliferative Diabetic Retinopathy	Diabetes Mellitus, Hypertension
3	Female/32 years	Right NPL Left 6/	SARS COVID 19 Infection	CRAO, Non-Proliferative Diabetic Retinopathy	Diabetes Mellitus, Hypertension

Table 2 Radiological and Microbial findings and treatment are documented.

Case No	Radiological Diagnosis	Sample/Microbial Diagnosis	Treatment	Outcome
1	Pansinusitis, with extraconal involvement	Nasal and Oral swabs/Mucor	Mechanical Ventilation, Remdesivir, Dexamethasone, Amphotericin B, Intravenous Antibiotics	Death
2	Maxillary, Ethmoidal sinusitis, Nasal Mucosal Thickening, Cavernous Sinus involvement	Nasal and Oral swabs/Mucor	Mechanical Ventilation, Remdesivir, Dexamethasone, Amphotericin B, Intravenous Antibiotics	Death
3	Pansinusitis with extraconal involvement	Nasal and Oral swab/Mucor	Mechanical Ventilation, Remdesivir, Dexamethasone, Amphotericin B, Intravenous Antibiotics	Death

**Discussion:**

Covid 19 infection compounded by mucormycosis of the orbit is a sight threatening and potentially fatal infection.

The main underlying pathology is caused by angioinvasion, mycotic thrombosis, and ischemic necrosis of tissues. There are many common organisms that can affect

the patients and include Mucor, Rhizopus, Rhizomucor, Abidia, Apophysomyces, Saksenaea, and Cunninghamella of the Mucorales order.<sup>5, 6</sup> The incidence varies from 0.005 to 1.7 per million population and the global case fatality rate is as high as 46%.<sup>7</sup>

The main anatomical areas that can be affected include sinus and nasal passages, orbit, skin, pulmonary system and gastrointestinal. The presentation can be varied with organism disseminated systemically in extreme conditions.<sup>8</sup> Predisposing factors to the development of the infections are uncontrolled diabetes mellitus, neutropenia, elevated free iron levels, deferoxamine, hematological malignancies, stem cell transplants, and organ transplant patients on immunosuppressants.

Primary route of entry is through inhalation of the spores into the nasal or oral cavities. Ocular involvement can either be direct invasion through the paranasal sinuses or indirectly through cavernous or sagittal sinus thrombosis, carotid occlusion, cerebral infarction, intracranial aneurysm or hemorrhage and cerebral abscesses formation.

Owing to their compromised immune status either because of immunosuppression, steroid use, mechanical ventilation, associated co morbidities especially diabetes mellitus these patients are increasingly vulnerable to develop fungal infections. These primarily affect high risk patients on ventilator support. Nosocomial infections are considerably higher especially in our settings and during the pandemic where resources are stretched their incidence rise rapidly.<sup>9</sup>

In our series, all patients were diagnosed RT-PCR positive Covid 19 cases admitted in the ICU. They developed superadded mucormycosis during the course of their treatment at hospital admission.

The patients were being treated with immunosuppressive Remdesivir and intravenous steroids. To control the sepsis intravenous antibiotics were administered. The developed superadded fungal infection during their course of treatment. The diagnosis was confirmed on pathological and radiological tests. All patients were diabetics with poorly controlled diabetes.<sup>10</sup> Mucormycosis was treated with Amphotericin B. In our patients the symptoms of rhino-orbital mucormycosis developed in the fourth and fifth weeks after the diagnosis of COVID-19. The primary presenting symptom was painless loss of vision in all cases with ophthalmoplegia involving two patients. In our cluster of patients, no ophthalmic intervention was performed because of the severity of the disease and poor health status.

Another peculiar finding was that after developing ocular symptoms their condition deteriorated rapidly and within a span of 48 to 96 hours, they were placed on mechanical ventilator support. All three patients unfortunately expired within 72 hours of being placed on mechanical ventilator support.

There have been numerous reports of patients developing or rarely presenting with signs of mucormycosis especially in Southeast Asia. There are varied presentations and in a small group of patients interventional success has been reported. Orbital exenteration and sinus debridement have been tried. However no significant difference has been found in survival with or without orbital exenteration.<sup>11, 12</sup>

Based on the recent evolution of the disease and critical nature of the patients a clear approach towards disease management is non-existent. Based on our experience and observation a high index of suspicion with repeated monitoring of such critical cases, earliest start of management within a

critical care setup can give a ray of hope for these patients. Antifungals are the mainstay of management along with surgical debridement. The European Confederation of Medical Mycology ECMM and Mycoses Study Group Education and Research Consortium (MSGERC) guideline strongly recommends an early complete surgical treatment whenever possible in addition to systemic antifungal treatment.<sup>13,14</sup> A nasal swab for KOH mount and culture is a bedside procedure.

Radiological findings may be non-specific. Sinus opacification with thickened mucosal lining are universally present. Radiological investigations are required to assess progression and extent of the disease process. CT scan is a useful noninvasive tool in this regard.

This study is limited in its scope and number of patients however due to the urgency of the disease and recent evolution of such cases we felt a pressing need to document and publish such cases to highlight these clinical cases.

### **Conclusion:**

COVID-19 has varied presentations and these cases are evolving and we are still on a learning curve for the many complications arising from these cases. A scientific collaboration on reporting of new information related to this is essential to increase the knowledge with regard to this infection.

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