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Editorial inquiries should be addressed to Prof. Dr. Tayyab Afghani, Department of Orbit and Oculoplastics, Al-Shifa Trust Eye Hospital, Jhelum Road Rawalpindi, Pakistan.
Tel: 0092 51 5487821-25, Fax: 0092 51 5487827: Email:aqrcpio@yahoo.com ;
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Epidemiology of Ocular Trauma

Tayyab Afghani

Ocular trauma is one of the leading causes of unilateral blindness in different age groups[1], particularly in developing nations, and can be prevented by taking protective measures. Unfortunately, we have very little data available on the epidemiology of ocular trauma worldwide. Back in 1992, the World Health Organization estimated that each year, 55 million people worldwide experience ocular trauma or disability. That included 19 million who suffer from blindness in one eye, 2.3 million with reduced vision in both eyes, 200,000 with open-globe injuries, and 1.6 million with trauma-related blindness that requires hospitalization.[2] The incidence of blindness resulting from ocular trauma calculated was 9/100,000 individuals in developed countries and 75/100,000 individuals in developing countries. Globe injuries occurred in 3.5/100,000 people worldwide, resulting in roughly 203,000 new cases each year.[1] The exact prevalence of ocular trauma-related blindness remains uncertain, however it has been conservatively estimated that at least half a million individuals are blind as a result of ocular trauma, highlighting the public health significance of this issue.[2]

Similar studies suggested that men are six times more susceptible to ocular trauma than women. Accidents and sports-related incidents are the some of the important causes of ocular injuries in young children and adolescents. Majority of cases with trauma-related ocular injuries were men, and the primary causes included accidents, industrial work-related injuries, chemical injuries, foreign bodies, and burns[3]. The prevalence of ocular trauma was 5.2% among 6-12-year-old children, of which 9.3% and 4.7% required hospitalization and surgical intervention, respectively.

In addition to causing health problems for the individual, ocular injuries can also cause mental distress, reduced quality of life, cosmetic issues, and decreased efficiency resulting in significant loss of working days. Studies show that ocular trauma causes a decrease in physical performance and mental health scores, leading to reduced quality of life, which can be significant in children.[4]

Visual impairment can result from ocular trauma, but it does not always reflect the overall incidence of trauma. According to a study conducted in Nepal, 8.6 individuals per 1000 showed signs or reported a history of ocular trauma, but only 38% of those individuals had experienced visual impairment. Additionally, in over 70% of those cases, the visual impairment was unilateral. Unfortunately, there is no reliable data on the true incidence of ocular trauma.[5]

Although ocular trauma can result in blindness, it is more commonly associated with monocular vision impairment, particularly in settings with limited access to healthcare services. Epidemiological studies have shown that up to one-third of cases of monocular blindness may be attributed to severe trauma and its late complications, underscoring the importance of preventive measures and timely intervention. Several factors influence the epidemiology of ocular trauma, including age, gender, socioeconomic status, and cultural practices. Additionally, socioeconomic disparities contribute to variations in the prevalence and severity of ocular trauma, with lower-income individuals and non-white populations experiencing a higher burden of injury. The discussion of causative factors for ocular trauma is complex and varies widely depending on the setting, with workplace accidents, sports injuries, road accidents, and domestic mishaps being common causes.

The socioeconomic impact of late complications from ocular trauma is

substantial, encompassing medical expenses, lost productivity, and the need for rehabilitation services. Preventive strategies and prompt management of ocular trauma are essential to mitigate the socioeconomic burden associated with late complications. By addressing the underlying risk factors and improving access to quality eye care services, it is possible to reduce the incidence of ocular trauma and its adverse consequences on individuals and communities worldwide.

Moving forward, there is a need for continued research and surveillance to monitor trends in ocular trauma epidemiology, identify high-risk populations, and evaluate the impact of preventive interventions. Collaborative initiatives involving healthcare providers, public health agencies, policymakers, and community stakeholders are essential for implementing evidence-based strategies to prevent ocular injuries and improve outcomes for affected individuals. Furthermore, fostering interdisciplinary collaborations and leveraging technological innovations hold promise for enhancing early detection, management, and rehabilitation of ocular trauma cases.

It is crucial to recognize the limitations that come with the current data and the outdated nature of available information regarding the epidemiology of ocular trauma. Considering these limitations, it is not practical to view the current update on ocular trauma epidemiology as a comprehensive or representative assessment of the present situation. The lack of recent and robust data highlights the critical need for updated surveys to accurately evaluate the morbidity of ocular trauma globally and nationally. Without the current epidemiological studies, our knowledge of the prevalence, incidence, and associated risk factors of ocular trauma remains inadequate. To address this knowledge gap and make informed decisions on public health policies and clinical practices, we need to make concerted efforts to conduct fresh surveys that capture the contemporary epidemiological profile of ocular trauma. By doing so, we can better understand the actual burden of ocular trauma and implement targeted interventions to reduce its impact on individuals and communities worldwide.

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ORIGINAL ARTICLE

Prognostic Factors For Visual Outcome Following Intraocular Foreign Body Removal

Hussain Ahmad Khaqan[1], Laraib Hassan[1], Raheela Naz[1], Atia Nawaz[1], Hasnain Muhammad Bukhsh[1], Muhammad Ali Haider[1], Aamna Jabran[1]

Abstract:

Objective: To determine the influence of prognostic factors on the visual outcome in patients who underwent vitrectomy for intraocular foreign body.

Methods: A retrospective study was conducted at the Ophthalmology Department, Lahore General Hospital Lahore, between 2017 and 2021. A sample size of 60 patients is estimated by using a 95% confidence level, 7% absolute precision with an expected percentage of 8.4 %. The data of 62 patients who aged between 25 to 55 years and presented with open-globe injuries and retained IOFBs was collected by non probability purposive sampling technique.

Results: All the patients underwent 23-gauge pars plana vitrectomy with removal of IOFB. The final BCVA was improved by 02 letters or more on Snellen's acuity chart in 38 (61.29%) patients and remained the same in 21 (33.87%) eyes while in 03 (4.84%) cases it decreased. Despite the systemic antibiotics, 03 (4.83%) eyes ended up with endophthalmitis. None of the eyes were enucleated.

Conclusion: The prognosis of an IOFB injury is mostly uncertain due to a complex combination of parameters. The main prognostic factors related to better visual outcomes were initial BCVA, time to surgery (first week), initially attached retina and the scleral entry site. Prognostic factors for poor final VA related to IOFBs included poor initial VA, large IOFB size, posterior segment location, and preoperative retinal detachment. The main complication was endophthalmitis. *Al-Shifa Journal of Ophthalmology 2023; 19(2): 46-51. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

1. *Lahore General Hospital PGMI*

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Correspondence to:
Laraib Hassan
Lahore General Hospital PGMI
drlaraib041@gmail.com

Introduction:

Particularly among people of working age, ocular trauma continues to be a leading cause of blindness and ocular morbidity [1]. Penetrating ocular damage is usually accompanied by intraocular foreign bodies (IOFBs), which can enhance ocular morbidity. IOFBs (intraocular foreign bodies) are a subtype of ocular injuries that present difficult surgical challenges to remove the IOFB successfully while striving to preserve vision and restore ocular architecture [2,3]. There are now more alternatives for handling these challenging cases thanks to improvements in microsurgical techniques [4-7]. IOFBs that have been retained often have a better prognosis than penetrating wounds caused by other sources [8-11].

Ocular injury caused by an IOFB depends on its velocity, size, nature, entry site, and impact. IOFB's Small and sharp size causes a small and linear perforation at the entry site. Such

perforations are easy to repair [25]. Large, irregular projectiles like stone particles cause a ragged and large wound at the entry site. They cause significant tissue damage and are difficult to repair. IOFBs generated at high speed generally lodge in the posterior segment of the eyeball. They can also ricochet inside the eye, causing injuries at multiple sites [26].

The most typical kind of foreign bodies are metallic [27]. Foreign bodies made of iron and copper are extremely reactive. Metallosis can occur due to Fe and Cu. Metallic ions are released, and these ions deposit in the different ocular tissues.

Siderosis bulbi is the outcome of iron foreign body injury to the eye. It is a degenerative, pigmentary process brought on by the long-term retention of an iron IOFB. The trabecular meshwork, iris, retina, cornea, lens, and other epithelial tissues accumulate deposits of iron. The pigments are deposited in the endothelium or stroma of the cornea. Iron accumulation in the stroma and epithelium of the iris is observed, resulting in greenish-brown discoloration and iris heterochromia [28,29,30,31].

Materials and Methods:

A retrospective study was carried out at the Ophthalmology Department of Lahore General Hospital between 2017 and 2021. For the study, a sample size of 60 patients was estimated using a 95% confidence level, 7% absolute precision, and an expected percentage of 8.4%. The data of 62 patients aged between 25 to 55 years with open-globe injuries and retained IOFBs were collected through non-probability purposive sampling techniques. The study included patients who had open globe injuries and retained IOFBs and were between the ages of 25 and 55. Patients who were taking medications such as antimicrobials, sedatives, anticonvulsants, diuretics, gold salts, and anti-diabetic drugs, those with a history of exposure to chemicals like ethanol, benzene, and arsenic, known cases of liver disease (as per medical record), patients with human immunodeficiency virus infection, patients with autoimmune disorders such as systemic lupus erythematosus (as per medical record), patients who had been treated with H. pylori eradication therapy during the past 4 weeks, patients with thrombotic thrombocytopenic purpura (as per medical record), and gestational thrombocytopenia (as per medical record) were excluded from the study. Additionally, patients with thrombocytopenia after transfusion (as per medical record) were also excluded. After informed consent, a detailed preoperative examination was carried out. All the patients underwent 23-gauge pars plana vitrectomy with removal of IOFB. In 43 patients, the IOFB was removed during the first 24 hours after the accident. In 19 patients, who presented after the primary repair, the IOFB was removed later than 24 hours after the accident. Forceps removal was done in 43 (69.35%) eyes, Endo magnet was used in 12 (19.36%) of eyes while 07 (11.29%) foreign bodies were removed with a vitrectomy probe. The follow-up period was 05 years for 29 cases, and 03 years for 21 patients while 12 patients had a follow-up of 01 year. On each follow-up visit the best corrected visual acuity (BCVA) was noted.

Results:

This study included 62 patients. All the patients were males (100%). The mean age was 40 years. Metallic foreign bodies accounted for 49 (79.03%) cases and non-metallic foreign bodies were present in 13 (20.97%) eyes (Table 1). The entry wound was in the cornea in 24 (38.71%) cases, corneoscleral in 29 (46.77%), and scleral in 09 (14.52%) eyes (Table 2). The size of the IOFB ranged from 0.5 mm to 22 mm in its largest diameter, with a mean of 5.65 mm. The posterior segment was the most frequent location found in 35 (56.45%) eyes. Traumatic cataract was found in 35 (56.45%) eyes. Retinal detachment was found in 27 (43.54%) cases while 19 (30.64 %) eyes presented with vitreous hemorrhage. The final BCVA was

improved more than 02 letters on Snellen's chart in 38 (61.29%) patients, remained the same in 21 (33.87%) eyes while decreased in 03 (4.84%) cases. [Table 3]

Despite the systemic antibiotics, 03 (4.83%) eyes ended up with endophthalmitis. None of the eyes were enucleated.

Table 1: Nature of foreign bodies

Metallic foreign Status	No.of Eyes	Percentage
Metallic foreign bodies	49	79.03%
Non-Metallic foreign bodies	13	20.97%
Total	62	

Table 2: Location of wound

Wound Status	No. of Eyes	Percentage
cornea	24	38.71%
corneoscleral	29	46.77%
scleral	9	14.52%
TOTAL	62	

Table 3: Visual acuity after intervention

BCVA Status	No.of Patients	Percentage
Improved	38	61.29%
Remained Same	21	33.87%
Decreased	3	4.84%
TOTAL	62	

Discussion:

Penetrating ocular injuries continue to be a common cause of blindness in the United States despite advances in microsurgical techniques. Ocular trauma is the leading cause of blindness in teenage and young adult males.[12] Penetrating injuries involving retained IOFBs represent a significant subset of ocular injuries. Injuries involving IOFBs often occur under circumstances in which the injury may have been prevented with the use of eye protection. In the management of IOFBs, the primary goals of the patient and the physician are to restore the ocular integrity and obtain a good visual outcome. Secondary goals include minimizing intraoperative and postoperative complications and rehabilitating the patient in a timely manner. The surgical techniques available to remove retained IOFBs have increased with the routine availability of vitreous surgery.[13-22]

The management of IOFBs of the posterior segment by vitrectomy has occurred in the past several years. Many surgeons advocate pars plana vitrectomy for IOFBs in the vitreous or retina/choroid. In our study, IOFBs were located in the vitreous or retina/choroid. Vitrectomy was the most

commonly used method of removing the IOFB. The advantages of vitrectomy include the ability to remove media opacities concomitantly, such as hemorrhage and cataract, and direct visualization of the IOFB for forceps or nonmagnetic removal. Endo-magnetic removal of IOFBs is one of the techniques used in IOFB Removal. IOFBs located in the vitreous cavity were removed after vitrectomy with an endo magnet in 12 eyes, in 43 eyes we used forceps removal while in 7 eyes vitrectomy was done to remove IOFB. Initial visual acuity was the most important predictive factor of visual outcome in patients with retained IOFBs. Previous studies have also identified the presenting visual acuity as an important predictive factor.[13,14,16,17,23,24] The presence of retinal pathology was the primary reason for having a fair or poor visual outcome. Of the 62 eyes, 27 eyes had retinal detachments, and 19 had vitreous hemorrhage secondary to the foreign body and application of its results. Other factors predictive of good visual acuity include scleral entry site and time of surgery. Those who underwent surgery in the first week of IOFB retention have a better visual prognosis than those who underwent surgery later on. foreign body size is also an important prognostic factor. Ocular trauma continues to be a major cause of visual impairment.

Patient education, occupational safety, and advancement in microsurgical techniques continue to help improve outcomes of major ocular trauma. Intraocular foreign bodies contribute a significant component of ocular morbidity associated with open-globe injury. In this study, we identify several factors that may help to determine which patients risk for vision loss and globe loss. These factors may aid the clinician in counseling a patient regarding visual outcome

Conclusion:

The prognosis of an IOFB injury is for the most part uncertain due to a complex combination of parameters. The main prognostic factors related to better were initial BCVA, time to surgery (first week), initially attached retina, and the scleral entry site. Prognostic factors for poor final VA related to IOFBs included poor initial VA, large IOFB size, posterior segment location, and preoperative retinal detachment. The main complication was endophthalmitis

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Authors Contribution

Concept and Design: Hussain Ahmad Khaqan
Data Collection / Assembly: Raheela Naz, Atia Nawaz
Drafting: Hasnain Muhammad Bukhsh, Muhammad Ali Haider
Statistical expertise: Aamna Jabran
Critical Revision: Laraib Hassan

ORIGINAL ARTICLE

Spectrum of Work-related Musculoskeletal Disorders among Ophthalmologists in Pakistan

Shehr Bano Abbas[1], Arslan Sajjad[1], Fuad Ahmad Khan Niazi[1], Ambreen Gull[1], Mishaal Abbas[2], Muhammad Abbas[3]

Abstract:

Objectives: To assess the prevalence of work-related musculoskeletal disorders (MSD), associated symptoms, and contributing risk factors among ophthalmologists in Pakistan.

Methods: A web-based questionnaire (Google Form) was developed and circulated via a social media application (WhatsApp) to ophthalmologist members of the Ophthalmological Society of Pakistan across the country. The questionnaire consisted of 21 questions on respondent demographics, practice characteristics, pain, and effects of musculoskeletal disorders on their practice patterns and social life.

Results: The survey was completed by 121 ophthalmologists with a response rate of 60.5%. Out of 121 participants, 96 (79.3%) reported work-related musculoskeletal disorders. Lower back pain was the most common symptom 57 (59.4%). The primary causes of MSD symptoms were abnormal postures during surgical procedures 67 (69.8%) and slit lamp examination 55 (57.3%). MSD attributed loss of productivity was claimed by 46.9% of the respondents.

Conclusion: Musculoskeletal pain is widespread among Pakistani ophthalmologists, significantly affecting their work and well-being. Urgent workplace adjustments, and prioritizing ergonomics in ophthalmic settings are essential. Moreover, integrating ergonomics into resident trainees' curriculum is crucial for raising awareness of risks and promoting proactive prevention strategies. *Al-Shifa Journal of Ophthalmology 2023; 19(2): 52-63.*

1. *Department of Ophthalmology, Rawalpindi Medical University and Allied Hospitals, Rawalpindi, Pakistan*
2. *Al Nafees Hospital, Islamabad*
3. *King Fahad Armed Forces Hospital, Jeddah, KSA*

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Correspondence to:
Shehr Bano Abbas
Department of Ophthalmology, Benazir Bhutto and Holy Family Hospitals, Rawalpindi, Pakistan.
shehrbanoabbas2013@gmail.com

Introduction:

The World Health Organization (WHO) defines work-related musculoskeletal disorders as "health issues affecting the locomotor system, including muscles, tendons, bones, cartilage, ligaments, and nerves." Over the past few decades, work-related musculoskeletal disorders have become a significant and undesirable occupational health risk for healthcare professionals, particularly among healthcare practitioners[1–3]. These disorders can range from mild to severe pain and stiffness, potentially leading to long-term disability and reduced quality of life among healthcare workers[4]. In 2015, the United States Bureau of Labor Statistics reported that work-related musculoskeletal disorders accounted for 31% of all workplace injuries, resulting in estimated annual losses of $45 to $54 billion in wages and productivity[5].

While 21st-century ophthalmologists have access to a variety of advanced ophthalmic devices for diagnosis and treatment, improper ergonomic practices in their usage can paradoxically harm these professionals[6]. Daily activities involving awkward postures, prolonged muscle contractions, static loading, and repetitive movements can lead to serious musculoskeletal injuries. Unfortunately, the field of ophthalmology often neglects the teaching of good ergonomic practices during professional training and clinical practice, which can have disastrous consequences for ophthalmologists[7]

The reported prevalence of musculoskeletal disorders among ophthalmologists varies widely in different countries, ranging from 52% to 80%[8]. A recent study in Pakistan revealed that 74.8% of participants had experienced musculoskeletal symptoms, with the most common complaints being lower back pain in 36.4% and neck pain in 22.4% of ophthalmologists[9]. Another study conducted in the United Kingdom found that 62% of ophthalmologists had experienced symptoms in the cervical, upper body, or lower lumbar regions[10]. A survey of eye care professionals in Saudi Arabia identified neck and back pain in 70% of participants[11]. Furthermore, a study reported that 15% of ophthalmologists faced limitations in their work, 42% of ophthalmic plastic surgeons had to modify their surgical procedures, 8% underwent surgery themselves, and 9% had to discontinue surgeries due to spinal difficulties[8]. Therefore, raising awareness of ergonomics and implementing ergonomic practices is crucial in preventing this modern epidemic. The prevalence of musculoskeletal disorders among ophthalmologists in Pakistan has not been extensively studied. Therefore, we conducted this study to assess the prevalence of work-related musculoskeletal disorders, associated symptoms, and contributing risk factors among ophthalmologists in Pakistan.

Materials & Methods:

A cross-sectional study was conducted in Rawalpindi Medical University and allied hospitals, Rawalpindi. Ophthalmologists working in other institutes all over Pakistan were also included. A web-based questionnaire (Google Form) was developed and circulated via a social media application (WhatsApp) to ophthalmologist members of the Ophthalmological Society of Pakistan across the country. After obtaining the informed consent from all the participants electronically, they were asked to fill out the questionnaire. Data anonymity was secured. The sample size of 120 is calculated by Calculator.net (https://www.calculator.net/sample-size-calculator.html) with anticipated population proportion of ophthalmologists with musculoskeletal pain: 74.8 % [9], with 5% absolute precision and 95% confidence and expected target population 200.

Practicing ophthalmologists within the age-group 25 to 65 years, were included in the study.

The ophthalmologists who had less than one year of their practicing experience and who have had musculoskeletal symptoms prior to the start of their ophthalmology career, were excluded from the study. Data collection was conducted electronically using Google Forms, with survey responses being securely stored in a protected electronic format through a dedicated link. The questionnaire consisted of 21 questions, including inquiries about occupational-related pain frequency, rated as "daily" or by the number of days per month, and pain severity measured using the 5-point Numeric Pain Intensity Scale. Specific survey inquiries covered various aspects, including age, gender, weight, height, years in practice, specialization, patient volume, time allocation between clinic and operating room, practice type (academic vs. private), location and quality of musculoskeletal pain, treatment methods, corrective surgeries, and the impact of musculoskeletal issues on work and social life. To safeguard participant

anonymity, no personally identifying information such as names or email addresses was collected. To ensure the questionnaire's quality and relevance to the study objectives, a group of ten senior members from Rawalpindi Medical University and Allied Hospitals reviewed it. They assessed the questionnaire for clarity, comprehensiveness, and alignment with the research goals, confirming its suitability for data collection. Data was entered and analyzed in SPSS 22.0. Descriptive analysis was performed on all the variables. As all the variables were categorical and hence were represented using frequency and percentage. The data was divided into two distinct groups: one comprising the participants with MSD and the other without MSD. The association between the variables was assessed using Fisher's exact test or Chi square. P-value ≤0.05 was deemed statistically significant.

Results:

A total of 121 ophthalmologists were included in our study. The gender distribution showed a higher representation of males, accounting for 72.7% of the sample. Additionally, the majority 50.4% of participants were older than 45 years. In terms of height, a significant proportion of 90.9% fell within the height range of 5 to 6 feet, and in weight category 47.9% had a weight between 61- 80 kg.

In our study majority 66.9% was of general specialty. Regarding designation, 52.1% were consultants, 28.1% were PGR and 19.8% were general ophthalmologist.

A significant majority 62.8% of the respondents reported working more than 40 hours a week. When it comes to the patient load, 45.5% of the ophthalmologist examined more than 100 patients per week. An almost equal percentage 36.4% had practice for over 20 years and for 10 years or less. Majority 58.7% of the participants spent their time in both the OPD and OT, while 5% spent most of the time in OT. (Table 1) The prevalence of MSD in current study was notably high i-e. 79.3%, with a substantial majority experiencing these disorders. (Figure 1). The distribution of gender among ophthalmologist with MSD and without MSD was equal. But both the groups had higher proportion of males with 69.8% and 84.0%, respectively. (p-0.210) The participants were equally distributed in terms of age, with 50% ophthalmologist in MSD group being 45 year or younger. (p=1.000) The majority of the participants fell within the height category of 5-6 feet in both the groups. The height did not show any statistically significant difference in its distribution among both the groups. (p=0.813) The participants were distributed fair consistently across the weight categories with no statistically significant difference. (p=0.572) Hence, there does not appear to be a statistically significant association between the demographic variables and the presence of MSD in this study. (Table 2)

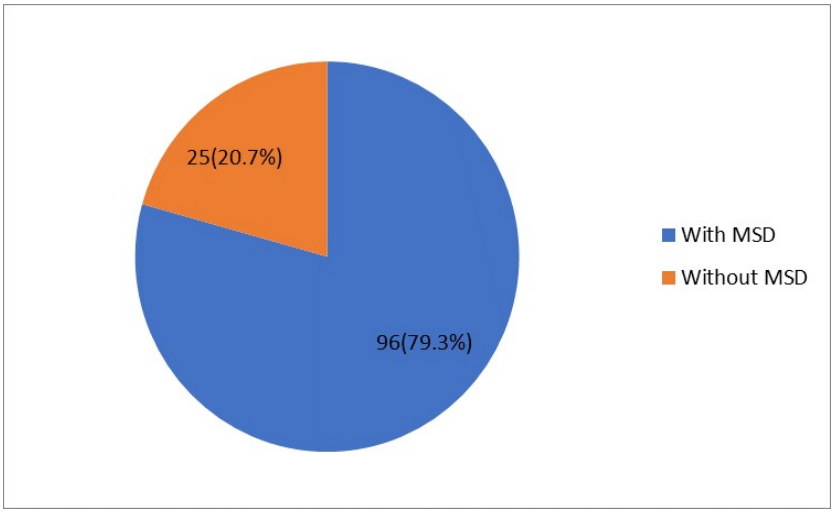

Figure 1: Distribution of ophthalmologists with and without MSD

Table 1: Demographic distribution of the ophthalmologist

Variables	Categories	Frequency	Percentage
Age	≤45 years	60	49.6
	> 45 years	61	50.4
Gender	Male	88	72.7
	Female	33	27.3
Height	< 5 feet	3	2.5
	5-6 feet	110	90.9
	>6 feet	8	6.6
Weight	≤ 60 kg	17	14.0
	61-80 kg	58	47.9
	>80 kg	46	38.0
Specialty	General	81	66.9
	Others	40	33.1
Designation	General ophthalmologist	24	19.8
	PGR	34	28.1
	Consultant	63	52.1
Working hours	≤40 hours	45	37.2
	> 40 hours	76	62.8
No. of patients seen per week	≤ 50	20	16.5
	51-75	19	15.7
	76-100	27	22.3
	>100	55	45.5
Years of Practice	≤ 10 years	44	36.4
	11-20 years	33	27.3
	>20 years	44	36.4
Most of the time spent in	OPD	44	36.4
	OT	6	5
	Both	71	58.7
Numbers of hours spent in operating room	≤ 10 hours	46	38.0
	> 10 hours	75	62.0

In ophthalmologists without MSD, large proportion 76.0% was of general specialty. In other group with MSD 64.6% of them was of general specialty. The distribution of specialty among both the groups was equal. (p=0.345) In terms of designation, consultants constituted majority in both the groups, comprising no significant difference. (p=0.408) The proportion of ophthalmologist with MSD who worked over 40 hours per week was slightly higher 66.7% than those without MSD (48.0%) but without showing any statistically significant difference (p=0.106). Likewise, the number of patients seen per week, years of practice time spent in different practice areas and hours spent in OT were equally distributed among both the groups without exhibiting a statistically significant difference. (Table 4)

Table 2: Comparative analysis of demographic, work type and experience among ophthalmologists with and without MSD

Variables	Categories	MSD	Without MSD	P-value
Gender	Female	29(30.2)	4(16.0)	0.210
	Male	67(69.8)	21(84.0)	
Age	≤45 years	48(50)	12(48)	1.000
	> 45 years	48(50)	13(52)	
Height	< 5 feet	2(2.1)	1(4.0)	0.813
	5-6 feet	88(91.7)	22(88)	
	>6 feet	6(6.3)	2(8.0)	
weight	≤ 60 kg	15(15.6)	2(8.0)	0.572
	61-80 kg	46(47.9)	12(48.0)	
	>80 kg	35(36.5)	11(44.0)	
Specialty	General	62(64.6)	19(76.0)	0.345
	Others	34(35.4)	6(24.0)	
Designation	General ophthalmologist	17(17.7)	7(28.0)	0.408
	PGR	29(30.2)	5(20.0)	
	Consultant	50(52.1)	13(52.0)	
Working hours	≤40 hours	32(33.3)	13(52.0)	0.106
	> 40 hours	64(66.7)	12(48.0)	
No. of patients seen per week	≤ 50	15(15.6)	5(20.0)	0.956
	51-75	15(15.6)	4(16.0)	
	76-100	22(22.9)	5(20.0)	
	>100	44(45.8)	11(44.0)	
Years of Practice	≤ 10 years	39(40.6)	5(20.0)	0.157
	11-20 years	24(25.0)	9(36.0)	
	>20 years	33(34.4)	11(44)	
Most of the time spent in	OPD	34(35.4)	10(40.0)	0.624
	OT	4(4.2)	2(8.0)	
	Both	58(60.4)	13(52.0)	
Numbers of hours spent in operating room	≤ 10 hours	37(38.5)	9(36.0)	0.816
	> 10 hours	59(61.5)	16(64.0)	

Within Colum percentages were reported

The prevalence of MSD in different ophthalmology sub-specialties shows general ophthalmology had 74.1% MSD cases, while vitreo-retina had 92.9% and oculoplastic had 100%. Over all across all subspecialties, 79.3% had MSD. Cornea/Anterior segment had 80% MSD and glaucoma had 80%. (Table 3)

Table 3: Prevalence of MSD among different sub specialties

Specialty	MSD		Total
	Yes	No	
General	60 74.1%	21 25.9%	81 100.0%
Cornea/Anterior segment	9 90.0%	1 10.0%	10 100.0%
Glaucoma	4 80.0%	1 20.0%	5 100.0%
Oculoplastic	7 100.0%	0 0.0%	7 100.0%
Pediatric Ophthalmology	3 75.0%	1 25.0%	4 100.0%
Vitreo - Retina	13 92.9%	1 7.1%	14 100.0%
Total	96 79.3%	25 20.7%	121 100.0%

The mean pain score was 2.13±0.93, indicated a moderate level of pain among ophthalmologist with MSD. Significant 53.1% respondents reported pain on ‘‘some of the days”. Lower back pain emerged as the significant issue affecting 59.4% of the ophthalmologists with MSD. Abnormal posture was identified as the major reason of pain, accounting for 63.5% of the cases. Surgical procedures were found to be the significant factor in causing MSD, impacting 69.8% of the professionals. A substantial 74.0% of the respondents reported fatigue/irritability as consequences of MSD. (Table 4)

Table 4: History and management of pain among the ophthalmologists having MSD

Variables	Category	Frequency	Percentage
Pain score (NSR)	1	26	27.1
	2	41	42.7
	3	21	21.9
	4	7	7.3
	5	1	1.04
Mean ± SD	2.13±0.93		
Frequency of pain	Rarely	16	16.7
	Some of the days	51	53.1
	Most of the days	23	24.0
	Daily	6	6.3
Location of Pain	Head	6	6.3
	Neck	33	34.4
	Upper Back	24	25
	Lower Back	57	59.4
	Upper Extremity	23	24.0
	Lower Extremity	11	11.5
	Joints	4	4.2
Associated Symptoms	Yes	23	24.0
	No	73	76
Reasons	Abnormal posture	61	63.5
	Prolonged surgical procedure	21	21.9
	Continuous work without break	28	29.2
	None	6	6.3
Treatment	Oral Pain Killer	44	45.8
	Physiotherapy	24	25.0
	Steroids	4	4.2
	None	38	39.6
Procedure responsible	Slit Lamp Examination	55	57.3
	Surgical Procedure	67	69.8
	Laser procedure	20	20.8
	None	6	6.25
Impacts	Fatigue/irritability	71	74.0
	Mental Stress	26	27.1
	Loss of productivity	45	46.9
	Abstaining form surgical procedure	34	35.4
	Early retirement	23	24.0
	None	11	11.5

Discussion:

This study conducted a comprehensive analysis of the prevalence of work-related musculoskeletal disorders (MSD), along with associated symptoms and contributing risk factors, among ophthalmologists in Pakistan using a questionnaire-based survey. The findings revealed that 79.3% of the participants reported experiencing symptoms of MSD. This is in line with existing data from both local and international studies, where the prevalence ranged from 57% to 80%[12]. For instance, a 2022 study by Rafique A and colleagues on ergonomics in ophthalmology practice among Pakistani ophthalmologists also identified MSD symptoms in 74.8% of the respondents[9]. Notably, our study observed a higher occurrence of MSD symptoms among ophthalmologists with less than 10 years of professional experience, which is consistent with findings by Dhimitri K.C and associates, WHO reported a higher frequency of neck symptoms in participants with fewer years of practice[13]. This could be attributed to the increased workload, both in outpatient and operating room settings, lower awareness about ergonomic practices, and greater use of modern ophthalmic devices among less experienced ophthalmologists. Conversely, Dabholkar T and colleagues reported opposite findings, with a higher frequency of MSD symptoms among ophthalmologists with more years of work experience[14], suggesting that experienced ophthalmologists may have developed better ergonomic practices over time.

Regarding the location of pain, the lower back was the most commonly reported site of pain, noted by 59.4% of respondents, followed by neck pain in 34.4% and upper back pain in 25% of participants, respectively. These results align with studies conducted among Indian, Pakistani, UK, and Saudi Arabian ophthalmologists[6,9,10,15]. However, studies carried out in the United States by Sidney A et al. and Dhimitri K.C and colleagues found that neck pain was the most prevalent location of pain, affecting 70% and 51.8% of participating ophthalmologists, respectively[5,13]. In our study, it was observed that female ophthalmologists experienced more neck and back pain 87.87% compared to their male counterparts 76.13%. This gender difference in pain prevalence was also demonstrated in a 2005 study by Dhimitri K.C et al., which associated neck and back pain with both female gender and higher stress levels[13]. Conversely, a study of Saudi Arabian ophthalmologists found no association between mental stress and the incidence of neck or back pain[16].In our research, no significant associations were found between reported pain and factors such as age, height, weight, and the number of patients seen per week. These findings are consistent with studies among ophthalmologists in the USA, UK, and Iran[5,10,12]. However, our study did reveal an association between higher pain levels and ophthalmologists who worked longer hours per week and those with fewer years of practice.

Certain subspecialists, such as plastic surgeons or vitreoretinal surgeons, may exhibit a higher susceptibility to musculoskeletal (MSK) disorders due to extended periods in specific postures and repetitive tasks. The current research demonstrates that MSDs were present in 100% of oculoplastic surgeons, while 92.9% of vitreoretinal surgeons experienced MSDs. In a survey conducted by Sivak-Callcott JA et al. among oculoplastic surgeons, 72.5% reported experiencing MSD symptoms. The study also revealed that a concerning minority of participants had to cease their surgical activities due to neck pain and injury. Notably, the use of magnifying loupes and headlights emerged as particular sources of concern. In another recent study led by Al Taisan A et al., the prevalence of MSDs among various subspecialties was explored. In this study, anterior segment and glaucoma surgeons ranked highest in

experiencing MSD symptoms, with rates of 68.6% and 67.1%, respectively, followed closely by oculoplastic surgeons at 65.5%[17].

Among participants experiencing pain, two-thirds reported mild to moderate pain, while less than one-third experienced severe pain, and 1% reported the worst possible pain. The primary causes of pain were identified as abnormal postures during surgical procedures 69.8% and during slit lamp examination 57.3%, with an additional 29.2% attributing their pain to continuous work without breaks. The most commonly utilized methods to alleviate pain were oral medicine and physiotherapy. In the study of Al Taisan A et al, the participants also used the similar remedies to treat their musculoskeletal pain[17].

Our study also highlighted that ophthalmologists experiencing pain had a significant impact on their professional work and quality of life. Fatigue and irritability were reported by 74%, while mental stress was experienced by 27.1% of these individuals. Additionally, loss of productivity was reported by 46.9%, 35.4% were contemplating abstaining from certain surgical procedures, and 24% were considering early retirement. These results suggest a higher level of pain-related impacts on ophthalmologists compared to previous studies[5,9,14]. One potential explanation is that 52.1% of our study consisted of consultants and senior ophthalmologists who had greater exposure to job stress, fatigue from their work, and longer careers, potentially approaching retirement age. Another factor to consider is the possibility of overestimation of self-reported musculoskeletal disorders, as individuals with MSD symptoms may be more inclined to participate in such a survey than those without symptoms.

Implications for Working Environment Modification

Modifying the working environment for ophthalmologists who are grappling with musculoskeletal disorders is of paramount importance to enhance their overall well-being, job satisfaction, and long-term career prospects. To achieve this objective, it is imperative to underscore the significance of integrating ergonomic principles into the practice of ophthalmology. Ergonomics is a scientific discipline and field of study dedicated to the design and arrangement of workspaces, tools, equipment, and tasks in a manner that optimizes the comfort, safety, and efficiency of human interactions with their environment and tasks. The primary goal is to enhance human well-being, productivity, and performance while minimizing the risk of discomfort, musculoskeletal disorders, and errors[18].

The American Academy of Ophthalmology has established a task force on ergonomics with the aim of educating its members about common work-related musculoskeletal disorders and strategies for their prevention. This task force is also actively involved in developing ergonomic guidelines and standards for ophthalmic equipment[19].

In daily practice, ophthalmologists can take proactive steps to mitigate the risk of musculoskeletal disorders. For instance, when operating the slit lamp, it is essential to maintain a neutral posture by aligning the head, neck, and torso vertically. Avoid craning the head forward or tilting it up or down, and reduce the distance between yourself and the patient[20]. Developing habits such as taking micro-breaks and engaging in stretch exercises can also be beneficial. In the operating room, various elements like the microscope, chair, foot pedals, and patient bed can impact the surgeon's ergonomic well-being. Careful adjustment of these elements to achieve an optimal position before commencing a procedure is crucial[21]. Maintaining a neutral spine, which includes keeping the knees bent at 90 degrees, feet flat on the floor, thighs parallel to the floor, and maintaining a straight back, is advisable. Additional modifications, such as the

placement of arm or wrist rests and instrument design, can provide forearm support. There are also specialized ergonomic devices designed for surgeons, including back and neck braces and elbow support pads[19].

Furthermore, daily schedules can be adjusted to minimize the time spent on repetitive tasks, especially in the operating theater, as prolonged operating may exacerbate discomfort for those fatigued by prior repetitive tasks at the slit lamp in the clinic. Lightweight equipment such as indirect ophthalmoscopes and binocular magnification loupes should be utilized to reduce fatigue, and instruments should not be gripped harder than necessary. Shaw et al. have emphasized the importance of considering the maximum holding time (MHT) for specific postures[22]. For instance, moderate flexion of the lower back has an MHT of 5.6 minutes. The increasing use of electronic health records has also extended the time ophthalmologists spend at computers. It is crucial to adjust the chair, table, monitor, keyboard, and mouse to promote a neutral sitting position.

To further enhance ergonomic practices, hospital managements should be encouraged to make the services of ergonomists available on-site. Ophthalmologists should actively advocate for ergonomic solutions from equipment manufacturers, and manufacturers, in turn, should substantiate the ergonomic optimization of their products through rigorous, science-based testing to demonstrate their benefits to users.

Limitations and Future Studies

To the best of our understanding, this research marks one of the initial endeavors to gather nationwide information concerning musculoskeletal issues and ergonomic practices within the ophthalmologist community in Pakistan. However, it's important to acknowledge potential biases in survey studies, particularly self-reporting bias, which is a primary limitation of our study. Additionally, although we achieved a relatively high response rate, the sample size remained modest, constituting another notable limitation. Lastly, given the demanding schedules of ophthalmologists, the frequent solicitations for survey participation may have hindered some individuals from adequately completing the survey due to time constraints. Further studies should be aim for larger, diverse and more representative sample of ophthalmologist across different demographics, geographical locations and practice settings. Validated standardized tools should be used for pain assessment and MSD evaluation rather than subject's self-reporting. In depth investigation of potential risk factors should be conducted. Longitudinal studies should be conducted to observe the progression and causality of MSD over time.

Conclusion:

The prevalence of musculoskeletal pain among ophthalmologists in Pakistan is quite common, and its impact on their work and quality of life can be significant. Given the substantial prevalence of this problem, there is an urgent requirement for workplace environment adjustments, with a particular focus on the integration of ergonomic principles, both in ophthalmic clinics and operating rooms. Furthermore, it is imperative to include ergonomics as a vital component of the curriculum for resident trainees to ensure they are well-informed about the associated risks and can take proactive measures to minimize them. Acknowledgement We are grateful to all the ophthalmologists who participated in this study.

Declaration of conflicting interest

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Authors Contribution

Concept and Design: Muhammad Abbas
Data Collection / Assembly: Arslan Sajjad
Drafting: Fuad Ahmad Khan Niazi, Ambreen Gull
Statistical expertise: Mishaal Abbas
Critical Revision: Shehr Bano Abbas

ORIGINAL ARTICLE

Frequency of Eye Diseases among medical students of Mohi-ud-din Islamic Medical College

Fatima Akbar Shah[1], Umair Tariq Mirza[1], Muhammad Usman Sadiq[1], Sidrah Riaz[2], Amjad Akram[1], Porus Ahmed[1]

Abstract:

Objectives: The research was aimed to know the incidence of various eye diseases to get an insight into the incidence and subsequently probe into their causes so that students could be guided about lifestyle modifications.

Methods: A descriptive, cross-sectional study was carried out on MBBS students of both genders whose age group ranged from 18-24 years. The duration of the study was one month. A sample size of 427 was employed by non probability consecutive sampling. Data was collected by a researcher with a questionnaire after approval from the ethical review committee. A general eye examination was carried out and readings were noted on the questionnaire by the researchers.

Results: It was found that 257 students had healthy eyes. Myopia was prevalent among students with a total of 120 (28.2%) affected. Hypermetropia (0.5 %), astigmatism (3.3%), convergence insufficiency (2.1%), dry eyes (1.6%), blepharitis (1.2%), allergic conjunctivitis (2.8%) and color blindness (0.5%) were other disease entities discovered among the students.

Conclusion: Refractive error in general is the most common eye disease among medical students in which myopia was the leading cause, followed by hypermetropia and astigmatism. Dry eye, blepharitis, and allergic conjunctivitis were a few other eye disease entities found among students. *Al-Shifa Journal of Ophthalmology 2023; 19(2): 64-69.*

1. *Department of Ophthalmology, Mohiuddin Islamic Medical College, Mirpur AJK*
2. *Akhtar Saeed Medical & Dental College, Lahore*

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Correspondence to:
Fatima Akbar Shah
Department of Ophthalmology,
Mohiuddin Islamic Medical College,
Mirpur AJK

Introduction:

Medical students are young adults who are engaged in a stressed lifestyle. The reason for such stress is a very demanding academic schedule where lectures, clinical rotations, and elective training go side by side around the clock. Students attempting to meet their academic challenges tend to ignore their health requirements. The propensity of medical students to develop various illnesses in general and eye diseases in specific has been a matter of deep concern. Belonging to an age group most studied and talked about, their physical and mental health remains the focus of study of many researchers since good mental health and active physical functioning is pivotal to adequate learning [2].

A lot of studies have shown that the prevalence of dry eye disease among young adults is 70.8 %[3]. Being involved in digital study modalities in most waking hours of the day, dry eye disease is quite common

among them. Stress is another factor causative to this[4]. Dry eye syndrome presents as burning, foreign body sensation, or grittiness and the same symptoms sometimes present when one is suffering from refractive errors[5]. Various environmental, social, and behavioral problems are known to be causative of dry eye[6]. Refractive error is known to be another eye disease quite prevalent among medical students. Myopia, hypermetropia and astigmatism are common refractive errors[3]. It is surprising that a study has shown that about one-fourth of the world's educated individuals are myopic[7]. Myopia is a state is which light rays are focused at a point in front of the retina in an optically relaxed eye (non-accommodating)[8]. Among some individuals, being exposed to a prolonged illness leads to the onset and progression of myopia[9]. Ethnicity and specific family history are also known to play a role. Moreover, the social circumstances one is exposed to during life also play a role in the progression of myopia[10]. If myopia is not well managed in childhood as well as in adulthood with the use of adequate correction the individual's efficiency at work is hampered and may lead to further eye complications[11]. This sounds logical because poor eye health leads to frequent complaints of headache and fatiguability thereby reflecting decreased productivity at work[12].

The goal of the study was to research the incidence of various eye diseases randomly known to occur among medical students. This would help in getting an insight into the incidence and causative factors and subsequently probing into their causes so that students both boarders and non-boarders could be guided about lifestyle modifications. The college administrations too can be benefitted to facilitate students in whatever regard the outcomes suggest.

Material and Methods:

This descriptive cross-sectional study was done after getting the approval (Ref. No. 1-2/23-MIMC/ERB/0019) from Ethical Review Board of Mohi-Ud-Din Islamic Medical College, Mipur Azad Kashmir. The sample size was calculated by WHO sample size calculator, using confidence level 95, anticipated population proportion of patients with myopia 0.66, with 5% absolute precision[13]. The minimal sample size was 345. 427 students from 1st year MBBS to final-year MBBS were included in the study. Data was collected by researcher using non-probability, consecutive sampling technique. All the students were included after informed written consent. Then in all students general eye examination was carried out as described in operational definitions by one consultant ophthalmologist (at least 3 years of post-fellowship experience) and readings were noted on a Performa. Mydriatic instillation, if required, was carried out after informed consent. All this information was noted on a specially designed Performa. All medical students aged 18-24 years of both genders were included in the study. The students from Allied health institutes as well as those who refused examination were excluded. Data was analyzed using SPSS version 21. Mean and standard deviation were calculated for quantitative variables i.e age. Qualitative variables like gender, class, and eye disease were presented by frequency and percentage.

Results:

427 medical students were included in the study. Out of the total number of students, 134 were males and 293 were females (Table 1). Mean age was 21.20±1.710 (Table 2). It was found that 257 students had healthy eyes. Myopia had the highest incidence among students with total of 120 (28.2%) affected (31 males, 89 females). Hypermetropia (0.5 %), astigmatism (3.3%), convergence insufficiency (2.1%), dry eyes (1.6%), blepharitis (1.2%), allergic conjunctivitis (2.8%) and color blindness (0.5%) were other disease entities discovered among the students whose incidence in terms of frequency is explained in the pie chart (Figure I).

Table 1: Gender Distribution according to Class

CLASS	GENDER		Total
	Female	Male	
1st Year	64	24	88
2nd Year	59	36	95
3rd Year	60	21	81
4th Year	57	32	89
Final Year	53	21	74
Total	293	134	427

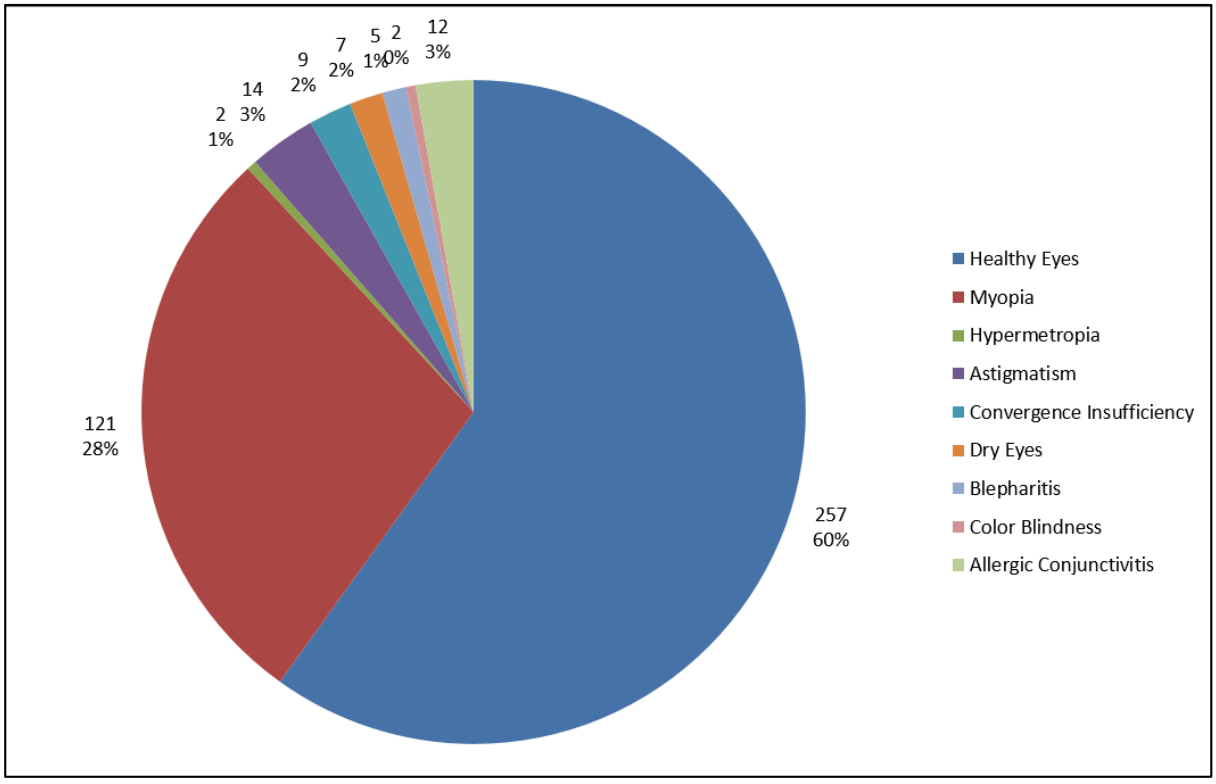

Figure 1: Frequency of Disease in our study

Discussion:

Eye diseases form a significant percentage of medical reports among university students and medical students in particular. The ongoing deteriorating life style practices and increase usage of electronic gadgets seems to be the major causative factor.

In a study carried out in Jazaan medical University, Saudia Arabia 33.8% students had myopia, 10.5% had hypermetropia and 10.5% had astigmatism. The percentage of refractive errors was found to be higher who had a screen time of greater than one hour per day[14]. While our study reported the higher incidence of myopia (28.2%), the

incidence of astigmatism (3.3%) was significantly higher than hypermetropia (0.5%). A similar study carried out among Jordanian medical students showed a higher incidence of myopia (82.6%), while incidence of hypermetropia (9%) was greater than astigmatism (8.4%)[15].So a variation to our study appeared regarding incidence of hypermetropia and astigmatism which signifies the role of other causative factors. A study on University students carried out in Shanghai within the age bracket of 18-22 years, which is almost similar to the age group of our study population, myopia prevalence was 92%[16]. So myopia remains the most common refractive error in particular and eye disease in general, in students.

A lot of previous studies have highlighted a high incidence of various ocular surface disease entities. According to OSDI grading index, studied by Aberame et al, dry eye was seen among 46.1% of students, the association between spectacle wear and dry eye had a P value of 2.5[17].In a study carried out among university students in Shanghai, the incidence of dry eye disease was 10%: those who had a screen time of more than eight hours had a higher incidence than non-users, 14.1% versus 13%[16]. Among Chinese high school students, the incidence of symptomatic dry eye was 70.5%, poor sleep quality, excessive use of screens, and use of contact lenses had a causative role[18]. Surprisingly, our results had a much lower incidence of dry eyes i.e. 1.6%. Meta-analysis of thirteen studies carried out in the US showed the prevalence of dry eye to be 8.1% and meibomian gland dysfunction (blepharitis) to be 21.2%. However, dry eye incidence was 3.5% in a population 18 years and older and no meibomian gland dysfunction (blepharitis) was seen, in this population group[14]. We, on the other hand, discovered a mere 1.2% incidence of blepharitis (meibomian gland dysfunction).

Another disease entity reported among the medical students in our study was allergic conjunctivitis. Students reported as having repeated episodes of itching and watering in eyes over different times of the year, though at the time of the study, only 2.8% had active disease. This verbal report of the students holds significance since a study carried out in a nearby locality among individuals of almost similar age groups showed the incidence of VKC to be 46.2% and atopic conjunctivitis to be 9.3%. VKC was more prevalent in individuals less than 20 years of age.[19]

A lot of environmental, social, and behavioral factors seem to play a role in the occurrence of eye diseases[20]. The awareness of those factors and prevention from them at the individual and mass level may help in the eradication of the eye disease load from the communities.

This study had very specific limitations. It was performed exclusively on medical students of our university. The results though are found concordant with many such studies carried out previously on medical students in different universities in different parts of the world but these results should not be generalized to the mass population because of the drastically different lifestyle and social behaviors contracted by medical students.

Conclusion:

A significant portion of medical students had eye disease. Refractive error in general is the most common eye disease in which myopia tops followed by astigmatism and hypermetropia. Dry eye, blepharitis, and allergic conjunctivitis were a few other eye disease entities found among students. Myopia is a multifactorial disease with genetic and environmental causes. Also, IQ level has been associated with myopia as well as lack of sunlight exposure, these are found in excess in university students. The association of these entities with causative environmental and social factors exclusively associated with the lifestyle of medical students needs to be studied so that more students and university authorities can benefit.

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Authors Contibution

Concept and Design: Umair Tariq Mirza
Data Collection / Assembly: Muhammad Usman Sadiq
Drafting: Sidrah Riaz, Porus Ahmed
Statistical expertise: Amjad Akram
Critical Revision: Fatima Akbar Shah

ORIGINAL ARTICLE

Frequency Of Patients With Different Stages Of Diabetic Retinopathy Presenting To A Tertiary Care Eye Hospital In Rawalpindi, Pakistan

Waleed Ahmad[1], Muhammad Afaq Shah[1], Hafiz Muhammad Ahmad[1], Mehwish Ameer[1], Saad Bin Yasir[1], Yasir Ahmad[1]

Abstract:

Objective: To determine the frequency of patients with different stages of diabetic retinopathy presenting to a tertiary care eye hospital in Rawalpindi.

Methods: A descriptive cross-sectional study was carried out in the general ophthalmology department. Consultant ophthalmologists identified 366 individuals, 66 (18.0%) with type I and 300 (82.0%) with type II diabetes mellitus based on patient history. A consultant ophthalmologist performed clinical evaluation; diabetic retinopathy was diagnosed and graded according to the 2017 ICO classification[2].

Results: The mean age of patients with Type I Diabetes Mellitus and Type II Diabetes Mellitus was 24.64+7.74 and 54.76+3.60 respectively. Mean visual acuity in patients with Type I DM and Type II DM was 0.36+0.26 and 0.37+0.27 decimal respectively. The mean duration of disease in patients with Type I DM and Type II DM was 7.61+2.79 and 7.59+2.87 years respectively. Similarly, 16 (16.0%) patients with Type I DM had proliferative diabetic retinopathy as compared to 84 (84.0%) patients having Type II DM.

Conclusion: The present study demonstrated a huge burden of proliferative diabetic retinopathy amongst Type II diabetic patients, thus warrants large multicentered studies to generalize its results to the overall population of the province and to contribute to the establishment of the national screening program for catering diabetic retinopathy. *Al-Shifa Journal of Ophthalmology 2023; 19(2): 70-76.*

1. *Al-Shifa Trust Eye Hospital, Rawalpindi.*

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

Introduction:

Damage to the retina caused by diabetes is known as diabetic retinopathy (DR). Retinopathy caused by diabetes can be either non-proliferative or proliferative. According to the International Diabetes Federation (IDF) [1] the number of persons with diabetes mellitus (DM) is projected to increase from 463 million in 2019 to 700 million by 2045. The most common and distinct complication of diabetes mellitus is diabetic retinopathy [1,2] which affects 25.1% of people with type 2 diabetes and 77.3% of people with type 1 diabetes. It is responsible for more cases of blindness in adults than any other preventable cause [3,4,5]. The prevalence of blindness owing to diabetic eye disease has increased from 14.9% to 18.5% across the world among people aged 30 and older over the past 30 years [6]. There will be more cases of diabetic

retinopathy as the world's population ages rapidly. Diabetic retinopathy can cause blindness if not caught and treated in time [7]. Longer diabetes duration, higher hyperglycemia, and higher blood pressure are the main risk factors for diabetic retinopathy [8,9,10]. Nephropathy, dyslipidemia, tobacco use, and obesity are also contributors [11,12,13].

Diabetic retinopathy can be diagnosed clinically through the observation of microvascular abnormalities in the retina. Diabetic retinopathy has two distinct clinical stages: non-proliferative (NPDR) and proliferative (PDR). NPDR can range from mild to severe [12]. Microaneurysms, hemorrhages, and hard exudates are discovered during NPDR. When neovascularization of the retina occurs in patients with NPDR, the condition advances to PDR[13]. Patients may experience severe vision loss if complications, including vitreous hemorrhage, occur. One of the most common complications of diabetes is diabetic macular edema (DME), which can lead to blindness. When the blood-retinal barrier (BRB) is compromised, fluid accumulates sub- and intra-retinally, leading to macula swelling and thickening [14].

Patients with NPDR were found to be 61% more common than those with PDR [15]. There are many studies, but not nearly as many that include data from Asia, and Pakistan in particular [6].

The rationale of this study was to assess the frequency of diabetic retinopathy in our local population. Since it is a preventable cause of vision loss, it is imperative to know about the current magnitude and burden of diabetic retinopathy in our local population.

Materials and Methods:

From November 2022 to January 2023, researchers from the Department of Ophthalmology at Al-Shifa Trust Eye Hospital in Rawalpindi gathered data in a descriptive cross-sectional study. The Ethical Committee of the Hospital approved. The sample size was 366 calculated using the WHO Sample Size Calculator with the following inputs: the prevalence of diabetic retinopathy (61%)[(15)], the power (80%), and the significance level of (5%). A nonprobability consecutive sampling technique was adopted. Patients of either gender, aged between 20 to 65, having been diagnosed with type I or type II diabetes mellitus (HbA1c > 7.5%) based on a clinical history taken by a consultant ophthalmologist were included in the study. Patients with additional posterior segment disorders and those with mental impairments were excluded.

All participants provided written informed permission following a thorough explanation of the study's purpose and procedures. Patients were sorted by diabetes subtype for analysis. Diabetic retinopathy was diagnosed and graded based on clinical findings by a consultant ophthalmologist using the 2017 ICO classification.

The version 23.00 of the Statistical Package for the Social Sciences (SPSS) was used for all analyses. Descriptive statistics were used to describe the demographic and clinical features of the patients. The quantitative data were summarized using Mean±SD. Diabetic retinopathy severity was classified according to diabetes subtype. A chi-square test was performed after stratification, with significance set at P=0.05.

Results:

A total of three hundred and sixty-six patients were recruited for this study. Mean age of patients with Type I Diabetes Mellitus and Type II Diabetes Mellitus was 24.64±7.74 and 54.76±3.60 years respectively. Mean visual acuity in patients with Type I DM and Type II DM was 0.36±0.26 and 0.37+0.27 respectively. Mean duration of disease in patients with Type I DM and Type II DM was 7.61+2.79 and 7.59±2.87 years respectively. Similarly, 16 (16.0%) patients with Type I

DM had proliferative diabetic retinopathy as compared to 84 (84.0%) patients having Type II DM. The majority of patients 301 (82.2%) were > 40 years of age with male preponderance 219 (59.8%) (Table 1).

Out of 366 patients, 215 (58.7%) patients had right eye involved while 151 (41.3%) patients had the left eye involved.

The majority of patients 300 (82.0%) had type II diabetes mellitus with presbyopia 216 (59.0%) being the common refractive error recorded and most of the patients 100 (27.3%) had proliferative diabetic retinopathy. (Table 2).

A statistically insignificant association of different stages of diabetic retinopathy with type of diabetes mellitus was observed (p-value 0.808) (Table 3).

Table 1: Demographic Characteristics of Patients (n=366)

Type of Diabetes	Quantitative Variables	Mean	Std. Deviation
Type I Diabetes Mellitus	Age (Years)	24.64	4.745
	Visual Acuity (Decimal)	.3635	.26264
	Duration of Disease (Years)	7.61	2.795
Type II Diabetes Mellitus	Age (Years)	54.76	3.604
	Visual Acuity (Decimal)	.3728	.27103
	Duration of Disease (Years)	7.59	2.875
Type of Diabetes	Age Groups	Frequency	Percent
Type I Diabetes Mellitus	≤ 40 Years	65	98.5%
	> 40 Years	1	1.5%
	Total	66	100.0%
Type II Diabetes Mellitus	> 40 Years	300	100.0%
Type of Diabetes	Gender Groups	Frequency	Percent
Type I Diabetes Mellitus	Male	30	45.5%
	Female	36	54.5%
	Total	66	100.0%
Type II Diabetes Mellitus	Male	189	63.0%
	Female	111	37.0%
	Total	300	100.0%

Table 2: Clinical Characteristics of Patients (n=366)

Type of Diabetes	Side of Eye	Frequency	Percent
Type I Diabetes Mellitus	Right Eye	39	59.1%
	Left Eye	27	40.9%
	Total	66	100.0%
Type II Diabetes Mellitus	Right Eye	176	58.7%
	Left Eye	124	41.3%
	Total	300	100.0%

Type of Diabetes	Stages of Diabetic Retinopathy	Frequency	Percent
Type I Diabetes Mellitus	Non apparent diabetic retinopathy	16	24.2%
	Mild non proliferative diabetic retinopathy	17	25.8%
	Moderate non proliferative diabetic retinopathy	6	9.1%
	Severe non proliferative diabetic retinopathy	11	16.7%
	Proliferative diabetic retinopathy	16	24.2%
	Total	66	100.0%
Type II Diabetes Mellitus	Non apparent diabetic retinopathy	66	22.0%
	Mild non proliferative diabetic retinopathy	71	23.7%
	Moderate non proliferative diabetic retinopathy	39	13.0%
	Severe non proliferative diabetic retinopathy	40	13.3%
	Proliferative diabetic retinopathy	84	28.0%
	Total	300	100.0%

Table 3: Association of Stages of Diabetic Retinopathy with Type of Diabetes (n=366)

Stages of Diabetic Retinopathy, n (%)	Type of Diabetes		Total	*p*-value
	Type I DM	Type II DM		
• Nonapparent diabetic retinopathy	16 (19.5%)	66 (80.5%)	82 (100.0%	0.808
• Mild non-proliferative diabetic retinopathy	17 (19.3%)	71 (80.7%)	88 (100.0%)	
• Moderate non-proliferative diabetic retinopathy	6 (13.3%)	39 (86.7%)	45 (100.0%)	
• Severe non-proliferative diabetic retinopathy	11 (21.6%)	40 (78.4%)	51 (100.0%)	
• Proliferative diabetic retinopathy	16 (16.0%)	84 (84.0%)	100 (100.0%)	
Total	66 (18.0%)	300 (82.0%)	366 (100.0%)	

Discussion:

Elevated blood sugar caused by either insulin deficiency or insulin resistance defines diabetes mellitus (DM) [17]. Worldwide, diabetes affects over 451 million people; in Pakistan, over 26% of the population has the disease, according to the International Diabetes Federation and the findings of the second National Diabetes Survey of Pakistan 18. The number of persons diagnosed with diabetes is expected to rise over the next few years as a result of significant socioeconomic change [19-21].

Out of the 366 patients, 100 (27.2%), had proliferative diabetic retinopathy, while 300 (82.0%) had type II diabetes mellitus, with presbyopia as the most prevalent refractive defect. One in twelve diabetic individuals in the southern areas of Pakistan had diabetic retinopathy, according to a recent study [22].

The prevalence of diabetic retinopathy in Pakistan's diabetic population was previously estimated at 13%, however, other studies have found rates as high as 18%. DR, which can cause blindness, is more common in people with type 2 diabetes. In 2040, DR is expected to affect over 200 million individuals worldwide.

Researchers in India estimated a frequency of retinopathy of 11.2% [23], whereas British researchers found a prevalence of 18% [24]. These differences could be attributable to racial and gender differences as well as the effects of age. To show this, we can look at how our findings compare to those of research done in Abbottabad [25].

The average patient age in this study was 49.33+12.21 years, the average disease duration was 7.59+2.85 years, and the average visual acuity was 0.371+0.26 decimals, all of which differ from the previously cited study. There was no statistically significant correlation between the different stages of diabetic retinopathy and the type of diabetes mellitus (p-value = 0.808), and presbyopia was the most common refractive error among the 300 (82.0%) patients who had type II diabetes mellitus.

This study had some limitations. The main limitation of this study was its study design by which findings were not followed up for any possible intervention and the whole emphasis was on ascertaining the prevalence of different stages in patients with type I and type II diabetes mellitus.

Conclusion:

The medical, social, and economic burdens of diabetes are all substantial. Vascular problems are the biggest issue, as they not only reduce the quality of life for diabetic patients but also result in substantial societal expenses. The present study demonstrated a huge burden of proliferative diabetic retinopathy amongst diabetic patients, thus warrants large multicentered studies to generalize its results to the overall population of the province and to contribute to the establishment of the national screening program for diabetic retinopathy.

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Authors Contribution

Concept and Design: Muhammad Afaq Shah
Data Collection / Assembly: Hafiz Muhammad Ahmad
Drafting: Mehwish Ameer, Saad Bin Yasir
Statistical expertise: Yasir Ahmad
Critical Revision: Waleed Ahmad

ORIGINAL ARTICLE

Incidence of Retinopathy of Prematurity in Infants with Low Gestational Age and Low Birth Weight

Bilal Humayun Mirza[1], Kanwal Zareen Abbasi[2], Muhammad Rizwan Khan[3], Munib Ur Rehman[4], Maria Zubair[5], Fuad Ahmad Khan Niazi[5]

Abstract:

Objectives: To determine the incidence of retinopathy of prematurity in infants with low gestational age and low birth weight.

Methods: An institution based cross-sectional study was conducted in the department of Ophthalmology, Holy Family Hospital, Rawalpindi in collaboration with department of Paediatrics, Holy Family Hospital for a duration of 12 months. Sample of 85 was collected using non probability consecutive sampling technique. 85 babies born before 34 weeks of gestation and babies with birth weight ranging from 0.9 kg to 2.5 kg were included in this study. These were the babies who were admitted in the neonatal intensive care unit and were on high concentration oxygen therapy. The fundi of the babies were examined under sterile conditions using an indirect ophthalmoscope, 20D and 28D lens. Data was analyzed through SPSS version 17.

Results: The mean gestational age of the babies was 30.48±1.517 weeks plus mean birth weight 1.56±0.30 kg. Out of 85 babies 54.1% were males while 45.9% were females. 20 (23.5%) of these babies were found to be suffering from retinopathy of prematurity. Among ROP positive infants, mostly belong to gestational age group 30 weeks and birth weight 1.1 to 1.5 kg group.

Conclusion: Retinopathy of prematurity is a disease of the premature infants. Lower gestational age at birth (less than 34 weeks) and low birth weight (less than 2 kg) have a strong association with development of retinopathy of prematurity. *Al-Shifa Journal of Ophthalmology 2023; 19(2): 77-84.*

1. *Shifa College of Medicine, Shifa Tameer-e-Millat University.*
2. *HBS Medical and Dental College, Ali Pur, Islamabad.*
3. *Faisalabad Medical University, Faisalabad.*
4. *Gujranwala Medical College, Gujranwala.*
5. *Rawalpindi Medical University, Rawalpindi.*

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Correspondence to:
Noor Abbasi
dr_maninoor_abbasi@yahoo.com

Introduction:

The history of retinopathy of prematurity (ROP) is relatively short and it has become one of the most common causes of irreversible childhood blindness in developed and developing countries[1]. ROP is a vasoproliferative disorder of the eye affecting preterm infants which can rapidly progress to cause permanent visual impairment or blindness[1,2].The worldwide incidence of premature infants who develop ROP is 10.4%[3,4,5].

Advances in neonatal care in the last decade, have improved the survival rates for premature infants. Consequently, the incidence of ROP and its complications has increased in parallel[6,7,8]. In the developed countries, with the progress in neonatology, the survival of infants of low gestational age has increased resulting in an increase in the number of cases of ROP[9].

Complications of untreated ROP include loss of visual field, strabismus, amblyopia and retinal detachment. Retinal detachment is the most dangerous complication as it causes permanent and irreversible blindness[10].

With the progressively improved neonatal care of premature babiesin our country (giving high concentration oxygen therapy), ROP is quite likely to become a significant cause of neonatal blindness. In our country, we do not have sufficient data about the load of ROP in premature infants. Screening of premature infants(either gestational age less than 34 weeks or birth weight less than 2 kg) for retinopathy will result in the timely diagnosis of the disease and so the appropriate management.

Material and Methods:

An institutional cross-sectional study was conducted in the department of Ophthalmology, Holy Family Hospital, Rawalpindi in collaboration with department of Paediatrics, Holy Family Hospital for a duration of 12 months from1st April, 2018 to 31st March, 2019. . The sample size was 85 and was collected using non probability consecutive sampling technique. 85 babies born before 34 weeks of gestation and babies with birth weight ranging from 0.9 kg to 2.5 kg were included in this study. These were the babies who were admitted in the neonatal intensive care unit and were on high concentration oxygen therapy. Babies suffering from perinatal life-threatening disease (e.g., developmental congenital anomalies involving the central nervous system, cardio-pulmonary system, and gastrointestinal tract), babies having any other congenital eye diseases (e.g., developmental congenital malformation of eye and orbit) or babies with ocular birth trauma were excluded from this study. After informed consent from the parents, the ocular examination of babies was done. This examination was done after 4 weeks of birth. During this time, these babies remained on high ambient oxygen. The fundi of the babies were examined in detail. Sterile gloves, lid speculum, and forceps were used during the examination. Topical anesthesia was achieved by proparacaine (0.5%) ophthalmic solution. The pupils of the babies were dilated using topical tropic amide and is one phrine (2.5%). The babies were swaddled and their fundi were examined using indirect ophthalmoscope, 20D and 28D lens. Fundal findings were noted and entered into a proforma. Data was analyzed through SPSS version 17.

Results:

Sample size was calculated through WHO formula and 85 infants were included in this study. Out of the total 85 infants, 39 (45.9%) were female while 46 (54.1%) were male (Figure 1).

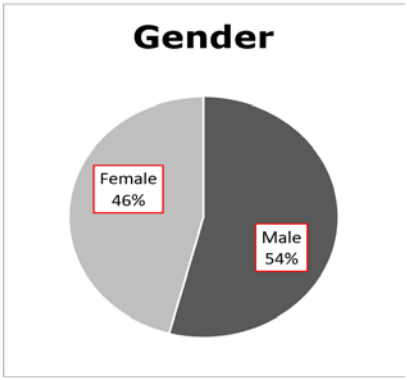

Figure 1: Gender Distribution

The gestational age was taken into account and the mean gestational age of the infants was 30.48±1.517 weeks. 44 infants (51.76%) had gestational age of 30 weeks or less. The highest representation was from the gestational age of 30 weeks which was 22.4%. The rest of the distribution has been given in figure 2.

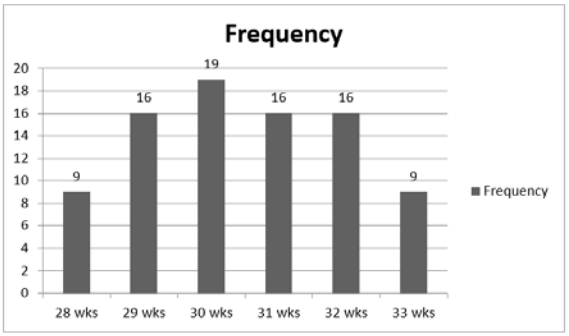

Figure 2: Graph of Gestational age Frequency

The birth weight was taken into account. Mean birth weight was found to be 1.56 ± 0.30 kg. The highest presentation was from birth weight group 1.1 to1.5 kg which was 59.59%. the rest of the distribution has been given in table 1.

Out of the total of 85 infants, 20 patients (23.5%) were found to be having ROP. Most affected birth weight group and most affected gestational age group plus distribution of ROP in all groups are shown in table 3 and table 4 respectively. As far as birth weight is concerned, most ROP cases were from group 1.1 to 1.5 kg, 11/85(12.9 %) and among different gestational ages, most ROP cases were from gestational age 30 weeks, 6/85 (7.05%). Rest of the details are in table 2.

Table 1: Frequency of infants falling into different birth weight groups

Birth weight (kg)	Number of infants	Percentage (%)
0.6 -1	6	7.06
1.1-1.5	43	50.59
1.6-2.0	35	7.06
2.1-2.5	1	1.17

Table 2: Frequency of ROP in different birth weights and gestational age groups

Weight (kg)	**Number of Infants with ROP**	**Percentage (%)**
0.6-1	4	4.7
1.1-1.5	11	12.9
1.6-2	5	5.9
2.1-2.5	0	0.0
Total	20	23.5
Gestational age (weeks)		
28	1	1.2
29	5	5.9
30	6	7.05
31	3	3.53
32	4	4.7
33	1	1.2
Total	20	23.5

The male babies were slightly more 46 (54.1%) with ratio of 1.18: 1. The study population comprises premature babies with gestation age 28 to 33 years and low birth weight with age range between 0.9 to 2.5 kg. Table 3.

Effect of different variables on incidence of ROP remained like this. Compared with female neonates, incidence of prematurity are slightly less in male neonates odds ratio .922 95% cl 0.318 to 2.676 however this effect is not significant. We found significant protective impact of weight of the new born on retinopathy of prematurity. The result showed with one kg increase in weight the odds of prematurity are decrease by .126, 95% CL 018 to .860. Table 4

Table 3 characteristics of study population

Variable	a Frequency /Mean (SD)b	a Percentage /minimum-maximum b
Gender new born		
Male	46	54.1%
Female	39	45.9%
Gestational age	30.45 ±1.50	28—33
Weight new born (kg)	1.56 ±0.30	0.9 –2.5 kg
a frequency and percentage for categorical data, b mean standard deviation, minimum and maximum values for quantitative data		

Table 4 effect of independent variables on incidence of prematurity

					95 CL	
Independent variable	B	SE	P value	Odds ratio	Lower	Upper
Gender	-.081	.544	.882	.922	.318	2.676
Weight	-2.075	.981	.035	.126	.018	.860
Gestational age	-.007	.180	.967	.993	.697	1.413
Constant	2.303	5.626	.682			
Dependent variable, retinopathy of prematurity coded as 0 no absent 1 present , gender female versus male , weight in kg . Cl confidence interval Method ENTER						

Applied test: logistic regression Analysis

Discussion:

Retinopathy of prematurity is a condition which is strongly associated with prematurity of infants. It's a retinal disease in which abnormal blood vessels grow in retina. It's a treatable cause of blindness in neonates but in Pakistan, ROP is often not recognized early because screening and treatment programs are not yet active in most neonatal units, even in tertiary care hospitals. As far as developed countries are concerned, the premature babies are sought out actively so that the consequences of retinopathy are not the same as we see in the developing countries like ours. Retinopathy of prematurity has decreased over the last decade due to improvement in antenatal care.

Whatever the incidence is, ROP is the major cause of blindness and decreased visual acuity in children in both the developing and developed countries. It has many factors responsible for it. The main associations are decreased gestational age, decreased birth weight and prolonged exposure to oxygen following delivery. Further factors responsible for it are anemia, sepsis, apnoea, male gender, maternal diabetes[11].

Our study included 85 patients and it was found that out of these 85 patients, 20 (23.5%) were confirmed to be suffering from retinopathy of prematurity, while 65(76.5%) babies had normal retinas. All of them need further follow ups, and those suffering from ROP need proper management. In a study by Awan A, et al, frequency of retinopathy of prematurity was 3.2 %. This is contrary to our study, where frequency is 23.5% but male female ratio is almost same as ours. Added thing in their study was different treatment approaches according to the stage of the disease, because of which the babies had favorable outcomes[12].Yucel OE, et al included 2186 infants in their study. The overall incidence of any stage of retinopathy and the stage specifically requiring the treatment were found to be 43.5% and 8% respectively. According to this study, babies with extremely low birth weight and extremely low gestational age had high rate of ROP and also the more severe ROP.[13]

According to -Rauf A, et al, ROP is a serious disease which affects the premature infants and in developing countries, it has become a serious health problem. They concluded by saying that the prevalence of ROP in prematurely delivered babies, who visited Ganga Ram hospital Lahore, is 27%[14].

Quinn GE, et al concluded that 43% of premature infants who were at risk of developing retinopathy of prematurity, developed some stage of the disease and among these mostly recovered without treatment but about 12.5% had severe ROP and these were the infants whose birth weight was less than 1.2 kg. Special thing about this study was that it was a large multicenter study and data was analyzed retrospectively. Its data was collected from 29 hospitals of USA and Canada[15]. According to Sohaila A, et al, in their study, 53.5%were males and46.5% were females which is almost same ratio as in our study and in many other studies. As far as ROP confirmed infants were concerned, their percentage was 10.5% on first eye examination. Adding to this, they concluded that there was a noticeable association between gestational age <32 weeks and birth weight less than 1.5 kg [16]. Almost similar results and conclusion were made by Kaur H And Kal S[17].This shows that these studies had similar results as ours.

Hong EH, et al reviewed previous researches and gave a key message that in past there were global tri-phasic epidemic times of ROP. They further added that in recent times, its incidence has been between 10% and 40% which depends upon the country and the study population. This review article also stressed upon the timely ROP screening and specific treatments according to the stage of the disease so that the progression of the disease and its complications can be

prevented[18]. A study from South Korea included 141,964 premature infants. Among them, nationwide incidence of ROP was found to be 29.8%. This incidence in gestational age group of <28 weeks was 4.3 times higher than in gestational age 28-37 weeks. This was the first Korean nationwide epidemiological study of ROP which revealed that the incidence of retinopathy of prematurity has decreased in infants undergoing conventional treatment during an 11years' time, from 2007(4.7%) to 2018(1.8%) [19].

Wu T, et al conducted a retrospective study in China and determined the incidence and perinatal risk factors for retinopathy of prematurity in very low-birth-weight infants. For this, medical records of infants, who were screened for ROP from 2012 to 2015, were checked. 26.0% was the overall incidence of ROP (131/504).Among perinatal risk factors, GA < 32 weeks was the most important risk factor. Others were sepsis, patent ductus arteriosus, in vitro fertilization and blood transfusion[20].

Similar to our study, a prospective observational study was carried out at Princess Marina Hospital in Gaborone, Botswana. Infants with gestational age less than 34 weeks or infants with birth weight less than 1.8 kg were included in this study. 200 premature infants were screened for ROP. Among these, 22 were found to be having the disease with the incidence of 11%. This study showed a significant association between risk factors (birth weight, gestational age and blood transfusion) and the disease[21].

Limitation of our study was that it couldn't be carried out on large scale because of difficulty in engaging the concerned people of other hospitals but its comparable to those studies which were carried out on infants from multiple centers. That's why we expect that hopefully this study will be useful in timely diagnosis and formulation of newer guidelines so that the disease prevention and timely diagnosis and so the appropriate management can be done.

Conclusion:

Retinopathy of prematurity is a serious disease of the premature infants in Pakistan. Although the sample size was small and we made the limited observations but still the results show an important association of ROP with low gestational age and low birth weight. All Premature infants with risk factors should have serial eye examinations for timely diagnosis and management.

Recommendations:

Awareness needs to be increased among all concerned doctors and parents of premature infants. Many studies, including our study, have been done on a small sample of the population so there is a need for conducting large multi-centre studies to determine the true incidence of ROP in Pakistan and to formulate cost-effective, region-specific screening guidelines for ROP.

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Authors Contribution

Concept and Design: Kanwal Zareen Abbasi
Data Collection / Assembly: Muhammad Rizwan Khan
Drafting: Munib Ur Rehman, Maria Zubair
Statistical expertise: Fuad Ahmad Khan Niazi
Critical Revision: Bilal Humayun Mirza