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# **Al-Shifa Journal of Ophthalmology**

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**Vol. 19, No. 4, October - December 2023 (Index Issue)**

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**QUARTERLY PUBLISHED**

- **Editorial: Avastin Injection: Shedding Light on Ethical Dilemma**
- **Navigating Pediatric Ophthalmological Disorders**
- **Corneal Donations Knowledge Among Medical Students**
- **Ranibizumab vs. Bevacizumab in Diabetic Macular Edema**
- **Practice Trends of Optometrists and Refractionists Regarding Myopia**
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# Shedding Light on the Ethical Dilemma: The Avastin Injection Crisis in Punjab

Mahmood Ali

The recent uncovering of issues surrounding Avastin (Bevacizumab) injections in Punjab has sparked serious ethical questions and highlighted the urgent need for regulatory changes. More than 70 people losing their sight due to the use of this injection has shaken the public's trust in healthcare providers and regulators.

At the heart of this crisis lies the widespread off-label use of Bevacizumab, driven primarily by its affordability compared to approved alternatives such as Ranibizumab and Aflibercept. Originally meant for cancer treatment, Avastin injections were used in the management of various ocular pathologies as a cheaper option. But the illegal production, storage, and distribution of these injections has caused irreversible harm to many patients, raising concerns about patient safety.

The role of regulatory authorities, such as the Drug Regulatory Authority of Pakistan (DRAP), also comes under scrutiny in light of this debacle. Despite the existence of licensing requirements and quality control measures, the Avastin scandal underscores the inadequacies in enforcement and oversight mechanisms. The failure to identify and prevent the illegal production and distribution by some unauthorized distributors of this injection reflects systemic shortcomings that demand immediate attention and reforms.

Foremost, regulatory agencies must consider licensing Bevacizumab for intravitreal use under controlled conditions. Despite its off-label status, extensive clinical data, alongside endorsements from reputable entities like the National Institute for Health and Care Excellence (NICE) and the International Council of Ophthalmology, underscore its potential efficacy and safety in the management of diseases like diabetic retinopathy, age related macular degeneration and choroidal

neovascularization. Regulatory bodies can ensure stringent oversight while facilitating access to this vital treatment modality by implementation of robust pharmacovigilance mechanisms and enable the generation of comprehensive long-term safety data, assuaging concerns regarding its off-label usage and bolstering confidence among clinicians and patients alike.

Furthermore, healthcare stakeholders, including Ophthalmologists and drug manufacturers, play pivotal roles in safeguarding patient welfare amidst off-label drug utilization. Ophthalmologists must diligently apprise patients of the off-label nature of treatments, thereby empowering them to make informed decisions. Simultaneously, drug manufacturers should rigorously monitor off-label usage and commit to ongoing safety surveillance to uphold their ethical obligations. Collaborative efforts between regulatory bodies, healthcare providers, and pharmaceutical companies are indispensable in navigating the intricate terrain of off-label drug usage, ensuring both patient safety and ethical integrity remain paramount.

In response to these challenges, Ministry of Health, regulatory bodies like drug Regulatory Authority and Healthcare Commission must adopt a multifaceted strategy that balances patient access with stringent safety standards. This entails conducting thorough assessments of Bevacizumab's efficacy and safety for ocular applications, guided by evidence from extensive clinical studies and meta-analyses. By leveraging insights from reputable organizations like NICE and the International Council of Ophthalmology, regulatory agencies can formulate evidence-based guidelines for the controlled licensing of Bevacizumab,

ensuring that its utilization adheres to rigorous standards of safety and efficacy. Additionally, the establishment of robust pharmacovigilance systems is imperative to monitor adverse events and long-term outcomes associated with off-label usage, thereby facilitating the generation of comprehensive safety data and informing future regulatory decisions. One of the most important challenges faced by these regulatory bodies is to strictly ensure the safe distribution of this injection by maintenance of appropriate cold chain and sterility during its distribution.

By fostering collaboration between stakeholders and prioritizing patient safety, the healthcare ecosystem can navigate the complexities of off-label usage of Bevacizumab while upholding ethical principles and regulatory standards.

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# Clearing the Path to Healthy Vision: Navigating Common Pediatric Ophthalmological Disorders

Sidrah Riaz<sup>1</sup>, Muhammad Tariq Khan<sup>1</sup>, Samina Bilal<sup>1</sup>, Hussain Ahmad Khaqan<sup>2</sup>, Muhammad Saghir<sup>1</sup>

## Abstract:

**Objectives:** To study the frequency of common pediatric ophthalmological disorders among patients presenting in an outpatient department of a Trust Hospital in Lahore, Pakistan.

**Methods:** A retrospective descriptive cross-sectional study was carried out at the outpatient department of Akhtar Saeed Trust Hospital, Lahore, from 15<sup>th</sup> March 2023 to 15<sup>th</sup> November 2023. Non-probability conventional sampling technique was used. The data were analyzed using SPSS-25 and presented in the form of pie charts, bar graphs, and tables. A total of 1119 patients were included, aged between 0-14 years. A provisional diagnosis was made after a detailed history and ocular examination and were prescribed treatment in the form of topical, oral, or systemic drugs. Refractive errors were corrected if applicable, and surgical treatment was discussed with parents if required. The exclusion criteria were patient's age above 14 years of age.

**Results:** There were 577 (51.56%) females and 542 (48.44%) males. The most common diagnosis was a refractive error, seen in 321 (28.68%) patients followed by conjunctivitis, including bacterial 285 (25.47%), allergic 95 (8.49%), and viral conjunctivitis 49 (4.38%). This was followed by routine emmetropes with complaints of headaches. Nasolacrimal duct blockage was present in 67 (5.98%), and strabismus in 41 (3.66%) individuals. Furthermore, some benign disorders were also seen.

**Conclusion:** Pediatric ophthalmological disorders require our attention, and efforts should be made to ensure their early detection and appropriate intervention, especially considering that relatively common disorders represent the larger proportion of diseases in our sample. *Al-Shifa Journal of Ophthalmology* 2023; 19(4): 139-144. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.

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1. Akhtar Saeed Medical and Dental College, Bahria Town, Lahore.
  2. Lahore General Hospital, Lahore.
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## Correspondence to:

Sidrah Riaz

Akhtar Saeed Medical and Dental College,  
Bahria Town, Lahore  
sidrah893@yahoo.com

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## Introduction:

Pediatric ophthalmology has become an emerging specialty and there are fellowships in this subject in Pakistan and worldwide, owing to its importance. Vision impairment poses an enormous global financial burden with an estimated annual global productivity loss of about US\$ 411 billion purchasing power parity<sup>1</sup>. The early detection and treatment of visual disorders in children can be very rewarding not only for them but also for the whole family and society.

Visual impairments in early childhood can significantly affect the development of visual, motor, and cognitive function and potentially lead to long-term adverse psychosocial effects. Hence there is a need

for their timely detection, not only to treat the disease but to increase the quality of life. While some conditions are congenital, others may develop as a child grows. According to a WHO report 5% of the global blind population are young children<sup>2-4</sup>. Some estimations show that there are nearly 19 million children worldwide with visual impairment; 1.4 million are blind, 17.5 million have low vision, and most are residents of poor countries<sup>5-6</sup>.

Many of these disorders are observed in outpatient settings, emphasizing the importance of early detection, diagnosis, and appropriate management<sup>7-9</sup>. Some visual disorders, if not treated timely, can lead to permanent blindness. At present, visual morbidity is the leading cause of childhood disabilities<sup>10-11</sup>. The goal of the study was to report patterns of pediatric visual disorders presenting at a hospital and their potential impact on children.

### Materials and methods:

Following the approval of the ethical review committee of the hospital, a total of 1119 patients, aged between 0-14 years, were included after reviewing prior records at the outpatient department of ophthalmology, Akhtar Saeed Trust Hospital, Lahore. These patients had presented in the eye OPD with some ocular or vision-related complaints. A detailed examination had been done, including auto-refractometry, and tonometry. Visual acuity was checked with the Snellen chart or Sheridan Gardiner chart, and cycloplegic refraction using 1% cyclopentolate or atropine was performed in selected cases. Where appropriate, slit lamp biomicroscopy was done for anterior and posterior segment examination, and a provisional diagnosis was made. B scan was done if the media were not clear. EUA was performed when required. These patients were prescribed treatment in the form of topical or systemic drugs, refractive errors were corrected if applicable, and surgical treatment was discussed with

parents if required. The data were collected in printed form, mentioning name, age, vision, and diagnosis. The statistical analysis was done with SPSS-25 and presented in the form of pie charts, bar graphs, and tables.

### Results:

A total of 1119 patients were included in our study, of which 577 individuals were (51.56%) females and 542 (48.44%) were males (Figure 1). The age distribution of these patients is shown (Figure 2). The most common diagnosis was a refractive error, seen in 321 (28.68%) patients. Myopia was the most prevalent refractive error 128 (39.88%), followed by myopic astigmatism 106 (33.02%) and hypermetropic astigmatism 48 (14.95%). Hypermetropia was the least common (39: 12.15%) (Table 1). It was followed by conjunctivitis, being bacterial in 285 (25.47%), allergic in 95 (8.49%), and viral in 49 (4.38%). Next were emmetropic patients (141: 12.60%), either brought by parents or referred from other departments of the hospital. The majority (101: 71%) presented complaints of headache, and no visual cause of headache was found. It was followed by cases of nasolacrimal duct blockage seen in 67 (5.98%), strabismus in 41 (3.66%), blepharitis in 26 (2.32%), and blunt trauma seen in 11 (0.98%) patients. Among 41 squint patients, 23 (2.05%) had exophoria, 12 (1.07%) had exotropia, and esotropia was seen in 6 (0.53%) individuals. These along with other disorders found are presented in Figure 3.

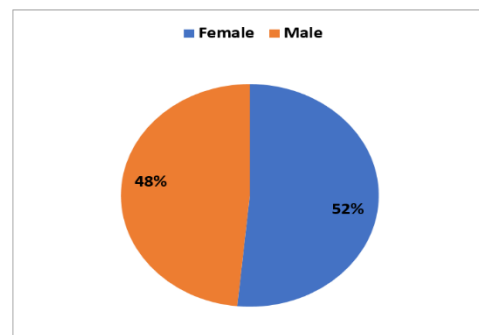


Figure 1 - Gender Distribution

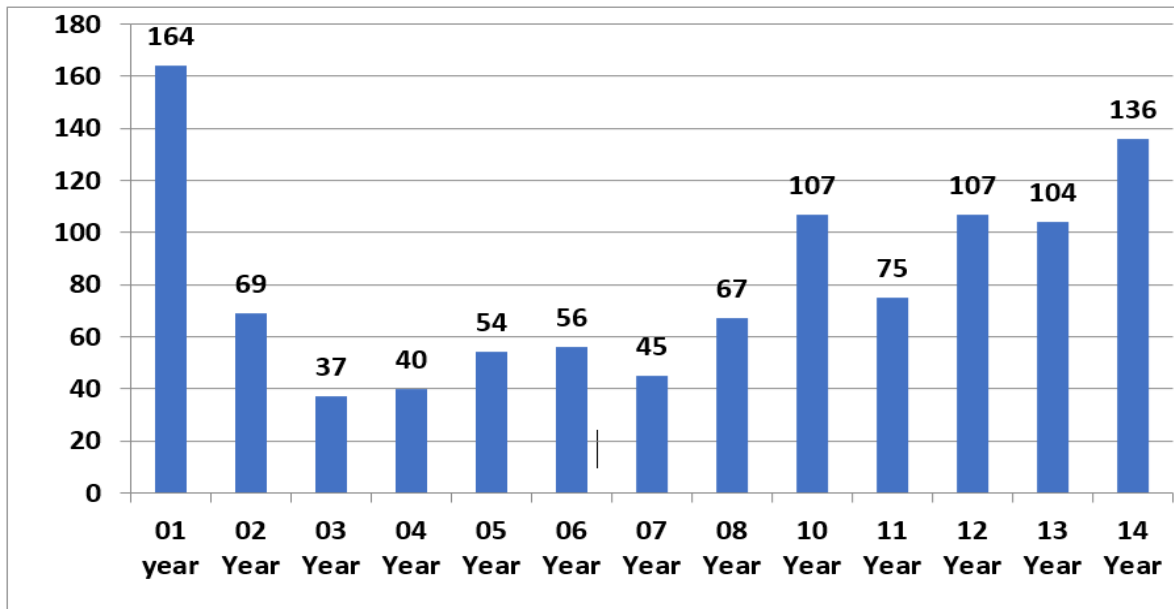


Figure 2: Age distribution

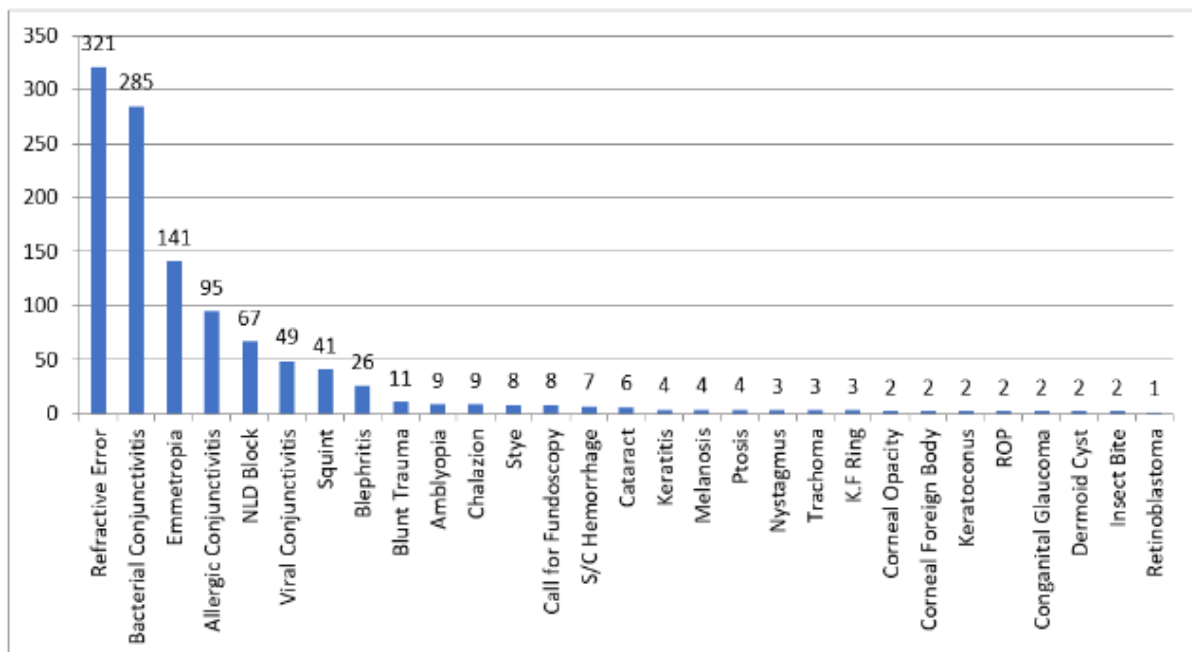


Figure 3 - Diagnosis (Pediatric Ocular Diseases)

Table 1: Type of Refractive Errors in Children

Refractive Error	No. of patients	Percentage
Hypermetropia	39	12.15 %
Hypermetropic astigmatism	48	14.95 %
Myopia	128	39.88 %
Myopic astigmatism	106	33.02 %
Total	321	100 %

## Discussion:

In a trust hospital, most of the patients who attend outpatient departments belong to the low-income class. The prevalence and causes of blindness in children vary from region to region and in relation to socioeconomic development. Recent estimates show that 19 million children suffer from vision impairment and of these 1.26 million are blind and two-thirds of these children live in developing countries adding to the socioeconomic burden of an already impoverished society<sup>12</sup>. A literature review has revealed that in Pakistan around 1 in 10,000 children are blind<sup>13</sup>.

In our study, there is no specific gender predilection among children presenting to the eye OPD. The female patients (51.56%) were slightly more than males (48.44%). In another study in Pakistan similar gender distribution was observed<sup>2</sup>. In contrast, a study from the southern hilly areas shows male preponderance [14], which may be associated with local norms (strict veil observation). No significant differences were found for male and female children, for vision-related complaints, in other similar studies from other parts of the world<sup>7,15</sup>.

The age distribution graph shows two prong patterns. Among pediatric patients ranging from birth to 14 years of age, most were either infants (below one year of age) or above 10 years of age. A study from Africa, on children from ophthalmology clinics showed higher incidence in the age range of one to six years<sup>16</sup>. The incidence of NLD block (nasolacrimal duct blockage) ranges from 5 to 20% of all newborns<sup>17</sup>. In our study it was seen in 6% of infants, observed as the most common ocular morbidity seen in infants.

The commonest cause of decreased vision in children below 14 years of age presenting to our OPD were refractive errors. Myopia and myopic astigmatism contributed to 73% of ametropic patients whereas 27% had hypermetropia or hypermetropic astigmatism. The leading causes of vision impairment and blindness

at a global level are refractive errors and cataracts<sup>12,18</sup>. A similar pattern of distribution was seen in another study from Karachi, Pakistan<sup>2</sup>, India<sup>7</sup>, and Ethiopia<sup>16</sup> where refractive error was found to be the commonest cause of visual morbidity. A meta-analysis from the Middle East has shown that rates of myopia rose significantly with age; 3.5% for children under 5 years of age and 47% for those over 18 years<sup>15</sup>. Recent studies from Africa also found refractive errors as one of main causes of vision impairment, commonly seen in primary school children<sup>20-23</sup>.

There is no specific reason associated with the increased prevalence of myopia but studies have found certain risk factors for developing myopia in children. These include the history of diabetes in mothers, excessive television watching, and increased use of smart screens by children as significant risk factors for ocular morbidity among children under the age of 5 years<sup>19</sup>.

Although cataract is thought to be a major cause of visual impairment among preschool children, in our study however, it was a minor cause, seen only in 6 (0.53%) patients. A survey conducted in Muzaffarabad showed cataracts as the 3<sup>rd</sup> most common cause of visual impairment. Still, refractive error was the most common cause of decreased vision<sup>14</sup>. It may be that most patients with cataracts were referred to some other, major pediatric centers.

The limitations of the study are a small sample including data from one hospital and a retrospective study design. Furthermore, hospital presentations represent an inherent bias in the disease distribution of the population at large. Larger studies should be carried out to get comprehensive results which can help in general policy making. There is no financial disclosure.

## Conclusion:

Pediatric ophthalmological disorders require our attention, understanding, and action. The well-being of our children's



vision should be a priority, and efforts should be made to ensure that every child receives regular eye examinations and timely treatment. With early detection, appropriate intervention, and a collective commitment to promote pediatric eye health, we can help children achieve their full visual potential and enhance their overall quality of life.

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#### **Authors Contribution**

Concept and Design: Muhammad Tariq Khan  
 Data Collection / Assembly: Samina Bilal  
 Drafting: Hussain Ahmad Khaqan  
 Statistical expertise: Muhammad Saghir  
 Critical Revision: Sidrah Riaz

# Attitudes and Knowledge of Corneal Donation Among Medical Students of Poonch Medical College, Rawalakot

Muqet Ahmed Zaheer<sup>1</sup>, Hira Naveed<sup>1</sup>, Ali Amjad<sup>1</sup>, Safa Tariq<sup>1</sup>, Muhammad Muneebullah Siddiqui<sup>2</sup>, Azhar Iqbal<sup>1</sup>

## Abstract:

**Objective:** The objective of this study was to determine the awareness and perspectives of medical students regarding corneal donations. This research strives to elevate students' awareness, consequently fostering an increase in corneal donations.

**Methods:** Cross-sectional investigation on the premises of Poonch Medical College, Rawalakot was conducted in duration of 3 months. An English-language self-administered questionnaire was used to assess different aspects of the participants' awareness and perspectives on corneal donation. Data were analyzed using SPSS software. Tests were applied and a p-value of < 0.05 was taken to be significant.

**Results:** A total of 292 students participated in this study. A mean score of  $3.22 \pm 1.78$  was achieved by the participants on the knowledge test. The most common reason for corneal donation was empathy for a blind person (62.3%), while a lack of information concerning corneal donation (61%) was seen to be the greatest barrier. There was no significant correlation between the knowledge and attitude of participants regarding corneal donations.

**Conclusion:** This study highlights a concerning lack of awareness about corneal donations among the participants. To boost donation rates, it's crucial to raise awareness among medical students. Bridging this knowledge gap necessitates organizing awareness-raising activities and motivating students for voluntary participation, ensuring they gain a fundamental understanding of corneal donation. *Al-Shifa Journal of Ophthalmology 2023; 19(4): 145-153.*  
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1. Poonch Medical College, Rawalakot.
2. Aga Khan University Hospital, Karachi.

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## Correspondence to:

Muqet Ahmed Zaheer  
Poonch Medical College, Rawalakot

## Introduction:

Embarking on the journey to restore vision through corneal transplantation resonates deeply with individuals grappling with the shadows of corneal blindness. However, the success of this noble endeavor hinges crucially upon the availability of donor corneas. Globally, the pervasive scarcity of donor corneas casts a significant shadow over the collective quest to address the burden of corneal blindness. A strikingly revealing global survey underscores the stark reality that only about 1 in 70 deaths contributes to corneal donation, thus underscoring the dire need to bridge the persistent demand-supply gap<sup>1</sup>. Remarkably, even in the year 2022, the United States conducted an approximate count of 61,000 corneal transplants, yet the

steadfastly growing demand remains unmet<sup>2</sup>. Significantly, the survey echoes the sentiments of over half of the countries, acknowledging the acute insufficiency of donor corneas available for transplantation<sup>3</sup>.

However, our lens of concern extends beyond the borders of individual nations. Within Pakistan, a nation confronting its own challenges of corneal blindness, the poignant reality is that an estimated 1.9 million individuals yearn for the invaluable gift of sight<sup>4</sup>. Yet, the sobering truth remains that the pace of corneal donation lags significantly due to a myriad of reasons, encompassing limited awareness and intricate cultural dynamics<sup>5</sup>. Our medical students, standing as torchbearers for the future of healthcare, hold crucial perceptions about corneal donation. A revealing study conducted in Karachi unearths a notable concern, revealing that only 33.2% of these aspiring medical professionals possess substantial knowledge concerning corneal donation<sup>6</sup>. Similarly, in Lahore, a noteworthy 60.4% expressed their intention to donate, yet the evident necessity for widespread awareness is glaring<sup>7</sup>. Notably, the struggle echoes across the borders into India as well. Research conducted in Navi, Mumbai brings to light the fact that a mere 48.6% of medical students possessed awareness about eye donation, and a rather humble 28.6% were inclined to pledge their eyes<sup>8</sup>. The stark facts themselves bear testament to the reality. Pakistan bears witness to an annual demand for approximately 25,000 corneal transplants, a figure that far outpaces the number of actual transplants performed<sup>9</sup>. Moreover, the absence of a well-established eye donation infrastructure coupled with inadequate eye banks erects substantial barriers to corneal donation in Pakistan<sup>10</sup>. A revealing survey has laid bare a significant gap in the population's awareness concerning corneal donation<sup>11</sup>.

The goal of the study was to evaluate the knowledge and attitudes of medical

students toward corneal donations and identify barriers to donations from the students' perspectives. Lastly, the intention was to draw comparative insights by aligning findings with global statistics, thereby illuminating the broader challenges and prospects tied to corneal donation awareness. Diving into the minds of medical students, this research aims to unveil the keystones that shape the trajectory of corneal donation rates. Such insights hold the potential to catalyze targeted educational endeavors, fostering a deeper grasp of the significance underpinning corneal donation. By bridging the knowledge gap, our vision extends toward a world where the equilibrium between supply and demand in corneal transplantation inches ever closer, inching us collectively toward the shared goal of eradicating corneal blindness.

### **Materials and Methods:**

During the period of 3 months, we undertook this cross-sectional study within the confines of Poonch Medical College in Rawalakot, AJK, Pakistan. The study aimed to explore medical students' knowledge and attitudes regarding eye donation. Our study encompassed both male and female students, including individuals from their first year up to house officers.

Encompassing both clinical and pre-clinical medical students, we chose to employ a non-probability convenience sampling technique. This approach allowed us to include medical students who willingly opted to participate while excluding non-medical students and those who declined involvement. The determination of the sample size, resulting in 280 participants, was guided by Raosoft (Raosoft Inc, Seattle, Washington), and was based on a 95% confidence level and a 5% margin of error.

For data collection, we adopted a validated English language self-administered questionnaire consisting of 15 items. The ease of data collection was facilitated by

employing an online questionnaire, which was distributed through class representatives to be shared within their respective classes. All individuals provided informed consent, covering their willingness to engage in the study. Participants were assured of the confidentiality of their data, as well as their right to withdraw from the study at any point without repercussions. Rigorous safeguards were implemented to ensure both anonymity and confidentiality throughout the research process.

The majority of the questions took the form of closed-ended queries, offering response options encompassing "Yes," "No," or "Don't know". The scores for knowledge, attitude, and willingness domains were obtained by averaging all the responses to obtain an overall result for knowledge and attitude items. The items were then divided into two categories representing "Good" and "Deficient" Knowledge. Similarly, "Good" and "Bad" Attitudes and "Willing" and "Unwilling". After data cleaning and assigning codes, Statistical Package for the Social Sciences (SPSS), Version 22.0 (IBM Corp., Chicago, Illinois, USA) was used for data analysis. Descriptive Statistics were presented as frequencies and percentages for categorical data, and a mean was used for numerical values. The total score for correct answers to knowledge questions (out of 7) was correlated to attitude and willingness. In addition, the results of this research were compared to the past articles on the topic.

Stepwise forward logistic regression analysis was performed to determine factors associated with knowledge of corneal donation. Statistical significance was assumed at  $P < 0.05$ .

## Results:

A total of 292 students actively participated in the conducted study. The participants' average age was recorded as 21.15 years, with a standard deviation of 1.7 years. On the background knowledge assessment, participants achieved an average score of

3.22 out of 7, indicating a subpar level of knowledge. Among the participants, 177 individuals (60.6%) demonstrated awareness that individuals who succumb to AIDS are ineligible to donate their eyes. Comparatively, a lesser count of 88 participants (30%) exhibited understanding regarding the disqualification of individuals with hepatitis for corneal donation. A minority of 49 participants (16%) erroneously believed that corneal donations had no restrictions.

The primary motive cited for corneal donation was empathy toward visually impaired individuals, as indicated by a substantial number of responses ( $n=182$ , 62.3%). Following closely, a noteworthy portion of participants ( $n=140$ , 47.9%) perceived corneal donation as a noble undertaking. Analyzing barriers to eye donation, the most prevalent impediment was a lack of information concerning corneal donation ( $n=178$ , 61%). Religious convictions also played a significant role ( $n=101$ , 34.6%), alongside prevalent myths associated with corneal donations ( $N=90$ , 30.8%). Lastly, familial pressure emerged as a factor contributing to reluctance in 47 cases (16%).

Pearson's correlation of knowledge on corneal donation among the samples and the attitude of the samples on corneal donations was found to be markedly low ( $r=0.096$ ,  $n=292$ ). The correlation between knowledge and willingness was positive ( $r=0.330$ ,  $n=292$ ).

In multivariate analysis, Female (OR = 1.84, 95% CL, 1.064-3.208;  $P=0.029$ ); 21-25 years (OR = 2.394, 95% CL, 1.138-5.037;  $P=0.021$ ) were found to be independently associated with knowledge (Table 3). This shows us that females were more knowledgeable than men and that people in the 21-25 years categories were more knowledgeable than 15-20 year-olds, in our sample.

*Table 1 : Participant's parent's qualifications, age, knowledge score regarding corneal donations (N= 192)*

Parameter	n (%)
Mean age in years $\pm$ SD	21.15 $\pm$ 1.7
Mean Knowledge Score $\pm$ SD	3.22 $\pm$ 1.79
Father's Qualification	
Illiterate	4 (1.4)
Elementary	11 (3.8)
High School	55 (18.8)
Graduate	202 (69.2)
Prefer Not Say	20 (6.8)
Mother's Qualification	
Illiterate	26 (8.9)
Elementary	25 (8.6)
High School	81 (27.7)
Graduate	133 (45.5)
Prefer Not Say	27 (9.2)

*Table 2: Frequencies of correct answers and "don't know" responses to knowledge and willingness questions regarding corneal donation among medical students of Poonch Medical College (N = 292)*

Item #	Questions and Responses	n (%)
1	Is there any eye bank in Pakistan?	
	Yes	71(24.3)
	Don't know	19(6.5)
2	Is there any age limit for corneal donation?	
	Yes (less than 65 years)	52(17.8)
	No	38(13)
3	Whom do you approach for an eye donation?	
	Ophthalmologist	207(70.9)
	Don't know	59(20.2)
4	Is there any time limit for Removal of eye after death?	
	Yes (2 to 6 hours after death)	134(45.9)
	Don't know	101(34.6)
5	How long can the eye be Preserved after removal?	
	Up-to 2 weeks	51(17.5)
	Don't know	182(62.3)
6	Which part of eye is removed from the donor?	
	Cornea	128(43.8)
	Don't know	95(32.5)
7	Will the identity of the donor be Revealed to the patient?	
	No	95(32.5)
	Don't know	83(28.4)
8	Are you willing to donate your eyes?	
	Yes	124(42.5)
	No	168(57.5)
9	Would you like to take money for the donation?	
	Yes	64(21.9)
	No	228(78.1)



*Table 3: Multivariate analysis of Knowledge of the subjects regarding corneal donations*

Variables		AOR(95% CI)	P
Gender	Male	1	0.029
	Female	1.84 (1.064 – 3.208)	
	Others	3.14 (0.156 – 63.218)	
Class MBBS	1st Year	1	0.854
	2nd Year	1.073 (0.502 – 2.296)	
	3rd Year	0.601 (0.233 – 1.550)	
	4th Year	0.994 (0.3281 – 3.012)	
	5th Year	1.230 (0.393 – 3.850)	
	House Officer	1.879 (0.2502 – 14.108)	
Fathers Qualification	Illiterate	1	0.438
	Elementary	2.436 (0.257 – 23.090)	
	High School	2.224 (0.294 – 16.789)	
	Graduate	2.427 (0.341 – 17.269)	0.376
Mothers Qualification	Illiterate	1	0.937
	Elementary	0.952 (0.283 – 3.202)	
	High school	1.482 (0.531 – 4.132)	
	Graduate	1.099 (0.378 – 3.191)	
	Prefer not to say	2.047 (0.314 – 13.317)	
Age	15 to 20 Years	1	0.021
	21 to 25 Y	2.394 (1.138 – 5.037)	

*Table 4: Comparison with other studies*

Study	Know about corneal donation	Know about ideal time for eye collection (2-6hrs)	Motivational force for donation	Perceived reason for not donating eye	Willingness to donate eye
Present Study	69.5%	45.9%	Empathy for a blind person (62.3%)	Lack of Knowledge (61%)	42.5%
Khalid M. Aloudah et al. (2020)[12]	-	13%	Providing vision to a blind person (47%)	Lack of Knowledge (55%)	26%
Chowdhury et al.(2021)[13]	100%	69%	Eye donation is noble work (81.8%)	Lack of awareness (76.5%)	88.4%
Alzuhairy et al.(2019)[14]	-	11.1%	-	Need more information to decide(37.8%)	33.1%

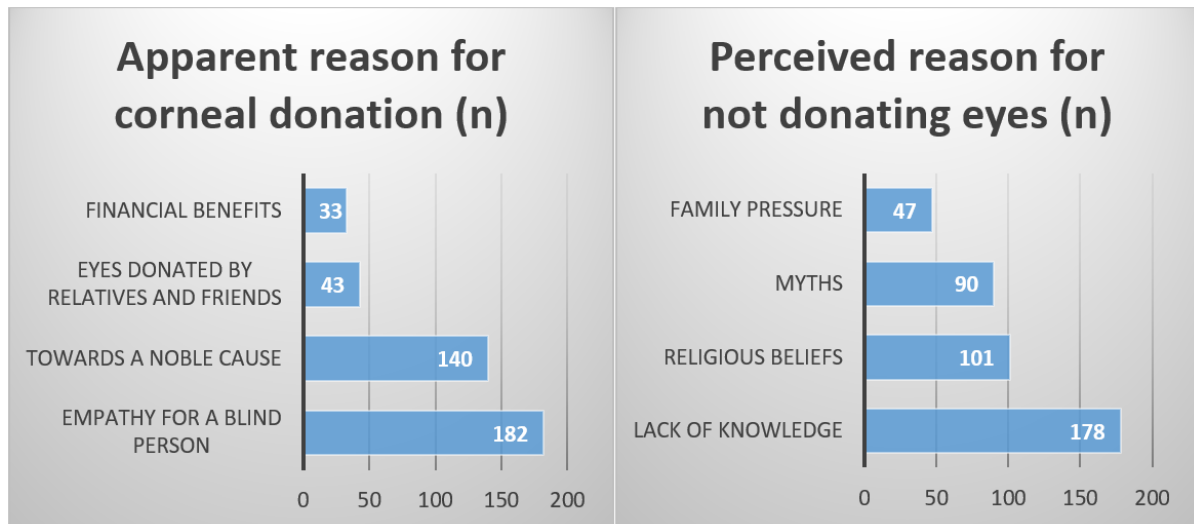


Figure 1

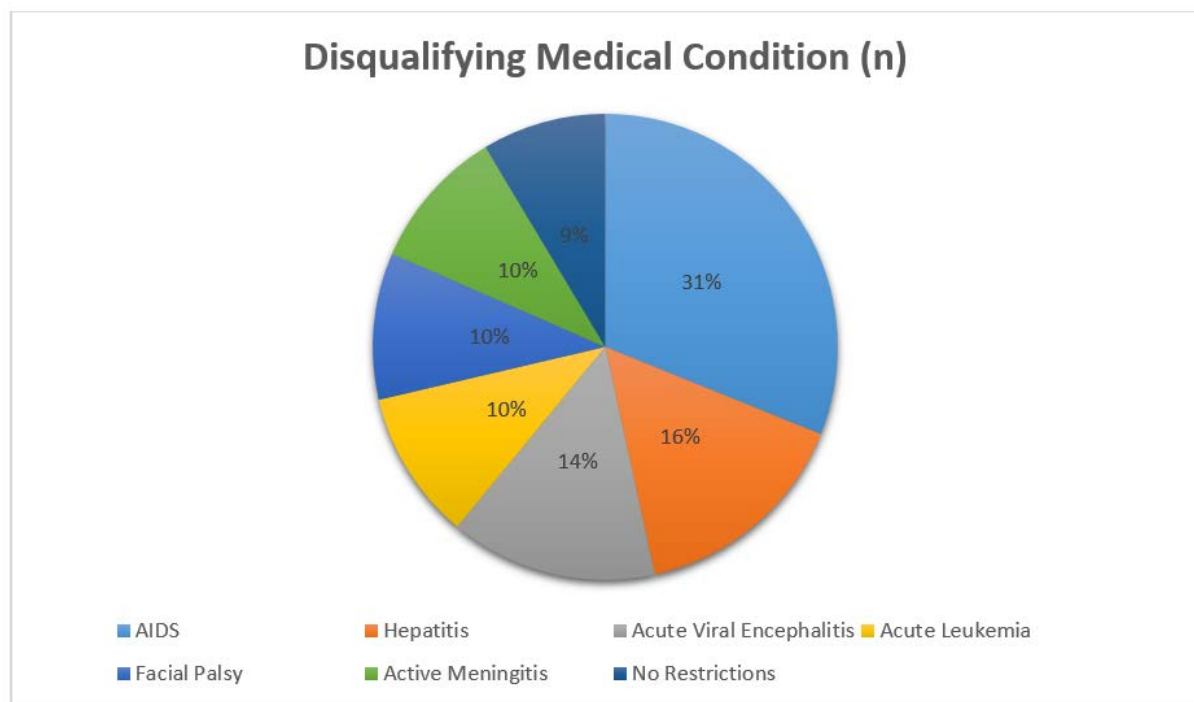


Figure 2

### Discussion:

Corneal donation stands out as an exceptionally effective method for restoring sight to individuals afflicted by corneal diseases leading to blindness. Nevertheless, a global shortage of organ donors persists, particularly in developing nations, signifying a low donor rate worldwide, even though it is regarded as a noble cause<sup>15</sup>. The current study, with a

mean knowledge score of 2.52 (N=292), highlights a significant deficit in the understanding of medical students in AJK, Pakistan. It becomes evident that this lack of knowledge contributes to a diminished inclination to donate, with 61% of students expressing hesitance due to their unawareness. Hence, healthcare professionals bear the responsibility of formulating strategies to enhance

awareness regarding eye donation within society, thereby augmenting the pool of potential donors<sup>16</sup>.

Cultural dynamics and religious beliefs in countries such as Pakistan and Saudi Arabia, among others, pose additional challenges<sup>17</sup>. Furthermore, a lack of proper infrastructure and the inadequacy of eye banks present substantial barriers to corneal donation in Pakistan. The current study reveals commendable performance among participants in response to a limited number of questions. For instance, 207 students (70.9%) were aware that they should consult an ophthalmologist in the event of donation, while 134 (45.9%) understood the time frame for eye removal after death is within 2-6 hours. However, only 51 (17.5%) were aware of the duration for which an eye can be preserved. This awareness level is notably lower compared to a similar study where 68.7% displayed knowledge on this topic<sup>18</sup>.

Despite efforts to emphasize, through a fatwa, that organ donation is religiously permissible due to its noble nature, 101 students (34.6%) still cite religion as a barrier to eye donation. Culture, religion, and familial pressure appear to be significant impediments to eye donation in developed countries<sup>19</sup>. Surprisingly, in our study, only 47 (16.1%) cited familial pressure as a hindrance, a significantly lower percentage than in similar studies among medical students in India, where objections from family were the most frequently cited reason for not pledging corneas<sup>19</sup>.

Regarding reasons for willingness to donate eyes, 182 participants (62.3%) expressed empathy for blind individuals, while 140 (47.9%) considered it a noble cause, consistent with a study in northwestern India<sup>20</sup>. Some also showed willingness due to financial incentives, while others were inspired by family and friends who had previously donated their eyes. This study demonstrates that 203 medical students (69.5%) were aware of eye donation, with 124 (42.5%) expressing an interest in

donating their eyes, closely paralleling a study conducted at Gondar University where the willingness rate was 43.9%<sup>21</sup>. Notably, the main reasons for not donating eyes in our study were a lack of awareness, objections from family members, and religious beliefs.

Furthermore, the study revealed that participants with an awareness of corneal transplants and hailing from educated backgrounds exhibited a greater willingness to donate eyes, mirroring findings from a study conducted in India<sup>22</sup>. Although this was a single institution-based study, it benefitted from cultural diversity, collecting data from students originating from various regions of Azad Kashmir and Pakistan. However, the level of knowledge was lower than in international studies.

The current study is subject to certain limitations, as it does not establish a reliable correlation between the willingness to pledge eyes, familial education, and knowledge of eye donation. Therefore, we recommend further research with a larger sample size to compare parental education levels and attitudes towards corneal donation. In light of the observed knowledge deficit, healthcare professionals and individuals in medical-related fields should play an instrumental role in developing awareness-raising initiatives and community-oriented programs aimed at enhancing knowledge and understanding of the significance of corneal transplantation. It is imperative to address and dispel self-formed cultural and religious misconceptions that serve as barriers to corneal transplants and to undertake appropriate measures accordingly.

### **Conclusion:**

There is a gap between knowledge and attitude among the students. This implies the need for appropriate and sustained education to raise the attitude and willingness of the students towards corneal donation. There is a need to remove the self-made cultural and religious aspects that have been noticed to cause hindrances in

corneal donation. To promote the awareness and knowledge of corneal donation among medical students, appropriate steps must be taken to foster corneal donations in society and eradicate misconceptions.

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#### **Authors Contribution**

Concept and Design: Hira Naveed  
Data Collection / Assembly: Ali Amjad, Safa Tariq  
Drafting: Muhammad Muneebullah Siddiqui  
Statistical expertise: Azhar Iqbal  
Critical Revision: Muqet Ahmed Zaheer

# To Compare the Mean Difference in Central Macular Thickness and Best Corrected Visual Acuity in Patients of Diabetic Macular Edema Receiving Intravitreal Ranibizumab versus Bevacizumab

Rehan Saleem<sup>1</sup>, Afia Matloob Rana<sup>2</sup>, Waseem Akhter<sup>3</sup>, Salman Tariq Toosy<sup>4</sup>, Fuad Khan Niazi<sup>5</sup>, Irum Yousafzai<sup>3</sup>

## Abstract:

**Objectives:** To compare the efficacy of two anti VEGF ranibizumab and bevacizumab in diabetic macular edema.

**Methods:** It was a randomized control trial conducted at the Eye department of Holy Family Hospital Rawalpindi 23<sup>rd</sup> April 2021 to 23<sup>rd</sup> April 2022. A total of 60 patients (30 in each group) with diabetic macular edema of age range from 15-65 years. In Group A 30 patients received three consecutive monthly intravitreal injections of ranibizumab 0.03mg/0.05ml. In Group B 30 patients received three consecutive monthly intravitreal injections of bevacizumab 1.25mg/0.05ml. After 3 months best corrected visual acuity and central macular thickness was recorded. Data was entered and analyzed by using SPSS VERSION 22.

**Results:** Total 60 patients were included in the study, 30 in each group. The mean age of patients in group A was  $38.67 \pm 7.88$  years and in group B was  $39.43 \pm 8.02$  years. Out of 60 patients, 45 (75.0%) were female and 15 (25.0%) were male. The reduction in central macular thickness (CMT) after three months with intravitreal bevacizumab and ranibizumab was  $342.23 \pm 6.41$  and  $320.10 \pm 9.79$  respectively (p-value = 0.0001). The improvement in best corrected visual acuity with intravitreal bevacizumab and ranibizumab after three month was  $0.45 \pm 0.02$  and  $0.48 \pm 0.03$  (p-value = 0.0001).

**Conclusion:** This study concluded that ranibizumab is better as compared to bevacizumab in terms of mean central macular thickness and best corrected visual acuity in patients of diabetic macular edema. *Al-Shifa Journal of Ophthalmology 2023; 19(4): 154-161. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

1. Shifa College of Medicine, Islamabad.
2. HBS Medical and Dental College, Islamabad.
3. Rawal Institute of Health Sciences, Islamabad.
4. DHQ, Rawalpindi Teaching Hospital.
5. RMC and Allied Hospitals, Rawalpindi.

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Revised: 21 November 2023

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## Correspondence to:

Afia Matloob Rana

Email: afiamatloob@yahoo.com

## Introduction:

Diabetes is multiorgan, metabolic disease of public health concern worldwide<sup>1</sup>. According to the International Diabetes Federation in 2022, 26.7% of adults in Pakistan are affected by diabetes making the total number of cases approximately 33million<sup>1</sup>. Diabetic retinopathy is a major cause of visual impairment in working age adults worldwide<sup>2</sup>. Diabetic retinopathy is a microangiopathy in which small blood vessels are particularly vulnerable to damage from hyperglycaemia. The pathogenic factors involved in diabetic retinopathy are cellular damage due to



intracellular sorbitol accumulation, oxidative stress due to free radical excess, accumulation of advanced glycation end products (AGE) and excess activation of several protein kinase C isoforms<sup>3</sup>. Vascular endothelial growth factor causes angiogenesis and increase in retinal vascular permeability by increasing the phosphorylation of the tight junction proteins.

Diabetic macular edema is major cause of visual impairment in diabetics and its pathogenesis is multifactorial and still not completely understood. Alteration of blood retinal barrier is the hallmark of diabetic macular edema which can lead to death of pericytes, thickening of capillary basement membrane, loss of smooth muscles, and proliferation of endothelial cells. Macular edema divides into Focal diabetic macular edema which is caused by accumulation of fluid from leaking microaneurysms and diffuse macular edema which is caused by leakage without any clear source. The fluid is initially located between outer plexiform and inner nuclear layer latter it may involve the inner plexiform and nerve fibre layer until the entire thickness of retina become edematous<sup>4</sup>. Based on OCT, cystoid macular edema is considered as intraretinal cystoid-like, hypo-reflective spaces with highly reflective septa separating the cystoid-like spaces<sup>5</sup>.

Available treatment options for diabetic macular edema are laser photocoagulation, intravitreal corticosteroids and intravitreal anti-VEGF. Conventional Laser treatment reduces the risk of moderate visual loss by approximately 50% without guaranteeing remarkable effects on visual improvement. Laser photocoagulation is standard treatment previously, but now intravitreal anti-vascular endothelial growth factors (anti-VEGF) is considered first line because of better anatomical and functional outcome<sup>6</sup>. Along with anti-VEGF treatment rigorous diabetic control plays very important role.<sup>6</sup>

Now anti-VEGF is considered as first line treatment for diabetic macular edema.

Currently different anti-VEGF agents are available in market with different clinical effects and pharmacological properties. Three anti-VEGF agents are mainly used in clinical practice to improve vision loss associated with DME: Aflibercept (Eylea®), Ranibizumab (Lucentis) and Bevacizumab (Avastin®)<sup>7</sup>.

In our study we compared effect of intravitreal ranibizumab and bevacizumab on diabetic macular edema. Bevacizumab is a complete humanized monoclonal antibody and much cheaper. The dose of bevacizumab is 2.5mg/0.1ml. It was mainly used for cancer therapy and its ocular use is off-label and is not commercially available for ocular use.<sup>8</sup>.

Ranibizumab anti-VEGF is a monoclonal antibody fragment. It selectively binds to inhibit all isoforms of VEGF A. The usual dose is 0.5mg in 0.05ml. Ranibizumab is as cost effective as laser in the treatment of diabetic macular edema. Side effects associated with anti-VEGF are increase in blood pressure, MI, transient ischemic attack, stroke, thromboembolic event<sup>9</sup>. The FDA approved ranibizumab (Lucentis) for diabetic macular edema in August 2012<sup>9</sup>.

In real world study conducted by Olufemi O et al, the BCVA for eyes that received Bevacizumab at baseline, 4 months, 6 months and 9 months post injection were  $0.32 \pm 0.16$ ,  $0.32 \pm 0.17$ ,  $0.40 \pm 0.24$   $0.44 \pm 0.26$  respectively while in eyes that received Ranibizumab, the mean BCVA at baseline, 4 months, 6 months and 9 months post injection was  $0.33 \pm 0.29$ ,  $0.40 \pm 0.26$ ,  $0.43 \pm 0.26$ ,  $0.41 \pm 0.26$  respectively<sup>10</sup>.

The purpose of our study is to compare the efficacy of two anti VEGF ranibizumab and bevacizumab in diabetic macular edema, which anti-VEGF causes more decrease in central macular thickness and gives better best corrected visual acuity.

### Materials and Methods:

It was a randomized control trial conducted at Eye department of Holy Family Hospital Rawalpindi for duration of one year from 23<sup>rd</sup> April 2021 to 23<sup>rd</sup> April 2022. Total 60

patients (30 in each group) with diabetic macular edema of age range from 15-65 years of both genders and both type I and type II diabetes were selected. Patients with previous history of PRP, Vitreoretinal surgery, intravitreal steroids, tractional retinal detachment, Epiretinal membrane and those with H/O Cerebral vascular accidents or MI within 3 months prior to anti- VEGF were excluded from the study. After the approval letter from Institutional Research Forum of RMU, patient fulfilling selection criteria were included in the study after Informed consent. After explaining them procedure of study, patients were allocated study groups as mentioned in sampling technique. In patients having diabetic macular edema, baseline best corrected visual acuity and central macular thickness by optical coherence tomography was recorded prior to any intravitreal injection. Patients were divided into two groups based on their choice of anti-VEGF. Injections were given either ranibizumab or bevacizumab to the patients keeping in view their affordability. Group A, 30 patients received three consecutive monthly intravitreal injections of ranibizumab 0.03mg/0.05ml. Group B, 30 patients received three consecutive monthly intravitreal injections of bevacizumab 1.25mg/0.05ml. All intravitreal injections were given 4mm posterior to the limbus if eye is aphakic or 3mm posterior to the limbus if eye is pseudophakic through pars plana with 30-gauge needles under topical anaesthesia. All patients were followed up monthly. After 3 months best corrected visual acuity and central macular thickness was recorded. All the information was recorded in the structured predesigned Performa of the study. Data was entered and analyzed by using SPSS VERSION 22. Mean and standard deviation was calculated for all quantitative variables like age, duration of Diabetes, macular thickness, and best corrected visual acuity. Frequency and percentages% were calculated for qualitative variables like gender and control of diabetes. Independent

sample T- test at 5% level of significance was used to compare means of macular thickness and best corrected visual acuity in both study groups. Independent sample T- test at 5% level of significance was also used to compare changes in means of macular thickness and best corrected visual acuity in both groups. Effect modifiers like duration, control of Diabetes, age and gender were controlled by stratifications. Post stratification independent sample t-test was applied. P Value less than 0.05% was taken as a significant.

### Results:

A total of 60 patients (30 in each group) with diabetic macular edema of age range 15-65 years of both genders and both types of diabetes were included in the study. The age range in this study was from 15 to 65 years with mean age of  $39.05 \pm 7.90$  years. The mean age of patients in group A was  $38.67 \pm 7.88$  years and in group B was  $39.43 \pm 8.02$  years. The majority of the patients 47 (78.33%) were between 25 to 45 years of age as shown in Table 1.

Out of these 60 patients, 45 (75.0%) were female and 15 (25.0%) were males with male to female ratio of ratio of 1:3 (Figure IV). Mean duration of DM was  $6.23 \pm 2.46$  years (Table 2). Distribution of patients according to control of DM is shown in Table 3.

In this study, the reduction in central macular thickness with intravitreal bevacizumab and ranibizumab after three months was  $342.23 \pm 6.41$  and  $320.10 \pm 9.79$  respectively (p-value = 0.0001). The improvement in best corrected visual acuity with intravitreal bevacizumab and ranibizumab after three months was  $0.45 \pm 0.02$  and  $0.48 \pm 0.03$  (p-value = 0.0001) as shown in Table 4. Stratification of Best Corrected Visual Acuity with respect to age, gender, duration of disease and control of DM is shown in Table 5. Stratification of central macular thickness with respect to age, gender, duration of disease and control of DM is shown in Table 6.

*Table 1: Age distribution for both groups (n=60)*

Age (years)	Group A (n=30)		Group B (n=30)		Total (n=60)	
	No. of patients	%age	No. of patients	%age	No. of patients	%age
15-45	24	80.0	23	76.67	47	78.33
46-65	06	20.0	07	23.33	13	21.67
Mean $\pm$ SD	38.67 $\pm$ 7.88		39.43 $\pm$ 8.02		39.05 $\pm$ 7.90	

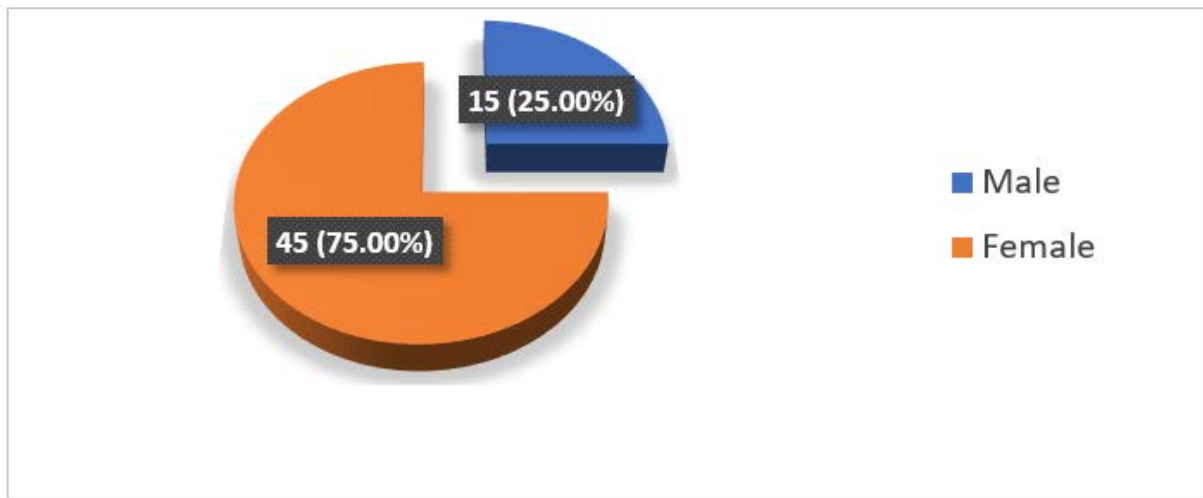


Figure 1: Distribution of patients according to Gender (n=60)

*Table 2: Distribution of patients according to duration of DM.*

Duration (yrs)	Group A (n=30)		Group B (n=30)		Total (n=60)	
	No. of patients	%age	No. of patients	%age	No. of patients	%age
$\leq 5$	15	50.0	14	46.67	29	48.33
$> 5$	15	50.0	16	53.33	31	51.67
Mean $\pm$ SD	6.23 $\pm$ 2.46		6.23 $\pm$ 2.44		6.23 $\pm$ 2.46	

*Table 3: Distribution of patients according to control of DM.*

Control	Group A (n=30)		Group B (n=30)		Total (n=60)	
	No. of patients	%age	No. of patients	%age	No. of patients	%age
Yes	10	33.33	10	33.33	20	33.33
No	20	66.67	20	66.67	40	66.67

*Table 4: Comparison the mean difference in Central Macular Thickness and Best Corrected Visual Acuity in patients of diabetic macular edema receiving Ranibizumab versus those receiving Bevacizumab.*

Outcome	Group A (n=30)	Group B (n=30)	p-value
	Mean $\pm$ SD	Mean $\pm$ SD	
Best Corrected Visual Acuity	0.48 $\pm$ 0.03	0.45 $\pm$ 0.02	0.0001
Central Macular Thickness	320.10 $\pm$ 9.79	342.23 $\pm$ 6.41	0.0001

*Table 5: Stratification of Best Corrected Visual Acuity with respect to age, gender, duration of disease and control of DM.*

Co-morbid conditions		Group A (n=30)		Group B (n=30)		P-value
		Best Corrected Visual Acuity		Best Corrected Visual Acuity		
		Mean	SD	Mean	SD	
Age (years)	15-45	0.49	0.03	0.45	0.02	0.0001
	46-65	0.48	0.02	0.45	0.02	0.0001
Gender	Male	0.49	0.03	0.45	0.02	0.0001
	Female	0.48	0.03	0.45	0.02	0.0001
Duration (months)	≤5	0.49	0.03	0.45	0.02	0.0001
	>5	0.48	0.02	0.45	0.02	0.0001
Controlled	Yes	0.48	0.03	0.45	0.02	0.0001
	No	0.49	0.03	0.46	0.02	0.0001

*Table 6: Stratification of Central Macular Thickness with respect to age, gender, duration of disease and control of DM.*

Disease and control of DM.

Co-morbid conditions		Group A (n=30)		Group B (n=30)		P-value
		Central Macular Thickness		Central Macular Thickness		
		Mean	SD	Mean	SD	
Age (years)	15-45	319.25	10.12	342.48	6.44	0.0001
	46-65	323.50	8.17	341.43	6.73	0.0001
Gender	Male	316.0	5.90	342.14	5.76	0.0001
	Female	321.59	10.58	342.26	6.72	0.0001
Duration (months)	≤5	318.27	9.75	343.0	7.01	0.0001
	>5	321.93	9.80	341.56	5.99	0.0001
Controlled	Yes	316.70	9.36	343.0	5.71	0.0001
	No	321.80	9.77	341.85	6.84	0.0001

### Discussion:

Diabetes is a major global health burden in working age group due to its complications. Diabetic retinopathy is one of the major complications of uncontrolled diabetes and occurs in 30-40% of diabetics<sup>11</sup>.

In 2020, the number of adults worldwide with Diabetic Retinopathy, Vision

Threatening DR, and Macular Edema was estimated to be 103.12 million, 28.54 million, and 18.83 million, respectively; and the numbers are projected to increase up to 160.50 million, 44.82 million, and 28.61 million, respectively by 2045<sup>12</sup>.

There has been continuous increase in prevalence of diabetes in Pakistan. The

National Diabetes Survey of Pakistan (NDSP 2016–2017) had reported that the prevalence of diabetes was 26.3% in Pakistan<sup>13</sup>. The study conducted by Jokhio AH et al diabetes prevalence is very high in rural population of Pakistan. Prevalence of clinically established DR, was 24.2% (95% CI, 22–26%). Age group >60 years and females had significantly more DR 40.5% and 58.1% respectively<sup>14</sup>.

Diabetic macular edema is leading cause of visual loss and meta- analysis yield its global prevalence of 5.47% among diabetics and it is increasing with each passing year<sup>15</sup>.

Antivascular endothelial growth factors are first line treatment in management of diabetic macular edema. In study conducted by Lundeen EA et al the 10 years trend of management of DME indicates use of Anti-vascular endothelial growth factor injections annual prevalence doubled among those with DME 15.7% to 35.2%<sup>16</sup>.

Anti-VEGF is effective treatment modality and results in anatomical as well as functional improvement. Bevacizumab is most used anti-VEGF due to its cost effectiveness and Intravitreal bevacizumab resulted in decrease in central macular thickness and improvement in BCVA in case of DME in study conducted by Sharma S et al<sup>17</sup>.

Ranibizumab is effective, safe and FDA proved anti-VEGF. Global LUMINOUS study showed improvement in baseline VA after intravitreal ranibizumab for DME. At 1-year, mean VA letter score improved by +3.5 (n = 502) from a baseline of 57.7 with a mean of 4.5 injections. Rather than RCT this study indicates safety and efficacy of ranibizumab in real world clinical practices<sup>18</sup>.

Previously multicenter RISE, RIDE and RESTORE clinical trials evaluate efficacy of IV ranibizumab and showed improvement in BCVA and Macular

thickness with IV ranibizumab<sup>19</sup>.

Olufemi O et al reported that 36 eyes with diabetic macular edema were enrolled in their study and at 4 months a larger percentage of eyes (47.6%) that received Ranibizumab had better visual acuities compared to (13.3%) eyes that received Bevacizumab. At 6 months, (26.7%) of eyes that received Ranibizumab had better visual acuities compared to 23.8% that received Bevacizumab. At 9 months, (33.3%) of eyes that received Ranibizumab had better visual acuities compared to (19%) of those that received Bevacizumab. This difference between two anti-VEGF was not statistically significant<sup>20</sup>.

Our results are also supported by another study conducted by Malik HA in Pakistan in which there is statistically significant improvement in visual acuity was observed in both the groups of intravitreal bevacizumab and ranibizumab for diabetic macular edema. There was also improvement in central retinal thickness and macular volume in both the groups, but difference was not statistically significant<sup>21</sup>.

In another study of twenty-three eyes of nineteen patients conducted by Mirshahi R et al showed improvement in central macular subfield thickness from  $418.30 \pm 103.06 \mu\text{m}$  to  $404.91 \pm 115.48 \mu\text{m}$  before and 1 month after IV bevacizumab<sup>22</sup>. However, in contrast to this, there is another observational retrospective study carried out on bevacizumab resistant macular odema. Mean Central Macular Thickness decreased from  $444.9 \pm 109.2 \mu\text{m}$  to  $316.3 \pm 54.5 \mu\text{m}$  after ranibizumab in these patients. Also, the mean BVCA increased from  $49.9 \pm 12.0$  ETDRS letters to  $61.1 \pm 9.1$ . Treatment with intravitreal ranibizumab contribute to better visual and anatomical outcomes<sup>23</sup>. Our study has many shortcomings in terms of small sample size, single center and no long term follow up of patient.

There are also many other factors that play important role in improvement of diabetic macular edema like diabetic nephropathy. However, our study results should be useful for clinicians who wants to use FDA approved anti-VEGF. We recommend this study with multicenter approach, comparison with other anti-VEGF agents with frequency of intravitreal injections should be explored with large sample size.

### Conclusion:

This study concluded that the ranibizumab is better as compared to bevacizumab in terms of mean central macular thickness and best corrected visual acuity in patients of diabetic macular edema. So, we recommend that intravitreal ranibizumab should be used in diabetic macular edema patients for preventing advance visual functional defects.

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#### **Authors Contribution**

Concept and Design: Rehan Saleem  
 Data Collection / Assembly: Waseem Akhter  
 Drafting: Salman Tariq Toosy, Fuad Khan Niazi  
 Statistical expertise: Irum Yousafzai  
 Critical Revision: Afia Matloob Rana

# Knowledge and Practice Trends of Optometrists and Refractionists at LRBT Regarding Myopia

Muhammad Nadeem<sup>1</sup>, Adnan Afsar<sup>1</sup>

## Abstract:

**Objectives:** To assess the Knowledge and Practice trends of optometrists and refractionists working at various eye care facilities of Layton Rahmatullah Benevolent Trust (LRBT) on myopia management and control.

**Methods:** A questionnaire-based online survey was conducted, which took 6 weeks to conclude. The participants' responses comprised their current trends towards the management of childhood myopia, knowledge & awareness level concerning modern concepts of myopia control strategies, and the extent of applicability of control measures in their practices.

**Results:** 105 professionals including 57 optometrists and 48 refractionists participated in the survey. Almost 50% of the participants were unaware of the current myopia control strategies. 75% of participants didn't attend any course or CME (Continuing Medical Education) session about current myopia management and control. The majority of participants (65%) considered myopia > 1D annual progression alarming for initiation of myopia control measures. Moreover, 67% were unaware of the significance of outdoor activity for myopic children. About 85% of participants were under-correcting myopic children to slow down myopia progression. Most respondents (69%) were not measuring the Axial Length of myopic children in their practice. More than 50% were neither testing binocular vision nor assessing accommodation lag. Furthermore, around 55% were not performing baseline fundus examination, whereas 64% considered pathological myopia > 6D as the standard criteria for peripheral fundus examination.

**Conclusion:** The responses of participants to survey questions reveal inadequacy in knowledge and practice concerning current myopia management and control strategies. *Al-Shifa Journal of Ophthalmology* 2023; 19(4): 162-171. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.

1. Layton Rahmatullah Benevolent Trust  
Hospital Mandra.

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## Correspondence to:

Muhammad Nadeem

Layton Rahmatullah Benevolent Trust  
Hospital Mandra.

irbaz286@gmail.com

## Introduction:

Myopia has stood out as a significant health problem owing to the considerable increase in its prevalence across the globe. It has been projected to affect almost 50% of the world population by the year 2050.<sup>1</sup> This alarming situation has aroused curiosity amongst eye care professionals to adequately control its progression. The rationale for slowing down myopia progression is to minimize the probability of significant vision loss due to sight-threatening complications later in life.

Myopia has been attributed as the most common cause of distant vision impairment in the working age group. Because of global myopia spillover, it is envisaged that more children will develop myopia and subsequently progress to high myopia if adequate control measures are not

employed. As a result, a significant proportion of high myopes are expected to suffer from visual morbidity due to the eventual, higher prevalence of myopic complications in the population. This is because of the increased risk of developing complications with age and progression of the refractive error.<sup>2</sup> Moreover, since both environmental and genetic factors have been regarded to cause myopia and its progression, a greater risk of developing myopia is anticipated among the children of myopic parents.

Myopia initially causes visual impairment due to uncorrected refractive error. However, if control strategies to slow down its progression are not employed, it can lead to an increased risk of sight-threatening complications including but not limited to open-angle glaucoma, retinal detachment, and myopic macular degeneration (MMD), thereby reducing the quality of life.<sup>3</sup> The central vision loss due to MMD is irreversible and an increase in axial length in high myopia is the major contributing factor for increasing the risk of MMD.<sup>4</sup>

The introduction of newer myopia control strategies in clinical practice should be deliberated as a priority agenda, as according to a study, any lapse in this execution may lead to visual impairment due to MMD in 55.7 million people out of which 18.5 million will be blind by the year 2050.<sup>5</sup>

Given that outdoor activity has an eminent role in the prevention of onset and slowing down the progression of myopia, it is also accepted that there exists a positive association of excessive near work with myopic progression<sup>6,7</sup>. This indicates that environmental and lifestyle changes can be utilized by eye care professionals as an effective tool in myopia management.<sup>8</sup> Furthermore, parents of myopic children should be made aware of myopia progression and its management to address the issue from a broader perspective.

The goal of employing myopia control strategies should be to slow down the progression of myopia and in turn,

minimize the occurrence of consequent sight-threatening complications. A number of these control strategies including the use of bifocals and multifocal lenses, atropine therapy, orthokeratology, and soft contact lenses have been established as significantly effective.<sup>6</sup> Substantial evidence is now available to validate that the conventional practice of under-correcting myopia leads to faster progression of the refractive error. This critical situation urges for the adoption of best practices by eye care practitioners for myopia management.

Layton Rahmatullah Benevolent Trust (LRBT) is present in all 4 provinces of Pakistan, with a network of 19 fully-equipped hospitals, 61 primary eye care, and outreach clinics. This study explores the awareness level and strategies being practiced for managing myopia and its progression by optometrists and refractionists at LRBT.

### Materials and Methods:

A questionnaire-based online survey was conducted, including optometrists and refractionists deployed at various eye care facilities of LRBT. Whereas, other eye care professionals, i.e., ophthalmologists, orthoptists, and ophthalmic technologists were excluded. The questionnaire comprised survey questions regarding knowledge and practice trends of the study participants about myopia management and control. Data entry and analysis were done using SPSS software.

### Results:

105 professionals including 57 optometrists and 48 refractionists working at various eye care facilities of LRBT participated in the survey. Based on years in practice; 52 (50%) had less than 5 years, 39 (37%) had between 5-10 years, and 14 (13%) had more than 10 years of experience.

50 (48%) survey participants were unaware of the current myopia control strategies.

Only 27 (25%) had so far attended the myopia course, conceptualizing current

myopia management and control measures, whereas 75% of survey participants had not attended any CPD(continuing professional development) session in this regard (Fig 1). The preferred method of refraction was cycloplegic, whether using retinoscopy (52%) or the auto-refractometer (53%), most of the optometrists and refractionists (n=89; 85%) tended to under-correct, for slowing down myopia progression (Fig 2). Of the participants, 72 individuals (69%) were not measuring the axial length of myopic children in their practice (Fig 3). A few participants (n=42, 40%) were highly concerned about rapid paediatric myopia progression in their clinical practice but the rest including 38 (36%) and 25 (24%) individuals, were somehow or not at all concerned respectively about rapid myopia progression in their paediatric patients. (Fig 4).

The majority of optometrists & refractionists (n=37; 65% & n=31; 65%

respectively) considered annual myopia progression  $> 1D$  as an alarming sign for initiation of myopia control management. 58 (55%) participants were not performing baseline fundus examination (Fig 5). The preferred initial concentration of atropine was 0.01% amongst 43 (41%) participants. After initiation of myopia control, 48 (38%) participants were reviewing patients on 3-monthly follow-ups while 65 (62%) were following them biannually, i.e., 6 monthly. 69 participants (67%) were unaware of the significance of outdoor activity in myopia control (Fig 6), whereas most optometrists and refractionists (n=60; 57%) responded considering  $< 2$  hours, the acceptable continuous near work time for myopic patients.

77 participants (73%) were not prescribing bifocal glasses, progressive glasses, or contact lenses (singly or in combination) for controlling myopia progression in children (Fig 7).

*Table 1: Knowledge and awareness regarding Myopia control and management*

S. N	Critical Aspects of Myopia Management & Control	Response n (%)	Details
1.	Awareness regarding myopia control strategies	Aware: 55 (52%) Unaware: 50 (48%)	Almost 50% of participants were unaware of the current myopia control strategies
2.	Attended or haven't yet attended any training course about current myopia management and control strategies	Attended: 27 (25%) Not attended: 78 (75%)	75% of participants had not attended any CME session about current myopia management and control strategies
3.	Awareness about the annual alarming progression of Myopia.	Aware: 37 (25%) Un-aware: 68 (65%)	Most participants (65%) were unaware of the annual alarming progression rate of myopia, i.e. $\geq 0.50 D$
4.	Awareness about suggesting outdoor activities for myopic children.	Aware: 36 (33%) Un-Aware: 69 (67%)	67% of participants were unaware of the significance of outdoor activity for myopic children.
5.	Awareness about acceptable continuous near-work time for myopic children.	Aware: 60 (57%) Un-aware:	57% of responses were accurate, i.e., the acceptable continuous near-work time should be $< 2$ hours.

*Table 2: Practice trends of participants pertaining to Myopia control and management*

S. N	Critical Aspects of Myopia Management & Control	Response n (%)	Details
1.	Preferred Method of refraction in pediatric myopic patients	Cycloplegic refraction with Retinoscopy: 49% Cycloplegic ref with Autorefractor: 51%	The preferred method of refraction amongst survey participants was cycloplegic refraction whether with retinoscopy (49%) or auto refraction (51%)
2.	Under-correction as a strategy to slow down myopia progression	Yes: 89 (85%) No: 16 (15%)	85% of participants were under correcting the myopic children to slow down myopia progression
3.	Axial length measurement	Yes: 33 (31%) No: 72 (69%)	The majority of participants (69%) do not measure the axial length of myopic children in their practice.
4.	Binocular vision testing and assessment of accommodation lag.	Yes: 51 (49%) No: 54 (51%)	More than 50% of participants were neither testing binocular vision nor assessing accommodation lag.
5.	Level of concern about the rapid progression of pediatric myopia in clinical practice	Extremely: 42 (40%) Somehow: 38 (36%) Not at all: 25 (24%)	The positive responses regarding extreme concern about rapid progression of pediatric myopia were 42%.
6.	Baseline fundus examination with direct ophthalmoscope including criteria for peripheral fundus examination	Yes: 47 (45%) No: 58 (55%)	55% do not perform baseline fundus examination, whereas 64% consider pathological myopia (> 6D) as the standard criteria for peripheral fundus examination.
7.	Typical starting concentration of atropine for myopia control	0.1 % = 40 (39%) 0.05% = 22 (20%) 0.01% = 43 (41%)	41% were using 0.01% as the starting concentration of Atropine, whereas another 39% were using 0.1% as the starting Atropine concentration for myopia control.
8.	Follow-up for myopic patients	3 monthly: 40 (38%) 6 monthly: 65 (62%)	62% were advising follow-up after every 6 months, which is the recommended approach.
9.	Employing various treatment modalities singly or in combination	Yes: 19 (33%) No: 38 (67%)	67% did not prescribe different treatment modalities like (bifocal glasses, progressive glasses/contact lenses, or orthokeratology) either singly or in combination to control myopia progression in children.

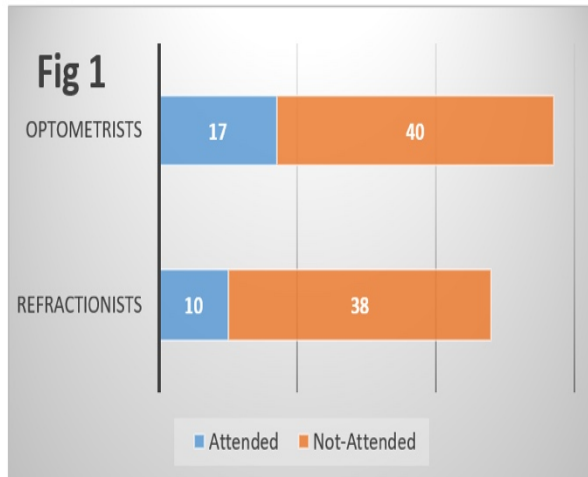


Figure 1: Distribution of participants who had or had not attended any myopia management course

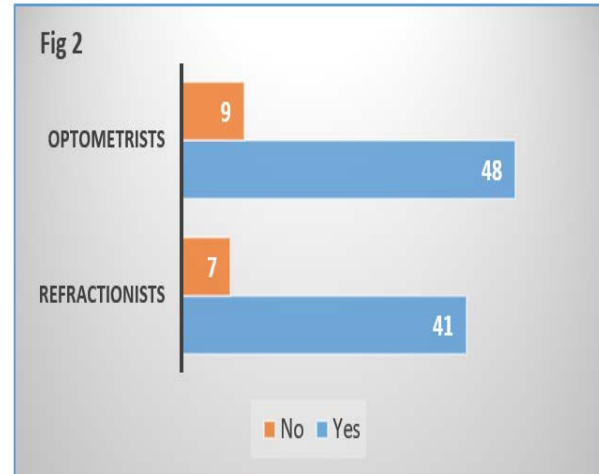


Figure 2: Proportion of participants practicing under-correction as a strategy to slow myopia progression



Figure 3: Proportion of participants measuring and not measuring axial length in myopic patients

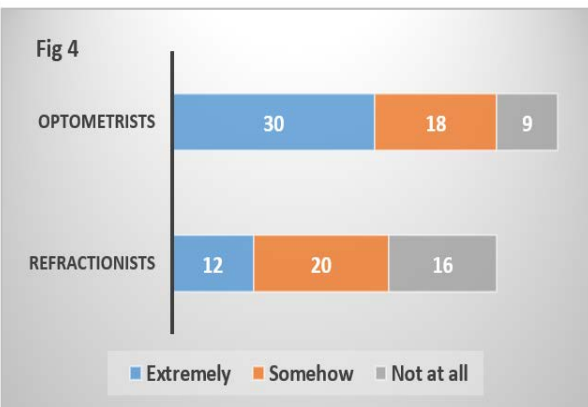


Figure 4: Illustrates the level of concern expressed by participants regarding rapid progression of paediatric myopia

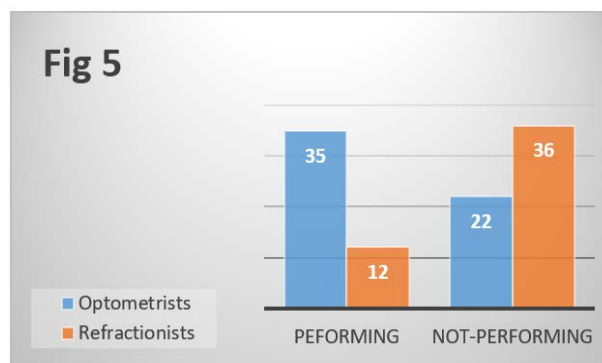


Figure 5: Displays the proportion of study participants who performed or did not perform baseline fundus examination of myopic patients

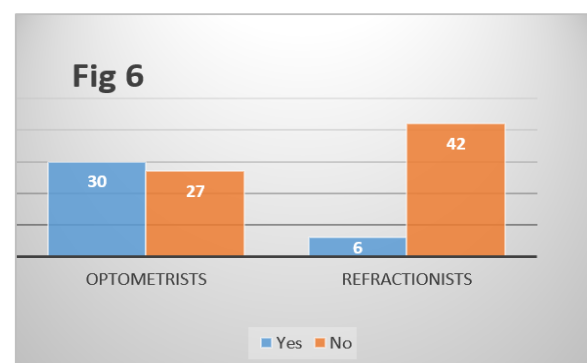


Figure 6: Depicts no of participants who suggested or did not suggest out-door activity

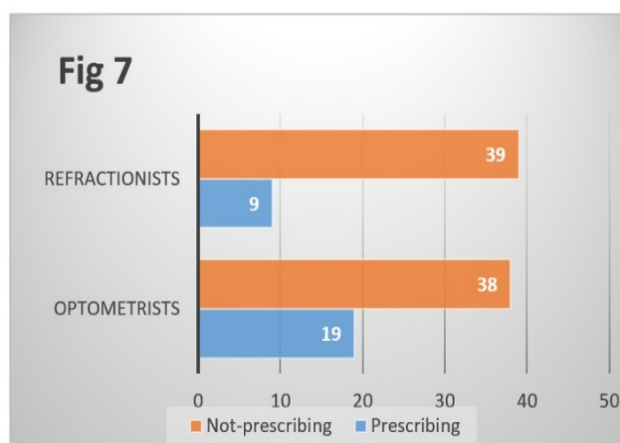


Figure 7: Proportion of participants prescribing or not prescribing treatment modalities for controlling myopia progression

### Discussion:

The purpose of this survey was to assess the knowledge and practice trends of optometrists and refractionists working at various LRBT eye care facilities (primary, secondary & tertiary) about current myopia management and control strategies. The findings highlight the dire need for enhancing knowledge and awareness amongst both categories of participants pertaining to these aspects. However, an important barrier for not putting into practice some of the myopia control strategies, especially at the primary level eye care facilities of LRBT was the unavailability of either myopia progression diagnostic equipment, i.e., A-Scan & refractor-Keratometer, or treatment modalities like progressive glasses, multifocal contact lenses, and low concentration atropine.

The preferred method of refraction amongst survey participants was cycloplegic refraction whether with retinoscopy (49%) or autorefraction (51%). Cycloplegic refraction is considered the standard approach for measuring refractive error in children. Skipping cycloplegia usually results in an overestimation of the degree of myopia in children<sup>9</sup>.

Previously, under-correcting myopia was practiced as a conventional approach to slow down myopia progression by

diminishing the accommodative demand. However, substantial evidence attributes under-correction as a significant factor for myopia progression as against full correction of myopic eyes<sup>10,11,12</sup>. However, in our study, 85% of all participants were under-correcting myopia in their practice. There exists a high correlation between axial length change and myopic progression, i.e., the longer the axial length the higher the degree of myopia<sup>13</sup>, hence axial length should essentially be measured and monitored while assessing the effect of myopia control strategies on ocular changes. According to survey findings, 69% of participants were not measuring axial length. This finding reflects the inaccessibility of optometrists and refractionists working at LRBT's primary eye care facilities to expensive biometry equipment.

59% of participants were not performing baseline fundus examination, whereas this should be done as a routine to assess the progression of retinal degenerative changes or choroidal thickness corresponding to any further increase in myopia. Studies suggest a high association between refractive error (spherical equivalent) and myopia-related peripheral retinal changes. Fundus examination reveals such changes, which helps practitioners in managing myopia and

planning for different treatment strategies accordingly<sup>14,15,16</sup>.

64% of practitioners consider pathological myopia > 6D as a benchmark for peripheral fundus examination, which is not in conformity with the standard practice. According to a study conducted in India, various pathologic features of myopia were found across all grades of myopia indicating that pathologic myopia lesions also exist in eyes with low degrees of myopia (2.5% in low myopes vs. 2.2% in severe myopes). Lattice degeneration was the most frequently seen lesion (2.7%)<sup>17</sup>.

In Myopes, Atropine therapy is offered to slow down progression. The majority of respondents (41%) in our study considered 0.01% atropine as a typical starting concentration for myopia control. However, 1-year follow-up data from the Low-Concentration Atropine for Myopia Progression (LAMP) study, which was a double-masked placebo-controlled trial, has questioned the efficacy of 0.01% topical Atropine, relative to a 0.05% concentration, for slowing axial elongation<sup>18</sup>.

67% of study participants were unaware of the significance of outdoor activity in myopia control. Sufficient evidence reveals the positive impact of outdoor activity on lowering the incidence of myopia. It has been observed that spending time outdoors and sunlight exposure protects against myopia progression, however, the underlying mechanism of this protective effect has not yet been fully understood. Hence, an increased span of outdoor activity may result in considerable protection against myopia progression, and studies carried out involving school-aged children have recommended a minimum of 8 to 15 hours of outdoor activity per week to achieve clinically significant protective effects<sup>19-22</sup>.

57% of respondents considered < 2 hours as the acceptable continuous near-work time for myopic patients. Long continuous near work time can be a contributing factor to the development and progression of

myopia. Continuous reading for more than 45 minutes at a close distance (20 cm) has been deemed as a greater risk for myopic progression. Children should be educated about regular breaks (near-to-distance fixation changes) every 20 minutes for 20 seconds and maintaining appropriate reading distance (30 to 40 cm) while reading or spending time on screens<sup>23,24</sup>.

More than two-thirds of participants (73%) were not prescribing bifocal glasses, progressive glasses, or contact lenses (singly or in combination) for controlling myopia progression in children. The most probable reason might be the high cost of these treatment modalities. Thus, according to survey findings, single-vision glasses had been the mainstay strategy for myopia control. Almost similar findings were observed in a study conducted in 2015 for investigating myopia management and control trends in Asia, Australia, Europe, North America, and South America<sup>25</sup>. The study was carried out again later between the years 2018 and 2019 and it was noticed that prescribing single vision glasses for myopic children was still the primary approach amongst eye care professionals (64%)<sup>26</sup>.

The majority of participants considered > 1D annual progression alarming for initiation of myopia control as against 1/3<sup>rd</sup> of respondents, who advocated 0.75 or 0.50 diopter annual progression as a threshold to initiate control measures. Recent studies suggest that myopia control strategies should urgently be employed for children who become myopic at a younger age to reduce the complications associated with myopia progression<sup>27,28</sup>.

Regarding myopia related CPD activities, most (75%) have not yet attended any myopia management course, which suggests that the knowledge and practices of a considerable proportion of optometrists and refractionists are not up to the mark concerning the current concepts of myopia management and control.



## Conclusion:

The responses of participants relating to the majority of survey questions reveal inadequacy in knowledge and practice concerning current myopia management and control strategies, which highlights the need to make them aware of these concepts through in-house CPD activities.

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**Authors Contribution**

Concept and Design: Adnan Afsar  
Data Collection / Assembly: Muhammad Nadeem  
Drafting: Adnan Afsar  
Statistical expertise: Muhammad Nadeem  
Critical Revision: Muhammad Nadeem

# Comparison of Causative Bacteria in Acute and Chronic Dacryocystitis

Sara Najeeb<sup>1</sup>, Muhammad Usman Sadiq<sup>1</sup>, Umair Tariq Mirza<sup>1</sup>, Fatima Akbar Shah<sup>1</sup>, Muhammad Irfan Sadiq<sup>2</sup>, Muhammad Shuaib<sup>1</sup>

## Abstract:

**Objectives:** This study aimed to compare the causative bacteria in acute and chronic dacryocystitis, to identify specific bacterial strains associated with each form of the condition.

**Methods:** A retrospective comparative analysis was conducted in the Ophthalmology Department, Divisional Headquarters Teaching Hospital, Mirpur AJK in which data of 54 patients was collected. Clinical data and microbiological findings from patients diagnosed with either acute or chronic dacryocystitis were collected from 1<sup>st</sup> January 2019 to 31<sup>st</sup> December 2022. The study encompassed a comprehensive review of patient records, including demographic information, clinical presentations, and laboratory results. Microbiological cultures of lacrimal sac secretions were performed to isolate and identify the bacteria associated with each type of dacryocystitis.

**Results:** The study included 54 patients, with 26 diagnosed with acute dacryocystitis and 28 with chronic dacryocystitis. The mean age was  $49.98 \pm 3.912$  years. Out of 54 patients, 21 were males and 33 were females. Microbiological analysis revealed distinct microbial profiles in each group. In cases of acute dacryocystitis, *Staphylococcus aureus* emerged as the predominant pathogen, accounting for 35% of cases compared to Chronic Dacryocystitis, in which, *Propionibacterium acnes* emerged as the most prevalent pathogen, contributing to 32% of cases.

**Conclusion:** The findings of this study underscore the importance of microbial analysis in distinguishing between acute and chronic dacryocystitis. Identifying specific bacterial strains associated with each form enhances diagnostic precision and informs targeted therapeutic strategies. *Al-Shifa Journal of Ophthalmology* 2023; 19(4): 172-177. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.

1. Mohi-ud-Din Islamic Medical College, Mirpur AJK.
2. Mohtarma Benazir Bhutto Shaheed Medical College, Mirpur AJK.

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## Correspondence to:

M Usman Sadiq  
Mohi-ud-Din Islamic Medical College,  
Mirpur AJK.  
u\_sadiq@hotmail.com

## Introduction:

In the annals of medical research, exploring ocular diseases has been a persistent and intricate journey, aiming to unravel the complexities that shroud the realm of eye health<sup>1</sup>. One such condition that has garnered attention within the scientific community is dacryocystitis, an inflammation of the lacrimal sac, which can manifest as either acute or chronic<sup>2</sup>. Understanding the underlying causative factors of this ocular ailment has been a focal point of research, and a significant stride in this quest involves the investigation of the role played by bacteria

in distinguishing between acute and chronic forms of dacryocystitis<sup>3</sup>.

The journey into the investigation of dacryocystitis dates to the early stages of ophthalmic research, where clinicians and researchers sought to decode the intricacies of this ocular affliction. Acute dacryocystitis, marked by a sudden onset of symptoms such as pain, redness, and swelling around the lacrimal sac, demands immediate attention and intervention<sup>4</sup>. On the other hand, chronic dacryocystitis unfolds gradually, often with persistent symptoms that may include recurrent infections, tearing, and discharge. The dichotomy in the clinical presentation of these two forms sparked a curiosity to delve deeper into the causative agents, particularly bacteria, orchestrating the distinctive features of acute and chronic dacryocystitis<sup>5</sup>.

Historically, the primary causative factor attributed to both acute and chronic dacryocystitis has been the obstruction of the nasolacrimal duct, impeding the normal drainage of tears. However, the role of bacteria in exacerbating the condition and influencing its chronicity has been a subject of growing interest<sup>6</sup>. Past studies hinted at the potential involvement of bacterial infections in the etiology of dacryocystitis, but a comprehensive comparative analysis to discern the nuances between acute and chronic forms was lacking<sup>7</sup>.

The turning point in this investigative journey came with advancements in microbiological techniques, enabling researchers to delve into the microbial landscape of dacryocystitis with unprecedented precision. By isolating and identifying bacteria from clinical samples obtained from affected individuals, scientists began to unravel the intricate relationship between causative agents and the chronicity of dacryocystitis<sup>8</sup>. The evolution of molecular diagnostic tools provided a deeper understanding of the microbial composition, allowing for the identification of specific bacterial strains

associated with acute and chronic presentations<sup>9</sup>.

The comparative analysis of bacterial involvement in acute and chronic dacryocystitis not only contributed to refining diagnostic approaches but also opened avenues for targeted therapeutic interventions. Past studies often treated dacryocystitis as a homogenous entity, overlooking the dynamic interplay between bacterial species and the host's immune response<sup>10</sup>. With the advent of sophisticated molecular techniques, researchers discerned the subtle variations in bacterial communities associated with acute and chronic dacryocystitis, providing a foundation for tailored treatment strategies<sup>11</sup>.

As the research landscape continued to evolve, the integration of clinical observations, microbial genomics, and immunological responses painted a more comprehensive picture of the intricate dance between bacteria and the lacrimal system<sup>12</sup>. This investigation into the role of causative bacteria in distinguishing acute from chronic dacryocystitis represents a pivotal chapter in the ongoing narrative of ocular health<sup>13</sup>. By decoding the microbial fingerprint embedded in the tears of affected individuals, researchers have not only expanded the understanding of dacryocystitis but have also laid the groundwork for more precise diagnostics and targeted therapeutic interventions in the ever-evolving landscape of ophthalmic medicine<sup>14</sup>.

### **Materials and Methods:**

The research adopted a retrospective comparative analysis design. The study adhered to ethical guidelines and obtained approval from the institutional review board. Informed consent was obtained from all participants, ensuring that their rights and privacy were protected throughout the research process. Patient records and samples were collected over a period of 3 Years from 1<sup>st</sup> January 2019 to 31<sup>st</sup> December 2022, encompassing cases of

both acute and chronic dacryocystitis from the Department of Ophthalmology, Divisional Headquarters Teaching Hospital, Mirpur AJK. Patients diagnosed with dacryocystitis were selected based on predefined inclusion and exclusion criteria. All fresh patients who were diagnosed with Acute or Chronic Dacryocystitis were included in the study. Those patients with dacryocystitis who took any previous treatment were excluded from the study. Clinical specimens, including conjunctival swabs and lacrimal fluid samples, were collected from each participant. All collected samples underwent rigorous laboratory processing. This included bacterial isolation, identification, and characterization. Cultures were prepared using appropriate growth media, and microbial colonies were subjected to biochemical tests and molecular techniques, such as polymerase chain reaction (PCR), to confirm bacterial species. Data were analyzed using SPSS version 21.0. Numerical variables like age were expressed as mean and standard deviation. Categorical variables like gender and causative bacteria were expressed as frequency and percentages.

### Results:

The mean age of patients included in this study was  $49.98 \pm 3.912$  years Table 1. The gender distribution is shown in Figure 1.

Table 2 illustrates the distribution of causative bacteria in cases of acute dacryocystitis. *Staphylococcus aureus* emerged as the predominant pathogen, accounting for 35% of cases, followed by *Streptococcus pneumoniae* at 23%. *Haemophilus influenzae* and *Pseudomonas aeruginosa* constituted 19% and 15% of cases, respectively. Additionally, a small percentage (8%) of cases was attributed to other Gram-negative bacteria.

The distribution of causative bacteria in cases of chronic dacryocystitis is shown in Table 3. Notably, *Propionibacterium acnes* emerged as the most prevalent pathogen, contributing to 32% of cases, followed closely by *Staphylococcus epidermidis* at 25%. *Corynebacterium* species and coagulase-negative *Staphylococci* accounted for 21% and 14% of cases, respectively. A small percentage (7%) of cases was attributed to other anaerobic bacteria.

*Table 1: Mean age in the study*

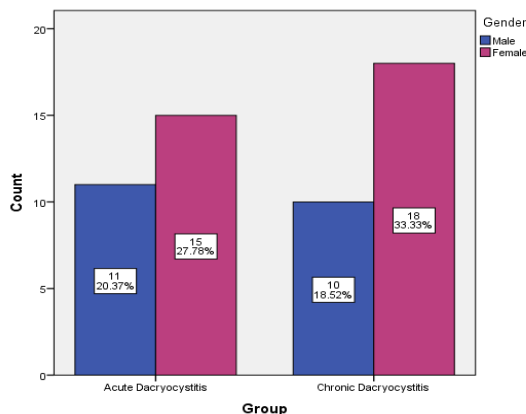
Mean Age in the Study				
N	Mean	Std. Deviation	Maximum	Minimum
54	49.98	3.912	56	42

*Table 2: Distribution of Causative Bacteria in Acute Dacryocystitis:*

Bacterial Species	Number of Cases	Percentage (%)
<i>Staphylococcus aureus</i>	9	35%
<i>Streptococcus pneumoniae</i>	6	23%
<i>Haemophilus influenzae</i>	5	19%
<i>Pseudomonas aeruginosa</i>	4	15%
Other Gram-negative bacteria	2	8%
Total	26	100%

*Table 3: Distribution of Causative Bacteria in Chronic Dacryocystitis:*

Bacterial Species	Number of Cases	Percentage (%)
Propionibacterium acnes	9	32%
Staphylococcus epidermidis	7	25%
Corynebacterium species	6	21%
Coagulase-negative Staphylococci	4	14%
Other anaerobic bacteria	2	7%
Total	28	100%

*Figure 1: Gender Distribution in both groups***Discussion:**

The exploration into the role of causative bacteria in distinguishing between acute and chronic dacryocystitis marked a significant milestone in understanding and managing these ocular conditions<sup>15</sup>. This comparative analysis, conducted in the past, aimed to unravel the microbial intricacies that contribute to the development and progression of dacryocystitis, shedding light on potential diagnostic and therapeutic avenues<sup>16</sup>.

In the realm of ophthalmology, dacryocystitis emerges as a prevalent ailment, affecting the lacrimal sac and causing inflammation. The classification into acute and chronic forms is pivotal for devising appropriate treatment strategies, making the identification of causative bacteria a crucial aspect of this research<sup>17</sup>. The study encompassed a thorough investigation of patients presenting with dacryocystitis, seeking to discern the microbial landscape associated with each variant. Past medical records, microbiological cultures, and clinical observations were meticulously analyzed to

draw meaningful correlations between bacterial profiles and the temporal nature of the condition<sup>18</sup>.

One of the notable findings that emerged from this investigation was the prevalence of specific bacterial strains in either acute or chronic dacryocystitis<sup>19</sup>. In cases of acute dacryocystitis, a surge in the incidence of rapidly proliferating bacteria, such as *Staphylococcus aureus* and *Streptococcus pneumoniae*, was observed. These organisms are known for their ability to cause swift and aggressive infections, aligning with the acute nature of the condition<sup>20</sup>.

Conversely, chronic dacryocystitis exhibited a distinct microbial profile characterized by persistent and often biofilm-forming bacteria. *Pseudomonas aeruginosa* and *Haemophilus influenzae* were recurrently identified in chronic cases, indicating their potential role in sustaining long-term inflammation within the lacrimal sac<sup>21</sup>. The formation of biofilms by these bacteria adds a layer of complexity to chronic dacryocystitis, rendering it more resistant to conventional treatments and emphasizing the need for targeted therapeutic interventions.

The significance of these findings transcends mere academic interest, as they hold profound implications for clinical practice<sup>22</sup>. The identification of specific bacterial markers associated with acute or chronic dacryocystitis opens avenues for more accurate and rapid diagnostic approaches<sup>23</sup>. A nuanced understanding of the microbial landscape can guide healthcare practitioners in tailoring antimicrobial therapies, thereby improving

patient outcomes and reducing the risk of complications.

Moreover, the insights gleaned from this comparative analysis underscore the importance of considering the temporal dimension in the management of dacryocystitis<sup>24</sup>. The transition from acute to chronic forms may not solely be a result of the persistence of the initial infecting agent but may involve a shift in the microbial composition. This realization prompts a reevaluation of treatment protocols, advocating for a dynamic and personalized approach that adapts to the evolving nature of the infection.

### **Conclusion:**

The comparative analysis delving into the role of causative bacteria in discerning between acute and chronic dacryocystitis has significantly contributed to our understanding of these ocular conditions. Through meticulous investigation, it was revealed how distinct bacterial profiles played a pivotal role in differentiating the acute and chronic phases. The insights gained underscore the importance of bacterial involvement in the progression of dacryocystitis, paving the way for more nuanced and effective management strategies.

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#### **Authors Contribution**

Concept and Design: Muhammad Usman Sadiq  
Data Collection / Assembly: Umair Tariq Mirza, Fatima Akbar Shah  
Drafting: Muhammad Irfan Sadiq  
Statistical expertise: Muhammad Shuaib  
Critical Revision: Sara Najeeb

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