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EDITORIAL

The Advent of Femtosecond Laser – Changing Paradigms in Corneal Disease Management

Francisco Bandeira[1], Hassan Mansoor[1]
1- Clinical Research Fellow, Singapore Eye Research Institute

Since the times of Galen, corneal surgery has always been the subject of intense research. The complex arrangement of collagen fibers, the dome geometrical shape and the delicate osmotic balance that maintains the window to the eye, are all challenging factors and need to be taken into careful consideration when planning corneal surgical procedures. However, unlike vitreo-retinal surgery, most of the advances in the field of corneal surgery were attributed to the creativity and ingenuity of craftsmen corneal specialists, relying very little on cutting-edge technology.

Surgical techniques must be standardized to achieve safe and efficient outcomes. The training process of becoming a competent corneal surgeon has many slopes and pitfalls. The usual learning curve for advanced procedures is steep and requires special tutoring and strenuous surgical training.

The advent of femtosecond laser technology has revolutionized anterior segment surgery by allowing meticulous planning and accurate treatment delivery.[1] Femtosecond laser platforms have an on-line, high-resolution OCT imaging system that allows for precise control of dissection along surgical planes. Accurate planar, angular, vertical or lamellar cuts/incisions, that are virtually impossible to achieve with a free hand technique, are now feasible with femtosecond laser. The obvious financial caveat of acquiring a femtosecond laser platform can be compensated by the increase in the reproducibility of corneal surgery, reducing the learning curve of performing technically challenging cases and thus mitigating the time required to produce skillful corneal surgeons[2].

Whilst, femtosecond laser assisted cataract surgery (FLACS) in routine cases is still questionable, the possibility of linking advanced tomographers to the laser suite is very exciting. Using the biometric data of eye directly from the femtosecond laser suite would ensue a truly customized cataract surgery, likely with more accurate and safer results. The preliminary clinical and cosmetic outcomes of femtosecond laser assisted pterygium surgery (FLAPS) are very promising. Small incision lenticule extraction (SMILE) procedure is gaining attraction all over the world, as the short and mid-term refractive results show comparable efficacy and safety to other refractive surgical procedures[3]. Moreover, the flapless procedure is bio-mechanically strong; also, the reduced laser energy minimizes corneal nerve damage and the risk for post-operative complications. Furthermore, myriad of conditions that had scarce therapeutic options can potentially benefit from the implantation of allogeneic corneal tissue. Extracted lenticels have already been implanted as a treatment for presbyopia, hyperopia, advanced keratoconus and corneal perforations[4]. The emerging clinical evidence of allogeneic lenticular implantation, also called endokeratophakia, has shown good safety profile both in animal and human models. Endokeratophakia is currently under investigation to provide optimal refractive results[5]. The lenticules may also have a place in tissue engineering strategies, since

they can be used as drug delivery systems or scaffolds for cell expansion.

New protocols are currently being developed to increase the armamentarium of femtosecond-assisted lamellar procedures. Giant strides have been taken to consistently achieve a successful "big-bubble" and overcome the previous interface problems associated with femtosecond deep anterior lamellar keratoplasty (FS-DALK). Femtosecond laser assisted endothelial keratoplasty is also on the horizon.

In summary, femtosecond laser is an exciting technology that has come to stay. Notwithstanding, further research need to be carried out to ensure that the proposed benefits of femtosecond laser are indeed achievable and that the cost does not overwhelm the benefits of this promising technology.

References:

1. He L, Sheehy K, Culbertson W. Femtosecond laser-assisted cataract surgery. Current opinion in ophthalmology. 2011 Jan 1;22(1):43-52.
2. Farjo AA, Sugar A, Schallhorn SC, Majmudar PA, Tanzer DJ, Trattler WB, Cason JB, Donaldson KE, Kymionis GD. Femtosecond lasers for LASIK flap creation: a report by the American Academy of Ophthalmology. Ophthalmology. 2013 Mar 1;120(3):e5-20.
3. Verdaguer P, El-Husseiny MA, Amat DE, Gris O, Manero F, Pérez MB, Villanueva JL. Small incision lenticule extraction (SMILE) procedure for the correction of myopia and myopic astigmatism. Journal of Emmetropia: Journal of Cataract, Refractive and Corneal Surgery. 2013;4(4):191-6.
4. Elaziz MS, Zaky AG, El SaebaySarhan AR. Stromal lenticule transplantation for management of corneal perforations; one year results. Graefe's Archive for Clinical and Experimental Ophthalmology. 2017 Jun 1;255(6):1179-84.
5. Pradhan KR, Reinstein DZ, Carp GI, Archer TJ, Gobbe M, Gurung R. Femtosecond laser-assisted keyhole endokeratophakia: correction of hyperopia by implantation of an allogeneic lenticule obtained by SMILE from a myopic donor. Journal of refractive surgery. 2013 Nov 1;29(11):777-82.

ORIGINAL ARTICLE

Frequency of Juvenile Onset Myopia in Children Between 7 to 16 Years of Age

Muhammad Hanif[1], Syed Hassan Massana[1], Sana Zahra[2]

ABSTRACT

Introduction: Myopia is a type of refractive error in which eye possesses too much optical power for its axial length. Myopia with onset between 7 years to 16 years of age is called juvenile onset myopia. In the myopic eye (with accommodation relaxed) light rays from an object at infinity converge too soon and thus focus in front of retina.

Objectives: To determine the frequency of juvenile onset myopia in children between 7 to 16 years of age

Study Design: Descriptive, cross-sectional study.

Study Duration: 15th August 2015 to 14th February 2016.

Materials & Methods: A total of 300 children aged between 7 and 16 years presenting with decreased vision for at least 1 month or longer as diagnosed on logMAR chart with values greater than 0.3 which is equivalent to 6/12 on Snellen were included. Patients with disorders of the eye other than refractive errors and anisometropia were excluded. According to study objective the patient age was categorized from 07 to 16 years.

Results: Mean age was 12.32 ± 2.84 years. Majority of the patients 167 (62.33%) were between 13 to 16 years of age. Out of the 300 patients, 193 (64.33%) were male and 107 (35.67%) were females with male to female ratio of 1.8:1. Juvenile onset myopia was found in 94 (31.33%) patients, whereas there was no Juvenile onset myopia in 206 (68.67%) patients.

Conclusion: This study concluded that there is high frequency of juvenile onset myopia with higher percentage between 13-16 years of age and in females. *Al-Shifa Journal of Ophthalmology 2018; 14(1): 8-13.*

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Introduction:

Myopia, also known as near-sightedness and short-sightedness, is a condition of the eye where the light that comes in does not directly focus on the retina but in front of it, causing the image that one sees when looking at a distant object to be out of focus, but in focus when looking at a close object.[1] Myopia with onset between 7 years to 16 years of age is called juvenile onset myopia [1]. Myopia can adversely affect the development of binocular vision in infants and children (if there is a large difference in clarity between the two eyes) , poor cognitive outcome[3] and can lead to multitude of clinical problems e.g. optic nerve crescents and lattice

degeneration.[4] Early Diagnosis and management of this disorder is mandatory so as to prevent the permanent loss of functional vision in the affected eye,[5] RD and also to improve cognitive outcomes.

Childhood myopia is a worldwide problem. It is reported that there are about 80 million myopic children worldwide.[2] In USA prevalence of myopia is reported to be 3% (5-7 yrs. old) , 8% (8-10 yrs. old) , 14% (11-12 yrs. old) and 25% (12-17 yrs. old).[2] Whereas in China it is found to be 61.5% in 12 year old children.[6] Studies conducted in other regions of the world e.g. Taiwan showed 12% prevalence(6 yr. old) and 84 % (16-18 yrs. old) of this disorder.[2] In Pakistan, refractive errors are reported to be the third largest cause of preventable/curable blindness.[3] Incidence of myopia among the children having refractive errors in different major cities of Pakistan is found to be 28.33% in Peshawar,[4] 25.3% in Lahore[5] and 19% in Rahim Yar Khan.[6]

Keeping in mind the lack of statistical data on Myopia in Pakistani population, variable prevalence reports on the disorder worldwide and its implications on a patient's life, we have planned to conduct a study to find out the frequency of myopia in from 6 to 17 years old. This evidence would benefit our ophthalmologists in understanding the epidemiological aspects of the disease and better understanding for early and effective management of the disorder. The objective of the study was to determine the frequency of juvenile onset myopia in children between 07 to 16 years of age.

Subjects and Methods:

Study design was descriptive cross-sectional study and study population was children between 07 to 16 years presenting at Department of Ophthalmology, Al-Shifa Trust Eye Hospital with no other co-morbidities. Sample technique was non-probability consecutive sampling. Using WHO criteria with confidence level 95%, margin of error 5%, prevalence of disease 26.11%, sample size came out to be 300 cases. All children of both genders aged between 7 and 16 years presenting with decreased vision for at least 1 months or longer as diagnosed on LogMAR chart with values greater than 0.3 which is equivalent to 6/12 on Snellen (see attached annexure), were included. Children with disorders of the eye other than refractive errors e.g. Cataract, Tumors and corneal disorders (Diagnosed on History and Examination), Anisometropia, patients with any chronic illnesses like Glycogen storage diseases, Thalassemia (Diagnosed on History and Examination) and those who didn't give consent were excluded.

After an informed written consent from child's caretaker or parent, the patients were screened for inclusion criteria. The physical assessment and eye examination for myopia was undertaken and those fulfilling the selection criteria were included in the study. Those diagnosed with myopia were enrolled and their demographic characteristics along with presenting signs and symptoms were recorded. According to study objective the patient age was categorized from 07 to 16 years. The study information was gathered on a specifically designed proforma (annexed). All the study related information was filled on the proforma by the FCPS resident himself.

The data was entered and analyzed using SPSS software version 11.0. The mean and standard deviations were calculated for numerical variables like age.

Frequency and percentages were calculated for qualitative variables i.e. sex and myopia. The results were

described and also presented in the form of tables and graphs accordingly. Effect modifiers were controlled by the stratification done with regards to Age and Gender. Post-stratification chi square was applied to see their effect on frequency and p-value ≤0.05 was taken as significant

Results:

Age range in this study was from 7 to 16 years with mean age of 12.32 ± 2.84 years. Majority of the patients 167 (62.33%) were between 13 to 16 years of age as shown in Table I. Out of the 300 patients, 193 (64.33%) were male and 107 (35.67%) were females with male to female ratio of 1.8:1. Juvenile onset myopia was found in 94 (31.33%) patients, whereas there was no Juvenile onset myopia in 206 (68.67%) patients.

When Stratification of Juvenile onset myopia was done on age groups, it was found that there was significant difference between different age groups as shown in Table II while the stratification of Juvenile onset myopia with respect to gender has shown in Table III which showed no significant difference between male and female.

Table-I: Age distribution of patients (n=300).

Age (in years)	No. of Patients	%age
7-12	113	37.67
13-16	187	62.33

- **Mean ± SD = 12.32 ± 2.84 years**

Table II: Stratification of myopia with respect to age groups.

Age (years)	**Myopia**		**p-value**
	Yes	No	
7-12	27 (23.89%)	86 (76.11%)	**0.031**
13-16	67 (35.83%)	120 (64.17%)	

Table III: Stratification of Myopia with respect to gender.

Gender	**Myopia**		**p-value**
	Yes	No	
Male	58 (30.05%)	135 (69.95%)	**0.520**
Female	36 (33.64%)	71 (36.36%)	

Discussion:

Myopia (nearsightedness or short sightedness) is a type of refractive error of the eye, in which the visual image is focused in front of the retina, typically resulting in blurred vision of distant objects. Myopia is especially prevalent among Asians and has been reported to be as high as 70-90% in Asian countries. In our study the prevalence came out to be 31.3%.

Age range in my study was from 7 to 16 years with mean age of 12.32 ± 2.84 years. Majority of the patients 167 (62.33%) were between 13 to 16 years of age. Out of the 300 patients, 193 (64.33%) were male and 107 (35.67%) were females with male to female ratio of 1.8:1. The prevalence of myopia varies with age and other factors. When examined without the aid of cycloplegic

agents, a significant number of infants are found to have some degree of myopia.[7,8]Their myopia tends to decrease, and most such infants reach emmetropia by 2-3 years of age. The prevalence of myopia is high in premature infants.[9,10]

Myopia of at least 0.50 D has a lower prevalence (< 5%) in the 5-year-old population than in any other age group.[11,12] The prevalence of myopia increases in school-age and young adult cohorts, reaching 25 percent in the mid to late teenage population and 25-35 percent in young adults in the United States and developed countries.[13,14] It is reported to be higher in some areas of Asia.[15] The prevalence of myopia declines somewhat in the population over age 45 years, reaching about 20 percent in 65-year olds,[14,16] and decreasing to as low as 14 percent of persons in their seventies.[17] Reviews of the extensive literature on myopia identify some factors associated with prevalence. Some studies have found a slightly higher prevalence of myopia in females than in males.[17-21]

The statistical data available worldwide has shown different prevalence of this disorder in different parts of the world. One study showed prevalence of myopia in children as 26.11%.[22] Another study showed its prevalence in USA to be 3% (5-7 yrs. old) , 8% (8-10 yrs. old) , 14% (11-12 yrs. old) and 25% (12-17 yrs. old).[2] Same study showed much higher prevalence in Chinese children .This fact was also evident with prevalence of myopia as 61.5% in 12 year old Chinese descent Hongkong children.[6] Studies conducted in other regions of the world e.g. Taiwan showed 12% prevalence(6 yr. old) and 84 % (16-18 yrs. old) of this disorder.[2] One regional study showed 54.53 %[23] prevalence.

Childhood myopia is a worldwide problem. It is reported that there are about 80 million myopic children worldwide.[24] In Pakistan one study shows that refractive errors are the third largest cause of preventable/curable blindness in this country.[25] Incidence of myopia among the children having refractive errors in different major cities of Pakistan is like 28.33% in Peshawar,[26] 25.3% in Lahore[27] and 19% in Rahim Yar Khan.[28] High myopia is associated with many severe complications, which may lead to permanent blindness. These complications include posterior staphyloma, macular degeneration, retinal detachment, retinal holes/tears, cataract and glaucoma.[29-32]

Myopia affects approximately one-third of the US population,[33] but the prevalence ranges from as low as 3% for Sherpa in Nepal[34] to over 90% in Taiwan University students.[35] In general, the prevalence of myopia is highest in Asian children,[36] followed by Hispanic, and then black and white children.[37] Some studies report a greater proportion of myopic females,[38,39] but others report a similar prevalence between sexes.[40]

Conclusion:

This study concluded that there is high frequency of juvenile onset myopia with higher percentage between 13-16 years of age and in females. So, we recommend that this particular age group should be given special consideration for early and effective management of the disorder.

References:

1. Pan CW, Ramamurthy D, Saw SM. "Worldwide prevalence and risk factors for myopia.". J Br Coll Ophthal Opticians (Optometrists). 2012;32(1):3—16.

2. American Academy of Ophthalmology : Clinical Optics , vol 3 . Sanfrancisco , AA0 , 2012 .
3. Ong SY, Ikram MK, Haaland BA, Cheng CY, Saw SM, Wong TY, et al . Myopia and cognitive dysfunction : the singapore malay eye study . Invest Ophthalmol Vis Sci. 2013 ;54:799-803.
4. Cheng SC, Lam CS, Yap MK. Prevalence of myopia-related retinal changes among 12-18 year old Hong Kong Chinese high myopes. Ophthalmic Physiol Opt. 2013 ;33:652-60.
5. Wu JF, Bi HS, Wang SM, Hu YY, Wu H, Sun W, et al. Refractive error, visual acuity and causes of vision loss in children in Shandong, China. The Shandong Children Eye Study. PLoS One. 2013 23;8:e82763.
6. Tong L, Huang XL, Koh ALT, Zhang X, Tan DTH, Chua WH. Atropine for the treatment of childhood myopia: effect on myopia progression after cessation of atropine. Opphthalmology. 2009 March; 116(3): p. 572-579.
7. Mohindra, Held R. Refraction in humans from birth to five years. Gwiazda J, Thorn F, Bauer J, Held R. Emmetropization and the progression of In: Fledelius HC, Alsbirk PH, Goldschmidt E, eds. Third International Conference on Myopia. Doc Ophthalmol Proc, ser vol 28. August 24-27, 1980. The Hague: Dr. W. Junk Publishers, 1981:19-27.
8. manifest refraction in children followed from infancy to puberty. Clin Vis Sci 1993; 8:337-44.
9. Fletcher MC, Brandon S. Myopia of prematurity. Am J Ophthalmol 1955; 40:474-81.
10. Drillen CM. The growth and development of the premature born infant. Baltimore: Williams & Wilkins, 1964:83-107.
11. Hirsch MJ. The changes in refraction between the ages of 5 and 14--theoretical and practical considerations. Am J Optom 1952; 29:445-59.
12. Young FA, Beattie RJ, Newby FJ, Swindal MT. The Pullman study--a visual survey of Pullman schoolchildren. Part II. Am J Optom 1954; 31:192-203.
13. Roberts J, Slaby D. Refraction status of youths 12-17 years. Vital Health Stat 1974; 148:1-55.
14. Angle J, Wissman DA. The epidemiology of myopia. Am J Epidemiol 1980; 111:220-8.
15. Wang Q, Klein BEK, Klein R, Moss SE. Refractive status in the Beaver Dam Eye Study. Invest Ophthalmol Vis Sci 1994; 35:4344-7.
16. Baldwin WR. A review of statistical studies of relations between myopia and ethnic, behavioral, and physiological characteristics. Am J Optom Physiol Opt 1981; 58:516-27.
17. Curtin BJ. The myopias: basic science and clinical management. Philadelphia: Harper & Row, 1985:39-59.
18. National Academy of Sciences Working Group on Myopia Prevalence and Progression. Myopia: prevalence and progression. Washington, DC: National Academy Press, 1989. 1.
19. Bear JC. Epidemiology and genetics of refractive anomalies. In: Grosvenor T, Flom MC, eds. Refractive anomalies: research and clinical applications. Boston: Butterworth-Heinemann, 1991:57-80
20. Grosvenor T. Primary care optometry. Anomalies of refraction and binocular vision, 3rd ed. Boston: Butterworth-Heinemann, 1996:33-72.
21. Birnbaum MH. Optometric management of nearpoint vision disorders. Boston: Butterworth-Heinemann, 1993:11-23.
22. Ma Y, He X, Zou H, Lu L, Qu X, Zhu J. Myopia screening: combining visual acuity and noncycloplegic autorefraction. Optom Vis Sci. 2013 ;90:1479-85.
23. Alam M, Fareed M. Refractive errors ; profile in school age children . Professional Med J. 2011 ;18:649-53

24. Pan CW, Ramamurthy D, Saw SM. "Worldwide prevalence and risk factors for myopia.". J Br Coll Ophthal Opticians (Optometrists). 2012;32(1):3—16.
25. Siatkowski RM, Cotter SA, Crockett RS, Miller JM, Novack GD, Zadnick K. Two-year multicenter, randomized, double-masked, placebo-controlled, parallel safety and efficacy study of 2% pirenzepine ophthalmic gel in children with myopia. Journal Of AAPOS. 2008 August; 12(4): p. 332-339.
26. Durani J. Blindness statistics for Pakistan. Pakistan J Ophthalmology. 1999; 15: p. 1-2.
27. Sethi S, Sethi MJ, Hussain I, Khan T. Refractive errors in children attending out-patient department of ophthalmology, Khyber teaching hospital, peshawar. Pak Armed Forced Med J. 2008 December;(4).
28. Seema Q. Refractive state of children in less than five years of age. Journal of Surgery Pakistan. 2006 June; 11(2): p. 73-5.
29. Masood S, Hussain Z, Ahmad A, Tanveer ZH, Ahmad. I. Incidence of myopia in school going children in Rahim Yar Khan. Professional Med J. July2007 July-September; 14(3):422-425.
30. Grossniklaus HE, R GW. Pathologic findings in pathologic myopia. Retina. 1992; 12(2): p. 127-133.
31. M CJ, C PR. Prevalence of lattice degeneration and its relation to axial length in severe myopia. American Journal Of Ophthalmology. 1991 January; 111(1): p. 20-23.
32. L P, I CF, M M, R B. Peripheral retinal changes and axial myopia. Retina. 1992; 12(1): p. 12-17.
33. Vitale S, Ellwein L, Cotch MF, Ferris FL 3rd, Sperduto R. Prevalence of refractive error in the United States, 1999—2004. Arch Ophthalmol.
34. Garner LF, Owens H, Kinnear RF, Frith MJ. Prevalence of myopia in Sherpa and Tibetan children in Nepal.Optom Vis Sci. 1999;76(5):282—285.
35. Wang TJ, Chiang TH, Wang TH, Lin LL, Shih YF. Changes of the ocular refraction among freshmen in National Taiwan University between 1988 and 2005. Eye (Lond). 2009;23(5):1168—1169 2008;126(8):1111—1119
36. Ip JM, Huynh SC, Robaei D, et al. Ethnic differences in refraction and ocular biometry in a population-based sample of 11—15-year-old Australian children. Eye (Lond). 2008;22(5):649—656.
37. Ip JM, Huynh SC, Robaei D, et al. Ethnic differences in the impact of parental myopia: findings from a population-based study of 12-year-old Australian children. Invest Ophthalmol Vis Sci. 2007; 48(6):2520—2528.
38. Bar Dayan Y, Levin A, Morad Y, et al. The changing prevalence of myopia in young adults: a 13-year series of population-based prevalence surveys. Invest Ophthalmol Vis Sci. 2005;46(8):2760—2765
39. He M, Huang W, Zheng Y, Huang L, Ellwein LB. Refractive error and visual impairment in school children in rural southern China. Ophthalmology. 2007;114(2):374—382.
40. He M, Huang W, Zheng Y, Huang L, Ellwein LB. Refractive error and visual impairment in school children in rural southern China. Ophthalmology. 2007;114(2):374—382.

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ORIGINAL ARTICLE

Association of Pterygium with Dry Eye: A Health Professional Dilemma

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ABSTRACT

Objective: This study was done to assess the grade of pterygium effects on dry eye, identified by clinical tests and to find association between dry eyes and pterygium

Study Design: The study was cross sectional in nature and carried out in the outpatient department of Al-Shifa Trust Eye Hospital, which is a tertiary eye care hospital.

Place & Duration: The study was conducted from 4th June 2017 to 8th November 2017.

Subjects and Methods: A total of 102 eyes of 60 patients who visited OPD of Al-Shifa Trust Eye Hospital were included in this study. Each patient had a complete ophthalmological examination to rule out any other problem other than dry eye and all information was recorded in a specially designed proforma. Status of pre-corneal tear film, tear film breakup time, Schirmer test with anesthesia and Schirmer test without anesthesia were also performed.

Results: The study revealed that the percentage of females having pterygium was more (grade-1 65% & grade-2 53%) as compared to males (grade-1 35% & grade-2 47%). The formers (38%) who work outside in direct sun light had grade-1 pterygium with severe dry eye symptoms. There is a significant association between the grade 2 & 3 pterygium and dry eye confirmed by clinical Schirmer test with and without anesthesia and the patients with grade 2&3 pterygium facing sever dry eye. The results were also tested with the tear film breakup time test, and results were found statistically significant.

Conclusion: Patients with decreased tear production are more prone to the damaging effects of U-V rays in the sunlight. There is an association between dry eyes and pterygium. Patients with pterygium are having decreased tear production, decreased tear film breakup time test and decreased Schirmer test value. *Al-Shifa Journal of Ophthalmology 2018; 14(1): 14-20.*

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Introduction:

Pterygium is an ocular degenerative condition that has been attributed to environmental factors. It is a fibrovascular growth of the conjunctiva, encroaching upon the cornea. It is a common disorder of ocular surface in many parts of world with unknown etiology and pathogenesis the prevalence of pterygium around the world wide varies from 1-25% depending upon the population studied[1,2]. Pterygium occurs more commonly in tropical regions. The prevalence of pterygium is associated with chronic sun exposure and specifically to UV which may explain the geographic variation in prevalence as people live in rural environments and outdoor activities are approximately five times more likely to

develop pterygia than those who live in urban areas and indoor activities[3,4]. Pterygia are thus more common among people such as farmers suffers who spend a lot of time outdoors in sunlight and UV exposure , but anyone can develop pterygium.[5]

Pterygia not only affects aesthetically, but also affects the refractive astigmatism and is potentially blinding disease in the advanced stage due to invasion of the visual axis, which can have a significant impact on vision[6].

The risk factors which has been most commonly identified with a strong relationship to the development of pterygium is exposure to sunlight (Ultraviolet rays)[7]. The UV type B light in solar radiation has been found to be the most significant environmental factor in pterygium pathogenesis so that occupationally the individuals who worked in hot climate and sunlight exposure for example farmers and labours and in older age due to dry eye the chances of pterygium increases[8]. Dust and irritation also has been a risk factors in the development of pterygia. Women are twice as likely as men to develop dry eyes. Estrogen supplements increase the risk of dry eye by 30 percent. Eye make-up can thin the oily layer of the tearfilm.[3]

Pterygium is a significant ocular problem around the world and also in Pakistan because majority of population is not socially well off and do works outside in sun light. Risk factors are geographical setting, UV exposure, age, dry eye syndrome which causes dry eye and ultimately pterygium formation, so it will be necessary to create awareness among patients suffering from this disease and avoid complication. Conservatively, the progress of pterygium can be stopped or slowed down by using topical lubricants eye drops as a substitute of tears[9].

The tear film abnormalities cause local drying of the cornea and conjunctiva which in turn predisposes to these new growths. It is stated that the sequence was ultraviolet light causing drying and that this was followed by the pterygium. Pterygia appearing to occur more frequently in hot, dry climates-and by clinical and biochemical studies of the tear film.

The objectives of the current study were:

- To assess the grade effects of pterygium on dry eye as identified by clinical tests
- To find out the association between dry eyes and pterygium
- To give recommendations for prevention of complications.

OPERATIONAL DEFINITIONS:

Grades of Pterygium

Grade 1 covered pterygium that was between the limbus and a point midway between the limbus and the pupillary margin.

Grade 2 occurred when the head of the pterygium was present between a point midway between the limbus and the pupillary margin—that is to say, the nasal pupillary margin in case of nasal pterygium and the temporal margin in case of temporal pterygium).

Grade 3 Pterygium that crossed pupillary margin was labeled Grade III.

Dry Eye

Dry eye is a condition associated with inadequate tear production and marked by redness of the conjunctiva, by itching and burning of the eye, and usually by filaments of desquamated epithelial cells adhering to the cornea also called as *keratoconjunctivitis sicca.*

CLASSIFICATION OF DRY EYE

SCHIRMER TEST		Tear Film Breakup time	
MILD	10mm- 15mm	MILD	8sec- 10sec
MODERATE	5mm- 10mm	MODERATE	5sec- 8sec
SEVERE	< 5mm	SEVERE	< 5sec

Subjects and Methods:

This cross-sectional study was carried out in the outpatient department of Al-Shifa Trust Eye Hospital Rawalpindi, which is a tertiary eye care hospital. A sample size of 102 eyes was calculated by using Open Epi software. Convenient sampling technique was used. The patients presenting in ZAKAT and General OPD having Pterygium were included in study.

INCLUSION CRITERIA:

- Pterygium of all grades.
- Patients of age 25 to above.
- Both genders male & female were included.

EXCLUSION CRITERIA:

- Patients having ocular surface disease.
- Patients of Steven Johnson syndrome.
- Patients having no history of radiation, conjunctival surgery and refractive surgery.

Data was collected using questionnaire along with clinical Performa. The questionnaire consisted of three parts: The first part included demographic data like age, sex, occupation, residence. Second part of questionnaire consisted of ocular and systemic disease along with duration and symptoms. Third part comprised of clinical examination and diagnostic test for dry eye. The questionnaire was validated for content and face validity by circulating them to expert in the field including the supervisor.

Complete history of patients was taken including systemic history, ocular history, chief complain, duration of disease was taken. Complete ocular examination was performed to rule out any abnormality by using slit lamp biomicroscope. And following 3 tests were carried out to check the Pterygium. Tear film breakup time (TFBUT), Schirmer test with anesthesia (STWA) and Schirmer test without anesthesia (STWOA).

Verbal informed consent was obtained from patients. Permission was obtained from institutional review board of Al-Shifa Trust Eye Hospital. The data was not shared with any other researcher. The patients with serious diseases were referred to specialized clinics.

Results:

A total 102 eyes of 60 patients were included in the study. Some of them were unilateral and mostly bilateral. The mean age was 45 ± 2.04 (SD) ranging from 31 to 63 years. Patients came from different areas of Pakistan comprising both hot and cold climate. The bar chart presents the percentage of Grade 1, Grade 2 and 3 pterygia among both genders. Table 1 shows results of TFBUT, STWA and STWOA in patients belonging to various occupations, while Table II, III and IV display the results of STWOA and STWA and TFBUT in patients with different grades of pterygium. These results showed that there was a significant association between the grade 2 & 3 pterygium and dry eye confirmed by clinical tests.

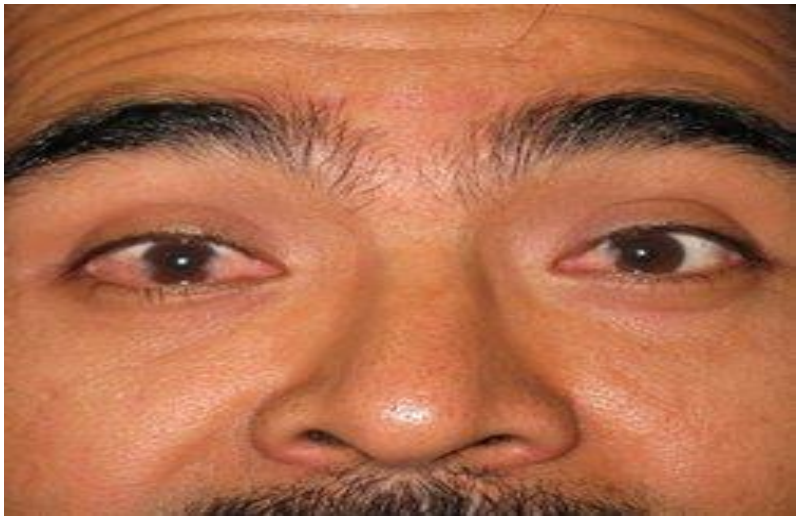

Fig 1: Patient with bilateral pterygium

Table I: Cross-tabulation of occupation with TFBUT,STWA and STWOA

	OCCUPATION	TFBUT*		STWA*		STWOA*	
		1sec-6sec	7sec-12sec	1mm-6mm	7mm-12mm	1mm-7mm	8mm-14mm
1	Farmer (Count, % within occupation)	32 84.2%	6 15.8%	30 78.9%	8 21.1%	18 47.4%	20 52.6%
2	Driver (Count, % within occupation)	2 100.0%	0 0%	1 50%	1 50%	0 0%	2 100%
3	Army officer (Count, % within occupation)	9 81.8%	2 18.2%	10 90.9%	1 9.1%	10 90.9%	1 9.1%
4	Labour (Count, % within occupation)	8 72.7%	3 27.3%	11 100.0%	0 0%	11 100.0%	0 0%
5	Teacher (Count, %within occupation)	12 54.5%	10 45.5%	16 72.7%	6 27.3%	16 72.7%	6 27.3%

*TFBUT Tear film breakup time , *STWA Schirmer test with anesthesia
*STWOA Schirmer test without anesthesia

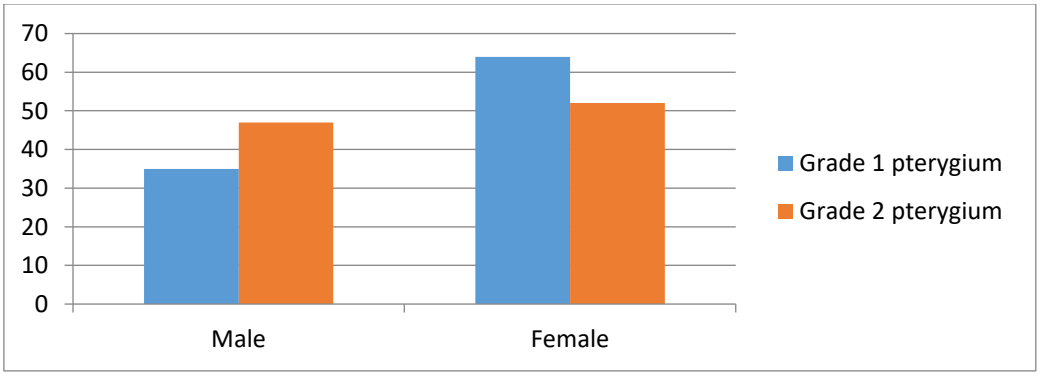

Fig 2: Grading of pterygium among both genders

Table II: Grade of pterygium with Schirmer Test without anesthesia

Grade of pterygium (GOT)		Schirmer Test without anesthesia		Total	Chi-square statistics
		1mm-7mm	8mm-14mm		
Grade 1	Count % within GOT	6 (35.3%)	11 (64.7%)	17 (100%)	**0.003***
Grade 2 and Grade 3	Count % within GOT	64 (75.3%)	21 (24.7%)	8 (100%)	

Table III: Grade of pterygium with Schirmer test with anesthesia

Grade of pterygium		Schirmer test with anesthesia		Total	Chi-square statistics
Grade 1	Count % within GOT	1mm-6mm	7mm-12mm		
		3 (17.6%)	14 (82.4%)	17 (100%)	**0.001***
Grade 2 and Grade 3	Count % within GOT	80 (94.1%)	5 (5.9%)	85 (100%)	

Table IV: Grade of pterygium with Tear film breakup time

Grade of pterygium		Tear film breakup time		Total	Chi-square
Grade 1	Count % within GOT	1sec-6sec	7sec-12sec		
		8 (47.1%)	9 (52.9%)	17 (100%)	**0.013***
Grade 2 and Grade 3	Count % within GOT	67 (78.8%)	18 (21.2%)	85 (100%)	

Discussion:

In this study, mean tear film breakup time, Schirmer test with anesthesia and Schirmer test without anesthesia was lower in eyes with pterygium. However, eyes with a tear film breakup time of less than 10 sec (abnormal values) were found more frequently in association with eyes with pterygium. Study examined 102 eyes with pterygia, 45.1% were male and 52.9% were female from 31-63 years of age. According to different authors pterygium is more common in male but in our study, female having more percentage of dry eyes and pterygia as compared to males.

In a study done by Muhammad Saleem et al on 120 patients with 170 pterygia, mean value of TBUT was 6sec range from 3-14sec. Schirmer test value was also affected with a mean value 5.70mm and range of 3-14mm[10]. Marginal tear film was decreased in most of the patients above the age of 40. The study concluded that unstable tear film may contribute to the initiation of pterygium.

TBUT is supposed to be an excellent diagnostic technique in detecting mucin deficient dry eyes. Halepota et al found that mean value of Schirmer test is 15.7mm in the age of 20-29 years and 10.7mm in 60-80 years age group[11]. We examined the status of marginal tear film very carefully in every patient of pterygium with the help of slit lamp. Marginal tear film was decreased in most of patients above the age of 40 years.

In other conditions associated with mucin deficiency, patients present with complaints of eye discomfort such as burning sensation, foreign body sensation and redness, experienced in ways quite similar to subjects with pterygium. The marked abnormality of TBUT, which was found more frequently in association in eyes with pterygia, also suggest that either there was an abnormality of mucin, which maybe a predisposing factor for the pathogenesis of pterygium, or the presence of pterygium causes abnormalities of mucin. The relationship, whether pterygium results from tear film dysfunction, is still not clear. Research and clinical evidence, however suggest there is some relationship between the two. Such observations include the position of pterygium in the exposed part of eye, the medial position is more frequent than the temporal position[13, 14].

Pterygium is a significant ocular problem around the world, and dry eye syndrome is an important risk factors for its origin, other than environmental factors like sunlight, ultraviolet exposure, age, gender, economic situation and others. Patients who are living in hot climate are prone to development of pterygium than in cold climate. On the other hand, person who spend more time outside in sunlight exposure like farmers develop pterygium more frequently and rate of progression of pterygium also increases.

Conclusion:

Pterygium is a significant ocular problem around the world, and dry eye syndrome is an important risk factors for its origin, other than environmental factors like sunlight, ultraviolet exposure, age, gender, economic situation and others. Patients who are living in hot climate are prone to development of pterygium than in cold climate. On the other hand, person who spend more time outside in sunlight exposure like farmers develop pterygium more frequently and rate of progression of pterygium also increases. Our study augmented the already established finding that the patients with pterygium have reduce Tear film breakup time, Schirmer test with anesthesia and Schirmer test without anesthesia value which is an indication of dry eye in pterygium.

Recommendations:

1. Usage of topical lubricant eye drops as a substitute of tears in patients with pterygium may help to prevent the dry eye.
2. Awareness should be given to public to use of protective measures like sunglasses and P-caps to prevent the drying of eyes.
3. Early detection and screening can prevent pterygium and dry eye effects.
4. Patient counseling can also prevent the further damage to eye and eye sight.

References:

1. Luthra R, Nemesure BB, Wu SY, et al. Frequency and risk factors for pterygium in the Barbados Eye Study. Arch Ophthalmol 2001; 119:1827.
2. Cajucom-Uy H, Tong L, Wong TY, et al. The prevalence of and risk factors for pterygium in an urban Malay population: the Singapore Malay Eye Study (SiMES). Br J Ophthalmol 2010; 94:977.
3. West S, Muñoz B. Prevalence of pterygium in Latinos: Proyecto VER. Br J Ophthalmol 2009; 93:1287.

4. Viso E, Gude F, Rodríguez-Ares MT. Prevalence of pinguecula and pterygium in a general population in Spain. Eye (Lond) 2011; 25:350.
5. Fotouhi A, Hashemi H, Khabazkhoob M, Mohammad K. Prevalence and risk factors of pterygium and pinguecula: the Tehran Eye Study. Eye (Lond) 2009; 23:1125.
6. Ma K, Xu L, Jie Y, Jonas JB. Prevalence of and factors associated with pterygium in adult Chinese: the Beijing Eye Study. Cornea 2007; 26:1184.
7. Anderson JR. A pterygium map. Acta Ophthalmol 1954; 3:1631.
8. Coroneo MT, Di Girolamo N, Wakefield D. The pathogenesis of pterygia.C urr Opin Ophthalmol 1999;10:282-288
9. Solomon A, Pires RT, Tseng SC. Amniotic membrane transplantation after extensive removal of primary and recurrent pterygia. Ophthalmology 2001;108: 449-460.
1.
10. Moran DJ, Hollows FC. Pterygium and ultraviolet radiation: a positive correlation.Br J Ophthalmol 1984;68:343-346.
11. Franklin W. pterygium., http://www.nlm.nih.gov/medlineplus/ency/article/001011.htm (accessed 30 july 2017).
12. .M T Coroneo. Pterygium as an early indicator of ultraviolet insolation: a hypothesis.. British Journal of Ophthalmology 1993; 77(11):734.
13. Pterygium. http://www.healthline.com/health/pterygium#Overview1 (accessed 30 july 2017).
14. Lisa Burkhart. Pterygium - what is it, symptoms, causes, risk factors, tests & diagnosis, treatment options: University of Michigan Kellogg Eye Center. http://www.kellogg.umich.edu/patientcare/conditions/pterygium.html (accessed 30 july 2017).

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ORIGINAL ARTICLE

Comparison of Rise in Intraocular Pressure After a Single Intravitreal Injection of Bevacizumab and Triamcinolone Acetonide

Zulfiqar Ali Khan[1], Muhammad Kashif Habib[2], Nighat Jabeen[1]

ABSTRACT:

Background: There are conflicting reports regarding elevation of intraocular pressure (IOP) after single intravitreal injection of bevacizumab (IVB) and triamcinolone acetonide.

Objectives: To compare the rise in IOP after a single intravitreal injection of bevacizumab versus triamcinolone acetonide.

Study Design and Settings: Randomized clinical trial conducted at Retina Clinic of Al-Shifa Trust Eye Hospital, Rawalpindi between 21st October 2014 to 21st April 2015.

Subjects and Methods: Sixty patients divided into two equal groups by non-probability consecutive sampling After an informed consent, Group 1 was given 1.25mg/0.05ml intravitreal bevacizumab (IVB) injection and Group 2 was given 4mg/0.1ml intravitreal triamcinolone acetonide (IVTA) injection. IOPs were recorded before injection and 30 minutes, 1 day, 1 week and 4 weeks post injection.

Results: Mean baseline IOP was 14.57±1.755 mm of Hg in IVB group and 11.93±1.112 mm of Hg in IVTA group. Post injection IOPs in IVB group at 30 minutes, 1 day, 1 week and 4 weeks were 17.40±4.789, 13.20±2.441, 12.40±1.923 and 12.87±2.145 mm of Hg respectively. Post injection IOPs in IVTA group at 30 minutes, 1 day, 1 week and 4 weeks were 21.53±9.468, 16.60±4.702, 15.20±3.380 and 14.57±3.380mm of Hg respectively. The mean IOP remained significantly higher in IVTA group as compared with IVB group at 30 minutes (p=0.039), 1 day`(p=0.001), 1 week (p=0.001) and 4 weeks (p=0.024).

Conclusion: Single 1.25mg/0.05ml Intravitreal bevacizumab injection causes less IOP rise above the baseline as compared to 4mg/0.1ml Intravitreal Triamcinolone Acetonide. *Al-Shifa Journal of Ophthalmology 2018; 14(1): 21-27.*

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Introduction:

Bevacizumab has shown to be beneficial for DME, providing stability or improvement in visual acuity. Bevacizumab may be beneficial for any ocular disease in which neovascularization and edema play a major role, particularly diseases like neovascular AMD, diabetic retinopathy, vein occlusions, neovascular glaucoma and retinopathy of prematurity. Intravitreal injection of bevacizumab has become a popular off-label treatment for ocular neovascular diseases, mainly because it is perceived to be as effective as ranibizumab.[1]

The efficacy of triamcinolone injections has been established in DME. Side effects including surgical cataract formation in 51% of phakic eyes at 2 years follow-up and intraocular pressure elevation in 25–40% of eyes.[2]The frequency of intraocular pressure(IOP) rise increases with higher doses[3].

Mechanisms of rise in the IOP are the increase volume induced by the drug itself and due to the pharmacologic properties of the medication. Both can result in loss of vision and should be monitored to prevent irreversible loss of vision. Main objective of monitoring IOP is to start the anti-glaucoma medication at appropriate timing and hence strict control of the permanent vision loss. The current study was conducted to evaluate the changes in IOP above baseline after administration of triamcinolone and bevacizumab in two groups over a period of four weeks follow up.

Subjects and Methods:

This was a randomized clinical trial conducted at Retina Clinic of Al-Shifa Trust Eye Hospital, Rawalpindi between 21st October 2014 to 21st April 2015. Sample size was calculated using WHO sample size calculator with the following parameters:

Level of significance: 5%, Power of test: 90%, Pooled SD: 0.251

Test value of population mean: 0.48545, Anticipated population mean: 0.68545

n= 30 in each group:

Sampling technique was by probability consecutive sampling.

INCLUSION CRITERIA:

- Patients with exudative AMD and DR (as diagnosed on Slit Lamp biomicroscopy using 90D Lens).
- Age >18 years, both genders included.

EXCLUSION CRITERIA:

- History of any previous intravitreal injection, vitrectomy or retinal detachment surgery.
- Vitreous haemorrhage (diagnosed on SLE using 90 D Lenses)
- Any active ocular inflammation.(diagnosed on SLE using 90 D Lenses)
- Tractional retinal detachment (diagnosed on SLE using 90 D Lenses)
- Prior diagnosis of glaucoma. (from previous History and Ocular Examination)
- Prior use of IOP-lowering agents (from previous History)
- Baseline IOP > 21 mmHg (measured by applanation Goldmann tonometer)

Approval by the hospital ethical committee was taken. An informed written consent was obtained from all the patients. Patients fulfilling the inclusion criteria were randomly allocated to group A (IVB) or group B(IVT) based on computer generated table of random numbers. Baseline readings of the sample included anterior segment and fully dilated fundus examination performed with slit lamp biomicroscope using 90D indirect lens. The study variable that was seen included IOP as measured with Goldmann applanation tonometer, which was noted at baseline before Intravitreal injection administration.

Intravitreal injection of 1.25 mg/0.05 ml bevacizumab or 4mg/0.1ml triamcinolone were administered in retina clinic under sterile conditions by Vitreo Retina Consultant. IOP was measured after injections at 30 minutes, following next day, 1 week and 4 weeks to document any rise in the IOP. Verification of pre and post intervention readings were done by a senior consultant. IOP measurements were performed by the Principal investigator (Trainee researcher). All data was entered on a specially designed proforma.

Data analysis was done using Statistical Package for Social Sciences (SPSS) version 13. Mean and standard deviation was calculated for numerical variables i.e. age and intraocular pressure at presentation and

after 30 minutes, 1 day, 1 week and 1 month. Frequency and percentages were presented for categorical variables i.e. gender and diagnostic condition requiring intravitreal injection. Statistical differences for IOP between pre- and post-intravitreal drug administration was assessed using the paired sample t-test (Baseline IOP and 4 weeks), and differences between the two groups were assessed using the Independent sample t- test. P-value <0.05 was considered significant.

Results:

In this randomized control trial, a total of 60 patients were included by using consecutive sampling and were divided into two equal groups of 30 patients each. One group was given intravitreal injection of bevacizumab (IVB) and 2nd group was given intravitreal injection of triamcinolone acetonide (IVTA). The age distribution of both drug groups is given in table1. The gender distribution is shown in figure1.

The distribution of IOP in IVB group shows that the mean IOP before injection was 14.57±1.755 with a minimum value of 12 and maximum value of 18. The mean IOP after 30 minutes of injection was 17.40±4.789 with a range of 10 to 26. The mean IOP decreased to 13.20±2.441 after 1 day of injection with minimum value of 10 and maximum value of 20. Similarly, the mean IOP values after 1 week and 4 weeks in IVB group were 12.40±1.923 and 12.87±2.145 with ranges of 10 to 18 and 8 to 20. In IVTA group the mean IOP at baseline was recorded 11.93±1.112 with a minimum value of 10 and a maximum value of 14 and after 30 minutes of injection the mean IOP was found to be 21.53±9.468 with range of 8 to 40. The mean values of IOP at day 1 and after 1 week were 16.60±4.702 and 15.20±3.380 with ranges of 8 to 26 and 8 to 24. The mean IOP after 4weeks was recorded 14.57±3.380 with a minimum value of 8 and maximum value of 24 as given in the (table II).

The comparison of IOP after 30 minutes of injection with baseline IOP (before injection) shows that there was significant increase in IOP in both groups, but this increase was very high in IVTA group. The comparison of IOP after 1 day with baseline values is given in (table3) which shows that it decreased significantly in IVB group but increased significantly in IVTA group. The comparison of IOP after 1 week with baseline value shows that in IVB group it decreased significantly (p-value <0.05) and in IVTA group after 1 week it is significantly (p-value < 0.05) less than that of IOP at baseline (table3). Similarly, the comparison of IOP after 4 weeks shows that in IVB group it decreased from baseline value with a significant (p-value < 0.05) difference and in IVTA group it is significantly (p-value < 0.05) different from baseline (table III).

When IOP at day 0 (30 minutes after injection) was compared in both groups it was noted that there was significant difference in both drug groups and mean IOP value of IVTA group was significantly greater than that of IVB group (table IV). The comparison of IOP after 1 day in both groups shows that the mean IOP was significantly (p-value < 0.05) higher in IVTA group as compared with IVB group (table4). The results of the study show that the mean IOP in IVTA group was significantly greater as compared with IVB group after 1 week. According the results of analysis of the data the mean IOP remains significantly higher in IVTA group as compared with IVB group after 4 weeks (table4).

Table I: Age distribution of both drug groups

Drug Group	N	Minimum	Maximum	Mean	Std. Deviation
IVB	30	44	70	54.30	6.983
IVTA	30	40	81	54.17	8.171

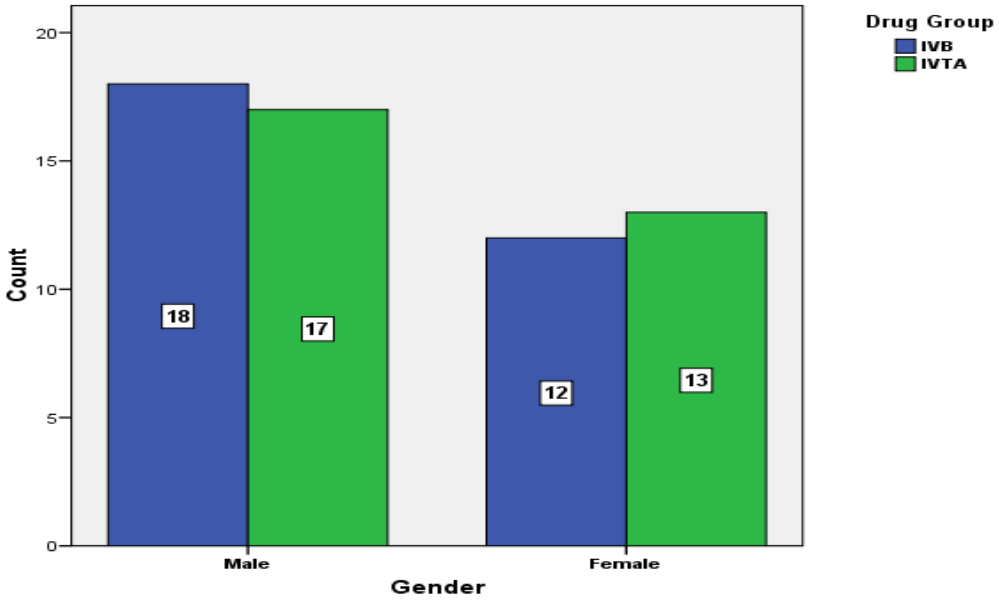

FIGURE1: GENDER DISTRIBUTION OF BOTH DRUG GROUPS

Table II: Distribution of IOP at baseline, day 0, after 1day, 1 week and 4 weeks in both drug groups

DRUG GROUP	IOP	N	Minimum	Maximum	Mean	Std. Deviation
IVB	IOP Before injection	30	12	18	14.57	1.755
	IOP at day 0 (30 minutes after Injection)	30	10	26	17.40	4.789
	IOP after 1 day	30	10	20	13.20	2.441
	IOP after 1 week	30	10	18	12.40	1.923
	IOP after 4 week	30	8	20	12.87	2.145
IVTA	IOP Before injection	30	10	14	11.93	1.112
	IOP at day 0 (30 minutes after Injection)	30	8	40	21.53	9.468
	IOP after 1 day	30	8	26	16.60	4.702
	IOP after 1 week	30	8	24	15.20	3.699
	IOP after 4 week	30	8	24	14.57	3.380

Table III: Comparison of IOP after 30 minutes of injection with Baseline IOP before injection

Drug Group	IOP	Mean	Std. Deviation	P-value
IVB	IOP at Baseline (Before injection)	14.57	1.755	0.004*
	IOP at day 0 (30 minutes after Injection)	17.40	4.789	
IVTA	IOP at Baseline (Before injection)	11.93	1.112	0.000*
	IOP at day 0 (30 minutes after Injection)	21.53	9.468	
IVB	IOP at Baseline (Before injection)	14.57	1.755	0.012*
	IOP after 1 day	13.20	2.441	
IVTA	IOP at Baseline (Before injection)	11.93	1.112	0.000*
	IOP after 1 day	16.60	4.702	
IVB	IOP at Baseline (Before injection)	14.57	1.755	0.000*
	IOP after 1 week	12.40	1.923	
IVTA	IOP at Baseline (Before injection)	11.93	1.112	0.000*
	IOP after 1 week	15.20	3.699	
IVB	IOP at Baseline (Before injection)	14.57	1.755	0.000*
	IOP after 4 weeks	12.87	2.145	
IVTA	IOP at Baseline (Before injection)	11.93	1.112	0.000*
	IOP after 4 weeks	14.57	3.380	

Table IV: Comparison of IOP (after Injection) in both drug groups

Drug Group	I0P	N	Mean	Std. Deviation	P-value
IVB	At day 0 , 30 minutes after injection	30	17.40	4.7890	0.039 *
IVTA		30	21.53	9.468	
IVB	After 1 day, 30 minutes after injection	30	13.20	2.441	0.001*
IVTA		30	16.60	4.702	
IVB	After 1 week, 30 minutes after injection	30	12.40	1.923	0.001*
IVTA		30	15.20	3.699	
IVB	After 4 weeks , 30 minutes after injection	30	12.87	2.145	0.024*
IVTA		30	14.57	3.380	

* Statistically significant at 5% level of significance

Discussion:

The safety of intraocular injections is being studied systematically in humans for the past many years. The risks involved with such injections are either procedure related (e.g. endophthalmitis and retinal detachment) or drug-related (cataract and elevated intraocular pressure). Previous

studies have shown that elevation of intraocular pressure is a common side effects of intravitreal injections particularly triamcinolone in different doses[4]. It was the purpose of this study to evaluate how often and when intraocular pressure rises after the injection; what are the predictive factors for a post injection elevation of intraocular pressure; whether intraocular pressure comes back to baseline and if so, when; and how many patients need lowering of intraocular pressure with topical medication or with surgery.

Results of this study suggested that intravitreal bevacizumab was safe regarding increase in IOP in normal population as compared to intravitreal triamcinolone after 4 weeks of administration of injection. We considered this period in our study as to our experience of clinical practice, many of the patients are lost to follow up after this period. Moreover, to the best of our knowledge there is only one study internationally, by Shimura et al, which described the comparison of the two drugs regarding rise in the IOP beyond 4 weeks of adminstration[5].

Our study demonstrated that after 4 weeks there was significant rise of IOP above the base line in the patients receiving intravitreal triamcinolone as compared to those receiving intravitreal avastin. These results are similar to the previous findings reported in other studies. Shimura et al have described the comparative elevation of IOP above base line on a longer follow up[5] and twenty-eight eyes of 14 Patients (8 Males, 6 females) with DME with type 1 DM were studied. In the current study, patients of exudative AMD were also included. The ages of the patients ranged from 58 to 75 years with a mean of 65.7 ± 5.3 (±SD) years. In the current study the mean age in IVB group was 54.30±6.983 and that in IVTA group mean age was 54.17±8.171 years. Baseline IOP that of Triamcinolone treated eyes was 15.0 ± 2.6 mm Hg, and in the bevacizumab treated eyes, 15.2 ± 2.6 mm Hg. There was no statistically significant difference between the two groups ($P = .907$). In the current study, in IVB group the mean IOP before injection was 14.57±1.755 and that of IVTA group it was 11.93±1.112. In the study by Shimura, during the clinical course, none of the eyes had an IOP increased more than 25 mm Hg. Compared to this, the peak IOP recorded in the current study was 40 mm of Hg. To clarify the alteration of IOP in the study by Shimura et al, the delta IOP (ΔIOP) defined as a subtraction of IOP at each time point from IOP at the initial exam was calculated in each eye. One month after the injection, ΔIOP in the triamcinolone treated eyes showed a statistically significant increase ($P = .038$), and then gradually increased with time. In contrast,ΔIOP in the bevacizumab-treated eyes did not show a statistically significant change during the clinical course.

Several studies have been done in past and are still being carried out dealing with only single injection either triamcinolone or avastin[6,7,8]. Aimal Khan et al, in a Quasi experimental study demonstrated effect of IVB on IOP along with other ocular complications.9 Another study describing short term effect of IOP rise after IVB was carried out by Falkenstein et al[10].These two studies described the effect of rise in IOP after IVB at different intervals of follow ups.

Ansari EA in a retrospective non-comparative case study described the effect on IOP after 4mg in 0.1ml of Ringer IVTA[11]. Dose was same as used in the current study. DJ Rhee et al, in a Retrospective, consecutive case series also mentioned rise of IOP after IVTA.[12] The results of our study were statistically similar to most of the above-mentioned studies. Our study is unique in the sense that it compares the rise of IOP after IVB and IVTA (the most administered injections in ophthalmological clinics in Pakistan).

Conclusion:

A single injection of IVB in a dosage of 1.25mg into 0.05ml is safe in terms of rise in IOP beyond the baseline after a period of 4 weeks compared to IVTA in a dosage of 4mg into 0.1ml. To evaluate the long-term safety and efficacy of this new treatment, further prospective randomized controlled clinical trials are needed, with scheduled re-injection and longer follow-up.

References:

1. Ziemssen F, Warga M, Neuhann IM, Leitritz M. Biester S, Grisanti S, et al. Does intravitreal injection of bevacizumab have an effect on the blood-aqueus barrier function? Br J Ophthalmol 2006; 90: 922.
2. Saeed M, Chaudhry MM.Visual acuity; assessment of efficacy and safety of different doses of intravitreal triamcinolone. Professional Med J 2007; 14: 500-3
3. Inatani M, Iwao K, Kawaji T, Hirano Y, Ogura Y, Hirooka K,et al. Intraocular pressure elevation after injection of triamcinolone acetonide: a multicenter retrospective case-control study.Am J Ophthalmol 2008; 145:676-81.
4. Saeed M, Chaudhry MM.Visual acuity; assessment of efficacy and safety of different doses of intravitreal triamcinolone. Professional Med J 2007; 14: 500-3
5. Shimuraa M, Nakazawab T, Yasudaa K, Shionoc T, Iidad T, Sakamotoe T, et al. Comparative therapy evaluation of intravitreal bevacizumab and triamcinolone acetonide on persistent diffuse diabetic macular edema. Am J Ophthalmol 2008; 145:854-61.
6. Wang Y, Wang VM, Chan CC. The role of anti-inflammatory agents in age-related macular degeneration (AMD) treatment. Eye (Lond). 2011;25:127-39
7. Shima C, Sakaguchi H, Gomi F, et al. Complications in patients after intravitreal injection of bevacizumab. Acta Ophthalmol 2008;86:372–6.
8. Paccola L, Costa RA, Folgosa MS, Barbosa JC, Scott IU, Jorge R. Intravitreal triamcinolone versus bevacizumab for treatment of refractory diabetic macular oedema (IBEME study).Br J Ophthalmol 2008; 92:76-80.
9. Khan.A, Mahar P.S, Hanfi AN, Qidwai U.Ocular complications after intravitreal bevacizumab injection in eyes with choroidal and retinal neovascularization. Pak J Ophthalmol 2010; 26:4
10. Falkenstein IA, Cheng L, Freeman WR. Changes of intraocular pressure after intravitreal injection of bevacizumab (avastin). Retina2007; 27:1044–47
11. Ansari EA, Ali N. Intraocular pressure following intravitreal injection of triamcinolone acetonide. Open Ophthalmol J. 2008 ;2:119-22.
12. D J Rhee, R E Peck, J Belmont, A Martidis, M Liu, J Chang et al. Intraocular pressure alterations following intravitreal triamcinolone acetonide. Br J Ophthalmol.2006;90:999–1003.

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ORIGINAL ARTICLE

Prevalence of Computer Vision Syndrome (CVS) Symptoms and Its Awareness Among Software Engineering Students of Twin Cities

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Abstract:

Introduction

Computer vision syndrome (CVS) is a condition in which a person experiences one or more of eye symptoms because of prolonged working on computer.

Objectives: To determine the prevalence of CVS symptoms, knowledge and practices of computer use in students studying in different universities of Rawalpindi, Islamabad Pakistan and to evaluate the association of various factors in computer use with the occurrence of symptoms.

Materials and Methods: It was a descriptive cross-sectional survey done on 350 university students of twin cities. A pre-tested structured questionnaire was used to collect data regarding demography, use of spectacles, duration of daily use of computer, symptoms of CVS and knowledge about its problem and use of preventive measures to reduce the symptoms.

Results: Prevalence of symptoms of CVS was found to be 87.7 %. The most disturbing symptoms was headache (57.7%) followed by eye strain (57.10%). Students who used computer for more than 2-3 hours per day experienced significantly more symptoms of CVS (p=0.0001). A statistically significance association was found between the posture and shoulder pain (p=0.03). Watery eyes were also associated, and the association was found statistically significant (p=0.004).

Conclusion: 87.7% of university students in Rawalpindi, Islamabad experienced symptoms related to CVS, which was seen more often in those who used computer for more than 2-3 hours continuously per day and the wrong posture. *Al-Shifa Journal of Ophthalmology 2018; 14(1): 28-33. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

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Introduction:

A computer is an electronic machine that can store, organize, find and manage information, do calculations and control other machines. Living in information society we spend a lot of time in front of visual display units such as computer or T.V screens. This has positive as well negative effects on our lives. Negative effects are health related and one major concern is the increasing number of people affected by the computer vision syndrome [1]

The Human eye is peripheral organ of vision, it consists of Cornea, conjunctiva, sclera, iris, choroid, aqueous humor, lens,

vitreous humor, retina[2]. Lacrimal system consists of lacrimal gland, eyelid margin, two puncta leading to canaliculi, lacrimal sac and nasolacrimal duct. The fluid is secreted over the surface of the eye by the action of blinking.[3]

According to American Association of optometry, Computer vision syndrome also referred to as digital eye strain, describes a group of eye and vision related problems that result from prolonged computer, tablet-reader and cell phone use.[4]The complex of eye and vision problems related to near work which are experienced during or related to computer use. The eye focusing system in human seems responds well to images that have well defined edges with good back ground and contrast between the background and the letters. The electronics characters have blurred edges as compared to letters on a printed page with sharply defined edges. This makes the human eye very difficult to maintain focus on Pixel characters because in attempt to focus on the plane of the computer the eyes fail to sustain the focus, therefore eyes relax on to the focus behind the screen. This is known as RPA resting point of accommodation.[5]
Excessive and close distance causes an excess accommodation which result in overworking of ciliary muscles of the eyes which is manifested as eye fatigue and headache. In close work the power of lens increases, accommodation occurs and excessive work for long term focusing on screen at near cause accommodation spasm which cause blurred vision in surrounding and eye fatigue.
Due to the consistent focusing on screen our blinking rhythm disturb that contributes to the reduced tear production and decrease natural moisture of eyes that results in stress to cornea cause Dry eye, watery eyes, contact lens discomfort, itching and sore eyes. Improper height and inclination angle of VDU lead to pain in the back, neck and shoulder. When the screen is at higher level the user turns back and causes muscle strain on trapezius and neck muscles.[6]

Materials and Methods:

This was a cross sectional study carried out between July to December 2015 in Rawalpindi Islamabad Universities Pakistan. All 18-25 years old male and female software engineering students using computers for the last 04 months with visual acuity 6/6 with or without correction were included in the study. Any student not willing, not meeting the above criteria and having any prior history of ocular trauma, surgery or convergence insufficiency were excluded from the study. Sample size was calculated by using Open Epi online software by single proportion formula z^2 $pq/^{e2}$, with anticipated frequency of 70% [7] at 95% Confidence level and margin of error was kept at 5%. The visited universities were selected randomly by lottery method. The data was collected by convenient sampling until the sample size was achieved. Data was collected on English language structured questionnaire. It was interviewed based and have 03 sections. Section A was on demographic characteristics, section B contained work profile and list of symptoms of CVS. Section C assessed knowledge regarding CVS and preventive measures and the practices of preventive measures. Snellen chart was used to assess the visual acuity of the respondents. Descriptive as well as inferential statistics were applied for analysis. Statistical analysis was done by using SPSS version 17. Chi –square test was applied to find out the association between independent factors and symptoms of CVS. P-value < 0.05 was considered as statistically significant.

Results:

A total of 350 students were interviewed in this study. Table 1 shows the prevalence of CVS among software engineering students in Rawalpindi Islamabad universities is 87.7%. The most prevalent symptoms were headache (57.40%) and eye strain (57.10%). Table II shows 52.9 % of the respondents had knowledge of harmful effects of long term computer use. And very

less 8.6 % have heard about CVS. Most of the respondents had knowledge of taking breaks as preventive measure to relief the CVS symptoms and mostly takes breaks while working on computer as shown in table III. Moreover, 19 and 3.1% of respondents blink frequently and look at far objects respectively while working on screen. A statistically significant association ($p < 0.05$) was found between the asthenopic symptoms and spectacle wearers (table IV).

Among the computer users 67.7% had wrong posture while using computer. A statistically significant ($p < 0.03$) association was found between the posture and shoulder pain. Watery eyes were also associated, and association was found significant ($p < 0.004$). Table V shows a statistically significant ($p<0.05$) association between exposure hours and symptoms.

Table 1. Computer vision syndrome among respondents (N=350)

CVS	Frequency	Percentage %
Yes	308	88
No	42	12
Total	**350**	**100**

Table II: Knowledge of respondents regarding harmful effects of Computer use

Knowledge About	Frequency	Percentage
CVS	30	8.6
Harmful effects of long term computer use	185	52.9
Harmful effects of long term focusing on screen	17	4.9
Blinking rhythm disturb	118	33.6
Total	350	100

Table III: Knowledge & Practices of respondents regarding preventive measures

Preventive Measures	Knowledge Frequency	Percentage	Practice Frequency	Percentage
Essential Breaks	172	49	140	40
Lubricants	42	12	11	3.1
Radiation Filter	49	14	21	6
Antireflective lenses	49	14	28	8
Tinting Lenses	38	11	3	0.9
Total	350	100		

Table IV: Association between spectacles wearers and symptoms

Symptoms	Spectacles wearers		X^2(df=1)	p-value
	Yes	NO		
Slow Refocusing Yes NO	38.8	25.6 74.4	2.779	0.022
Double Vision Yes NO	18.8 81.3	10.4 89.61	4.021	0.045
Eye Strain Yes No	70 30	53.7 46.3	6.704	0.01

Table V Association between duration of exposure hours and symptoms

Symptoms	Exposure Hours				X^2(df=3)	p-value
	2-3	4-5	6-8	>8		
Blurred Vision Yes No	26.1 73.9	45.6 54.4	57.3 42.7	47.4 52.6	9.874	0.02
Slow Refocusing Yes No	43.2 56.8	60.8 39.2	66.6 33.4	64.9 35.1	13.91	0.003
Eye Strain Yes No	15.3 84.7	29.1 70.6	37.9 62.1	36.8 63.2	15.838	0.001
Headache Yes No	47.7 52.3	46.8 53.2	69.9 30.1	66.7 33.3	16.387	0.001
Dry Eye Yes No	19.8 80.2	40.5 59.5	37.9 62.1	40.4 59.6	11.45	0.01
Itching Yes No	9 91	24.1 75.9	27.2 72.8	35.1 64.9	18.413	0.00
Shoulder Pain Yes NO	22.5 77.5	24.1 75.9	44.7 55.3	36.8 63.2	15.136	0.002
Back Pain Yes No	18.01 82	25.3 74.7	34 66	36.8 63.2	9.874	0.02

Discussion:

In the present study 87.7 respondents had one or more than one computer related symptoms. This observation is in conformity with Shah et al where 93.56 % software professional had one or more problems.[8] In the study done by Sjogran Rouka et al in Finland on computer operators as many as 91.85 reported one and more than one problems.[9] The study done by Manish Parsad et all reported 82.2% CVS in India on I.T professionals in Nagar Company.[10]89.9 % prevalence of

CVS was reported in study conducted Reddy SC et al in Nepal on Universities students.[11]Prevalence of CVS 81.9 % among engineering students as compared to medical students 78.6 % reported by Lograj M et al.[12]

The most prevalent visual and asthenopic symptoms are eye strain, headache and blurred vision. The study conducted by Mashigue KP et al reported eye strain and headache most prevalent among computer users. Eye strain and Headache may be caused by Long hours of work per day at the computer. blurred vision is due to temporary myopia caused by spasm of accommodation following long hours.[13] Headache was most common symptom reported by 30.9 % respondents in study of Akinbu RT.[5]The Arora et al reported in his study on software professional that 90% respondents' had severe pain in eyes and headache , 10 % had moderate condition .None of them was free from discomfort in eyes The most common ocular symptom was watery eyes in present study . Watery eyes can be associated with dry eyes in which reflex tears are produced. Ocular surface dryness stimulates the reflex of 5th and 7th cranial nerves producing tears. Reflex tears are different in composition with normal tears these are aqueous and deficient of mucin and oil they don't help in control dryness.[14]

In our study there was significant association between use of lubricants and less frequency of symptoms. According to Reddy SC et al it had also reported that use of lubricants significantly reduces the frequency of symptom. These eye drops rewet the ocular surface, contribute to tear volume and decrease the ocular surface symptoms.[11]

In Present study the 32.4 % respondents have right posture. Study conducted by Manish Parasad 34% workers had been using right posture.[10] In Present study CVS symptoms are significantly associated with posture. Study conducted by Chavda E et al reported less frequency of respondents had right posture.[15]In Present study there was significant association between exposure hours and CVS symptoms while the study conducted by Schadari Arugman showed no association between exposure hours and CVS.[7]While study conducted by Sharivastav et al visual symptoms as increase in working hours in computer .[16] Our study revealed that correction spectacles /Lenses were significantly associated eye CVS. Zairaina A Rehman also highlighted that wearing correction lenses were significantly associated with eye oproblems.[17] potential explanation of work among these using correction spectacles is because computer tasks is as type of near work that looks at letters on the screen which are formed by tiny dots called pixels, rather than a solid image .This causes the eyes which already have some corrective problem to work a bit harder to keep the images in focus.[18]

Conclusion:

87.7% of university students in Rawalpindi, Islamabad experienced symptoms related to CVS, which was seen more often in those who used computer for more than 2-3 hours continuously per day and due to the wrong posture.

References:

1. Divijak M,Bischof H, Eye blink based fatigue detection for prevention of computer vision syndrome Yokohama Japan , Mva , May 20-22, 2009: 350-353 .
2. Millidot M. Dictionary of optometry and visual sciences .4th ed.1997.
3. Eva P R , Vaughan and Asbury's General ophthalmology , 17th edition 1999 p-84.
4. American Optometric Association (Internet) Computer vision syndrome (2015). (Retrived January 2016) from http://www.aoa.org/
5. Akinbinu RT, M.J Knowledge of computer vision syndrome among computer users in the workplace in

Abuja, Nigeria. Academia journals, 2013;4(4):58-63.
6. Wimalasundera S. Computer vision syndrome Galle Med Journal Sep 2006;11(1):25-29.
7. Armugham S, Kumar K,Kumar R, Subramani R. Prevelence of computer vision syndrome among information technology Professionals working in Chennai .
World J Med Sci. 2014;1(3):312-31.
8. Shab PB , Reddy PSN , Hedge SC , stress occupational health disorder amongst computer professional IJOH 1999 : 71-73.
9. Sjogran RT , Ojajen OM, Malika E musculoskeltal symptoms and psychological functioning by gender and age on subjects with sedentary occupation 2001:42-52.
10. Parasad A, Mwagh V, Mudey A. A study of prevelnce of health problems among computer professionals in selected information technology company in Nagpur district of central India .Innovative journal of medical and health sciences , 2014;4(3): 96-98.
11. Reddy Sc et al. Original article computer vision syndrome: a study of knowledge and practices in university students , NEPJOH 2013 5(10) ,161-168 .
12. Logaraj M Madhupriya V hedge S. C.V.S and its risk factors among medical and engeenering students in Chennai Ann Med health sciences 2014;4(2) :179-185.
13. Mashigue KP , Ramparasad N , Odunton OA. A study of ergonomics factors leading to computer vision syndrome among computer users Ergonomics SA 2013 ;25(1) :3-12.
14. Arora charpe N, Kaushik V. Computer vision syndrome: Recognition and control in soft ware professionals. J Hum Eco 2009;28(1):67-69.25.
15. Chavda E , Parmar S, Parmar M. Current practice of laptop computer and related helth problems : A survey based on ergonomics .Int J Med sci Public Health .2013 ;2(4):1024-1026.
16. Shrivastava SR, Bobhate PS. Computer related health problems among software professionals in Mumbai: A cross sectional study. Int J Health sciences 2012;1:74-8.
17. Rehman Z, Sanip S. Computer user: Demographic and computer relaed factors that predispose user to get computer vision syndrome. International journal of business, Humanities and technology .2016;1(2):2011.
18. Computer Vision syndrome, 2010(online). American optometric Association Available from :http://www.aoa.org.

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ORIGINAL ARTICLE

Pharmacological Aspects and Utilization of Topical Antiglaucoma Drugs

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Abstract

Objective: To evaluate the utilization of topical antiglaucoma eye drops at a tertiary care teaching eye hospital.

Subjects and Methods: Data was obtained from computer record of the hospital and included only quantities and brand names of eye drops utilized and dispensed at main pharmacy of the hospital. The data was reorganized and rearranged by taking help from Pharma Guide Pakistan (23nd Edition, 2014-15) for active ingredients, Company name and drug group. The antiglaucoma drugs were then segregated from the whole data and then divided into six groups. All of the groups and individual drugs were analyzed with respect to their utilization pattern during three years and their pharmacological aspects were discussed and reviewed by using Google scholars and PubMed research data base. The patients who purchased eye drops from other than hospital pharmacy were excluded from this study.

Results: Amongst antiglaucoma groups fixed dose combinations (including dorzolamide HCl + Timolol maleate and Latanoprost + Timolol maleate) were utilized highest in number 49082 units {1363.4 average/month (34.70 %)} during three years, followed by Beta receptors antagonists 34045 {945.7 average/month (24.07 %)}, then alpha 2 adrenergic receptors agonists 28833 units {800.9 average/month (20.39 %)}, prostaglandin analogues 22799 units {633.3 average/month (16.12 %)} and parasympathomimetics (miotics) 4630 units {128.6 average/month (3.27 %)}. Carbonic anhydrase inhibitors were the lowest utilized antiglaucoma topical drugs 2051 units {57 average/month (1.45%)} during three years (July 2012-June 2015).

Conclusion: It was concluded that fixed dose combinations (FDC) were the most utilized antiglaucoma eye drops and amongst single drug the timolol maleate was the highest utilized antiglaucoma drug. *Al-Shifa Journal of Ophthalmology 2018; 14(1): 34-43.*

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Introduction:

Glaucoma is one of the leading cause of irreversible visual loss and blindness and responsible for approximately 15% of blindness worldwide[1]. WHO estimations indicated the world's population with elevated IOP (>21mm Hg) as 104.65 million and the number with chronic open angle glaucoma at 13.5 million[2]. Asia alone contributes for 60% of the total world glaucoma cases[3]. According to National Health Survey of Pakistan (1987-88), prevalence of blindness in Pakistan is 1.78% (2.5 millions) and glaucoma is the 4th most common cause of blindness that

accounts for 3.9% of total blinds in Pakistan[4].

Glaucoma is defined as a group of progressive optic neuropathies in which optic nerve axons are injured, cell membranes of retinal ganglion are reduced, and permanent and gradual vision loss occurs. Intraocular pressure reduction is the only effective and approved way to treat glaucoma[5]. Above 21mm Hg intra ocular pressure damage to the eye can begin[6]. Relief of the excess pressure is achieved by various types of treatments. These treatments range from drugs to surgical procedures and implants which are used to relieve the excess pressure[7].

Topical antiglaucoma drugs occupy the first place in the treatment regimen and by controlling intra ocular pressure effectively, they prevent further damage to the optic nerve. Antiglaucoma drugs lower intra ocular pressure mainly by two ways, either by increasing outflow of aqueous humor or by decreasing its production[8]. There are five groups generally used as an antiglaucoma drugs to lower the intra ocular pressure which includes β- blockers, α-agonists, parasympathomimetics (Miotics), carbonic anhydrase inhibitors (CAI's), and Prostaglandin analogues[9]. The fixed dose combinations (FDC) is considered as sixth group.

World Health Organization (WHO) has defined the drug utilization in 1977 as "the marketing, distribution, prescription and use of drugs in a society, with special emphasis on the resultant medical, social and economic consequences"[10]. To evaluate the health systems, drug utilization studies have become a very important and potential tool in the recent days[11].These studies are also used as powerful exploratory tool to assess the societal role of drugs and provide a basis for the health economics and socio-medical decisions and the data which will be obtained as a result of this type of studies may provide a crude estimation about the prevalence of disease and treatment expenditures[12]. So, it is important to audit drug utilization time to time for rational drug use, to increase the efficacy and cost effectiveness, to decrease the chances of side effects and proper feed back to the prescribers[13]. Thus, drug utilizations studies are helpful for the prescribers to get feedback and identify the problems so as to create an awareness about irrational use of drugs[14].

Since eye drops are the most frequently prescribed dosage form in ophthalmology settings and it is needed to maintain sufficient inventory as well as allocation of budget for each group of eye drops to overcome the problems of drug shortage. The drug shortage is defined by the center for drug evaluation and research (CDER), Drug shortage program of FDA as "a situation in which the total supply of all clinically interchangeable versions of an FDA regulated drug is inadequate to meet the current or projected demand at the user level"[15]. It has been indicated in a national survey that impact of shortages of drugs is very significant on finances and patient care services in hospitals[16].

As the pharmacotherapy of glaucoma is in dynamic phase now, due to the availability of new pharmacological agents, other treatment options and more clear understanding of the underlying disease pathology; the prescribers find difficulty and confusion in choosing more appropriate antiglaucoma drug from a wide variety of treatment options available[17]. So keeping in view the whole scenario and changing trends in the management of glaucoma, we have decided to conduct a data based drug utilization study of antiglaucoma eye drops and review of their pharmacological aspects for clear understanding of the efficacy and safety profile of each drug group.

The objective of this study was to evaluate the comparative utilization of antiglaucoma eye drops based upon data (3 years) obtained from IT department as well as to review their pharmacological aspects by

searching randomly selected studies on data base like Medline PubMed and Google scholar.

Subjects and Methods:

This study is based upon the data obtained from IT department of the tertiary care teaching eye hospital situated at Rawalpindi, Pakistan. The main pharmacy procures drugs from different pharmaceutical companies through procurement department and dispense to the indoor and outdoor patients as prescribed. The IT Department maintains the complete record of purchasing and dispensing. After getting formal permission from ethical therapeutic committee of the hospital, we obtained data of 3 years (From July 2012 to June 2015) from information technology department of the hospital. The data which we obtained was only the quantities of eye drops with their brand names without any information about active ingredients, company name or drug group. The data was reorganized and rearranged by taking help from a privately published quick drug reference book Pharma Guide Pakistan (23nd Edition, 2014-15) for active ingredients, Company name and drug group. After knowing the active ingredients, all of the products were placed in their respective groups. The antiglaucoma drugs were then segregated from the whole data and then divided into six groups.

1- Prostaglandin Analogues
2- Beta receptors antagonists
3- Alpha 2 adrenergic receptors agonists
4- Carbonic anhydrase inhibitors
5- Parasympathomimetics (Miotics)
6- Fixed dose combinations

The quantity of eye drops with different brand names having same active ingredients were gathered to get total quantity of a respective generic drug. Then by taking individual sum of each group and total sum of all the groups, we got total number of eye drops. Then percentage and average per month for each group was calculated. The results were tabulated, and graphs were constructed showing percentage for each drug group by using Microsoft Excel 2013. After knowing the percent utilization of each antiglaucoma drug group, individual anti-glaucoma drugs were further analyzed. All of the groups and individual drugs were comparatively analyzed with respect to their utilization pattern during three years and their pharmacological aspects were discussed and reviewed by using Google scholars and Medline PubMed research data base by searching randomly selected studies on the subject by using words like drug utilization, antiglaucoma drugs, prostaglandin analogues, beta blockers etc. The patients who purchased eye drops from other than hospital pharmacy were excluded from this study.

Results;

As shown in Table No. 1, during three years (July 2012-June 2015) total antiglaucoma eye drops (including all of the groups) utilized were 141440 (3928.9 average/month) in number. Amongst these three years highest number 52514 (37.12% of the total) were utilized in the year (July 2012-June 2013) and average per month utilization was 4376.2 eye drops. A slight decrease was shown in utilization during subsequent years as compared to first year like 44349 (31.35%) and 44577 (31.51%) during second (July 2013-June 2014) and third (July 2014-June 2015) years respectively. A negligible increase was noted in utilization during third year as compared to second year. The average per month utilization during second and third year was almost the same like 3695.8 and 3714.8 units/month respectively.

Amongst antiglaucoma groups fixed dose combinations (including dorzolamide HCl + Timolol maleate and Latanoprost + Timolol maleate) were utilized highest in number 49082 units {1363.4 average/month (34.70 %)} during three years, followed by Beta receptors

antagonists 34045 {945.7 average/month (24.07 %)}, then alpha 2 adrenergic receptors agonists 28833 units {800.9 average/month (20.39 %)}, prostaglandin analogues 22799 units {633.3 average/month (16.12 %)} and parasympathomimetics (miotics) 4630 units {128.6 average/month (3.27 %)}. Carbonic anhydrase inhibitors were the lowest utilized antiglaucoma topical drugs 2051 units {57 average/month (1.45%)} during three years (July 2012-June 2015) Fig 1.

Timolol maleate (Beta receptor antagonist), Brimonidine Tartrate (alpha 2 adrenergic receptors agonist), brinzolamide (Carbonic anhydrase inhibitor) and Pilocarpine Hydrochloride (Parasympathomimetics / miotics) were the only drugs of their respective groups that were topically used and their pattern of utilization as discussed above.

Table NO: 1 Utilization of Topical Antiglaucoma Drugs

Antiglaucoma, Miotics	2012-13	%	2013-14	%	2014-15	%	Total	%	Ave:/Month (36)
Prostaglandin Analogues	8775	16.7	7264	16.4	6760	15.2	22,799	16	633
Beta Receptors Antagonists	13189	25.1	7524	17.0	13332	29.9	34045	24.1	945.7
Alpha 2 Adrenergic Receptor Agonist	12250	23.3	9700	21.9	6883	15.4	28833	20.4	800.9
Carbonic Anhydrase Inhibitors	600	1.1	630	1.4	821	1.8	2051	1.5	57.0
Miotics	1300	2.5	2730	6.2	600	1.3	4630	3.3	128.6
Fixed Dose Combina-tion	16400	31.2	16501	37.2	16181	36.3	49082	34.7	1363.4
Total	**52,514**	100.0	**44,349**	100.0	**44,577**	100.0	**141440**	**100.0**	**3928.9**

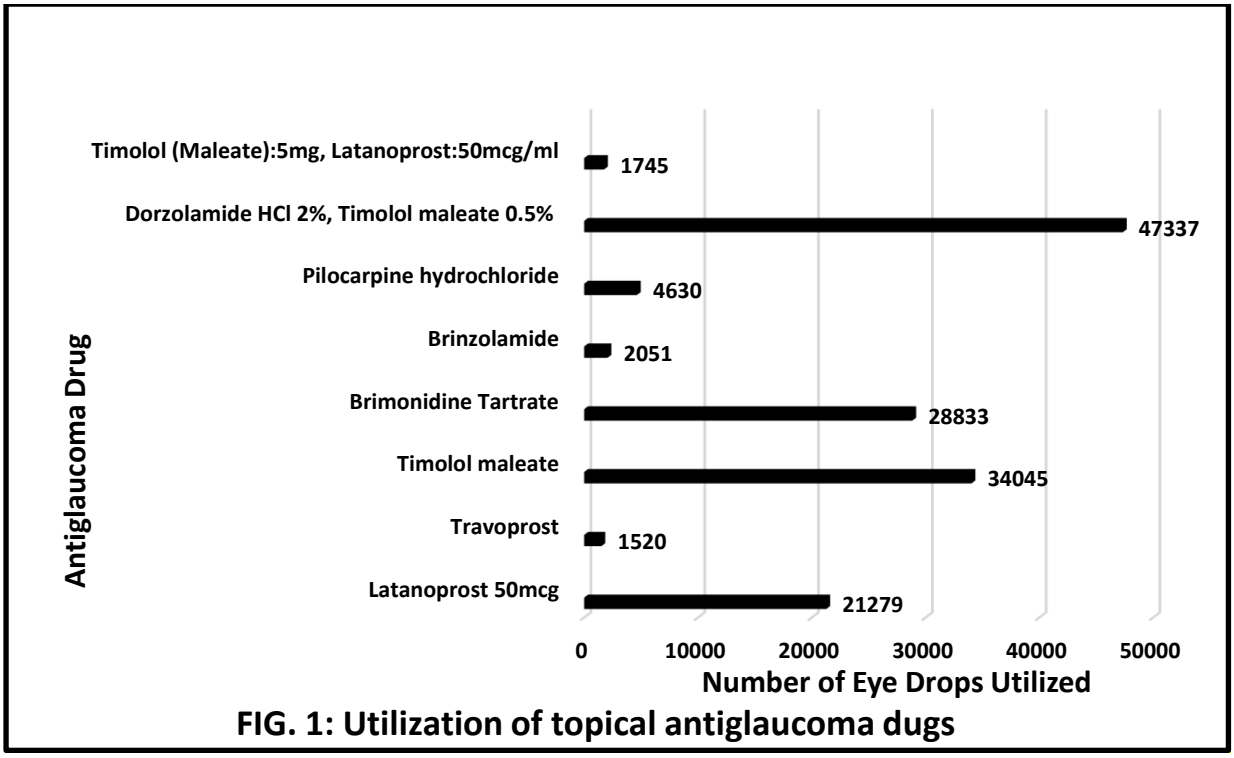

FIG. 1: Utilization of topical antiglaucoma dugs

Discussion:

Glaucoma has a very high impact on the socio-economic condition of the patients due to its effects on visual function and epidemiology. Glaucoma has high prevalence and considered as a second leading cause of irreversible blindness worldwide[18] including Pakistan. The recommendations in the management of glaucoma typically includes the usage of drugs prescribed and regular follow-ups by visiting glaucoma clinics to monitor drug's efficacy and progression of disease[19]. The limitation of our study is that, we have analyzed data of the drugs that were only dispensed from hospital pharmacy. So the slight variation in the total yearly utilization is possible because in a tertiary care teaching hospital, due to increase in patient's flow and subsequent demand of eye drops, it has become a challenge for the pharmacy management to manage and maintain proper inventory of each eye drop in accordance with the utilization and funds allocation for the purchase of sufficient quantities to overcome the problems of drug shortage at any level. So it is important to conduct drug utilization studies to obtain data regarding quality and pattern of use and the determinants and outcomes of drug use[20].

In the present study, fixed dose combination (FDC) eye drops showed highest utilization pattern (34.7%) as compared to beta blockers alone. Among them dorzolamide HCl + Timolol maleate (33.5%) was most frequently utilized eye drops. Another member of this group was latanoprost + Timolol maleate with very low utilization rate. This pattern clearly indicates that prescription trends have been changed from single beta blockers to combination therapy. It is may be due to tolerability or efficacy issues of beta blockers in controlling IOP as a single drug. On the other hand, beta blockers (Timolol maleate) showed the second most prescribed group (24.1%) of antiglaucoma drugs which means prescribers are still relying on the beta blockers besides having serious side effects like bradycardia and bronchospasm. It is because about 80% of the ocular dose absorbed by the nasal mucosa to systemic circulation after drained through nasolacrimal canal and acts

like an intravenous dose[21].As monotherapy timolol maleate is still at number 1 amongst antiglaucoma drugs. It is similar to some other studies which earlier reported the highest utilization of beta blockers specially timolol maleate[22]. Because Timolol maleate is the most cost effective topical antiglaucoma drug, ophthalmologists prescribe combination therapy intending to achieve higher reduction in IOP by following all possible mechanisms which can't be obtained by monotherapy[23]. Because of experiencing inconvenience in adjusting time of medication & increasing cost of two separate medication, it is justifiable for the higher utilization of fixed dose combination[24]. Fixed dose combination (FDC) reduces the number of bottles, number of drops per day, amount of preservatives, time for drop instillation, and cost which potentially enhance efficacy, tolerability and compliance. On the other hand, fixed dose combination has the major limitation that dose of the either drug cannot be altered within the combined product[25].

Several years ago, ocular beta blockers were introduced as an alternative to pilocarpine or epinephrine to treat glaucoma patients with relatively better efficacy and tolerability profile[26].
Ocular beta blockers like timolol, levobunolol, betaxolol, carteolol and metipranolol are preferred for the treatment of glaucoma, work by reducing intraocular pressure (IOP) are generally well tolerated and have similar efficacy. They have different pharmacological profile because of their nature and selectivity of beta receptors. They can badly affect cardiovascular and bronchopulmonary functions after getting systemic absorption in patients already suffering from heart failure, bradycardia, asthma or chronic obstructive pulmonary disease. Timolol is non-selective beta blocker while betaxolol is beta-1 selective and carteolol has intrinsic sympathomimetic activity (ISA) which support their superior tolerability profile as compared to traditional nonselective, non-ISA beta blockers[27]. To reduce the systemic absorption of the topical beta blockers, nasolacrimal occlusion or eyelid closure may be helpful. These procedures can also increase intraocular penetration of the drug and facilitate an instillation time interval between different drugs in patients using multiple medications[28].

Alpha 2 adrenergic receptor agonist (Brimonidine Tartrate) was found as third most frequently utilized group (20.4%) of antiglaucoma drugs or second most commonly utilized single drug after timolol maleate. It is similar to most of the studies conducted in India. Brimonidine is now utilized as a preferred antiglaucoma drugs because of its IOP lowering and neuroprotective role[29].Brimonidine is 1780-fold more selective for alpha2 adrenergic receptors as compared to alpha1 adrenergic receptors. It reduces IOP within 1 hour and shows peak effect at 2-3 hours after topical instillation into the eye. Its tolerability and safety profile are more favorable as compared to beta blockers and there is no contraindication in cardiopulmonary conditions[30].

Prostaglandin analogues including latanoprost & travoprost occupied the fourth place in utilization pattern in our study. Out of total 16% utilization of this group 93.3% was comprised of latanoprost. It is may be due to price difference, because latanoprost is more economical as compared to travoprost with almost same efficacy and safety profile. Now low price travoprost brands are also available which may replace latanoprost in the coming years if they prove their quality and gain the confidence of the prescribers. Based on higher efficacy, less side effects and once daily dosage, the prostaglandin analogues usage as a first line therapy for glaucoma and ocular hypertension is increasing[31]. The possible mechanism of prostaglandin

analogues is considered to increase the ocular aqueous outflow through uveoscleral pathway. Although it is not clear, but it is thought that they may bind to the ciliary body receptors and up regulate metalloproteinases which in turn remodel extracellular matrix and consequently increase the permeability of aqueous humor[32]. Once daily administration of 0.005% latanoprost exhibited superior intra ocular pressure lowering efficacy as compared to beta blocker timolol and prostaglandin analogue unoprostone and similar efficacy as exhibited by newly identified prostaglandin analogues bimatoprost and travoprost as confirmed in japan and other countries worldwide[33]. The ophthalmologist and patients, both are concerned about the conjunctival hyperemia. A result of study conducted by Robert M. Feldman at University of Texas Health Sciences Center at Houston showed the incidence of hyperemia in as many as 50% of patients treated with travoprost and as few as 5% of patients treated with latanoprost. This variation of incidence of hyperemia and intra ocular pressure lowering effect is linked with the difference of chemical structure of these drugs[34].

Chronic use of latanoprost turns the color of iris darker in 11 to 23% of patients during one year of treatment. Typically, a concentric increase of the iris pigmentation appears after 6 months of treatment[35]. Other side effects related to latanoprost are hypertrichosis of eyelashes and hyperpigmentation in the region of treatment, eyelids and periocular skin. It may also cause ocular inflammation and mild delayed uveitis[36].

The use of miotics was very less as compared to other groups. Only 3.3% of pilocarpine HCl has been utilized in our study. It reflects the clear change in prescription trends and switching from conventional therapies to more effective and safe therapies. Pilocarpine was introduced in 1870s and was the first medicine commercially utilized for the treatment of glaucoma. By stimulating the muscarinic receptors on human ciliary muscle cells, it causes the muscles contraction which results in trabecular meshwork structural changes and an increase in aqueous outflow[37].

In our study lowest utilization pattern was shown by carbonic anhydrase inhibitors. The only member of this group was brinzolamide that was utilized as 1.5%. It means prescribers are not relying on this group to be used as monotherapy or its concomitant use as compared to other groups. That is may be due to its efficacy, safety profile or cost. US FDA gave approval to brinzolamide in April 1998. It inhibits carbonic anhydrase (CA-II) reversibly & noncompetitively in the epithelium of ciliary processes and ultimately reducing the bicarbonate ions formation, which subsequently leads to sodium & fluid transport reduction and decrease in aqueous humor formation across the ciliary epithelium[38]. Less than 5% of the patients reported brinzolamide related ocular discomfort in various clinical trials and other common side effects were blurred vision and taste perversion[39]. Another member of this group, most commonly used alone or in combination with timolol maleate is dorzolamide. In our study dorzolamide was not utilized as a single drug but it was utilized as a fixed dose combination with timolol maleate as mentioned above. Several studies have shown that as monotherapy dorzolamide and brinzolamide reduces intraocular pressure by 10-26% and 15-21% respectively. Study revealed that dorzolamide showed more ocular pain, stinging and burning sensation as compared to brinzolamide[40].

Conclusion:

It was concluded that fixed dose combinations (FDC) were the most utilized antiglaucoma eye drops and amongst single

drug the timolol maleate was the highest utilized antiglaucoma drug.

It was also concluded that to investigate the prescribing habits of the prescriber, the drugs utilization research is important as it provide clear picture of pattern, quality, determinants, outcomes and efficiency of drug utilization. Such studies are also important for the management of a hospital for the allocation of budgets and for the estimation of proper usage, under or overuse of a specific drug. Pharmacy management can also take benefit of such studies to maintain proper inventory, to overcome the problems of drug shortage and to formulate drug index for the hospital. We suggest that hospital management should extend drug utilization studies to promote rational usage of drugs and to eliminate prescription errors for the long-term benefits.

References:

1. Quigley HA. Number of people with glaucoma worldwide. British Journal of Ophthalmology. 1996; 80(5):389-93.
2. Sharma R, Shastri N, Sadhotra P. β-Blockers as glaucoma therapy. JK Sci. 2007; 9:42-5.
3. Chan EWe, Li X, Tham Y-C, Liao J, Wong TY, Aung T, et al. Glaucoma in Asia: regional prevalence variations and future projections. British Journal of Ophthalmology. 2016; 100(1):78-85.
4. Babar TF, Saeed N, Masud Z, Khan MD. A two years audit of Glaucoma in Admitted patients at Hayatbad Medical Complex Peshawar. Journal of Postgraduate Medical Institute (Peshawar-Pakistan). 2011; 18(2).
5. B Toris C. Pharmacotherapies for glaucoma. Current molecular medicine. 2010; 10(9):824-40.
6. Trager SF, Blackburn GM. Treatment of glaucoma. Google Patents; 1994.
7. Wandel T. Treatment of glaucoma. Google Patents; 1998.
8. Costagliola C, dell'Omo R, Romano MR, Rinaldi M, Zeppa L, Parmeggiani F. Pharmacotherapy of intraocular pressure: part I. Parasympathomimetic, sympathomimetic and sympatholytics. Expert opinion on pharmacotherapy. 2009; 10(16):2663-77.
9. Suman RK, Deshmukh Y, Mohanty IR, Gore VS. Drug utilization studies in glaucoma patients at MGM Medical College and Hospital. International Journal of Scientific Research. 2013; 2(7):433-5.
10. Pradhan, S., et al., Drug utilization studies. National Med J India, 1988. 1: p. 185-189.
11. Laporte, J.-R., M. Porta, and D. Capella, Drug utilization studies: a tool for determining the effectiveness of drug use. British journal of clinical pharmacology, 1983. 16(3): p. 301-304.
12. Maniyar, Y., P. Bhixavatimath, and V. Akkone, A drug utilization study in the ophthalmology department of a medical college, Karnataka, India. Journal of clinical and diagnostic research, 2011. 5(1): p. 82-84.
13. Pooja Prajwal, M.R., Sharath Kumar K, Srinivas Bhat U, Drug utilization pattern in ophthalmology department at a tertiary care hospital. International research journal Of pharmacy, 2013. 4 (8)(ISSN 2230-8407): p. 205-210.
14. Sharma R, Khajuria R, Sharma P, Sadhotra P, Kapoor B, Kohli K, Sharma CL. Glaucoma therapy: prescribing pattern and cost analysis. JK Science. 2004; 6(2):88-92.
15. Griffith, M.M., et al., The impact of anti-infective drug shortages on hospitals in the United States: trends and causes. Clinical infectious diseases, 2012: p. cir954.
16. Baumer, A.M., et al., National survey of the impact of drug shortages in acute care hospitals. American journal of health-system pharmacy, 2004. 61(19): p. 2015-2022.
17. Sharma R, Khajuria R, Sharma P, Sadhotra P, Kapoor B, Kohli K, Sharma CL. Glaucoma therapy: prescribing

pattern and cost analysis. JK Science. 2004; 6(2):88-92.
18. Rossetti, L., Digiuni, M., Giovanni, M., Centofanti, M., Fea, A. M., Iester, M.,Fogagnolo, P. (2015). Blindness and Glaucoma: A Multicenter Data Review from 7 Academic Eye Clinics.PLoS ONE, 10(8), e0136632.
19. Stryker, J. E., Beck, A. D., Primo, S. A., Echt, K. V., Bundy, L., Pretorius, G. C., &Glanz, K. (2010). An Exploratory Study of Factors Influencing Glaucoma Treatment Adherence. Journal of Glaucoma, 19(1), 66–72.
20. Jadhav, P.R., V.V. Moghe, and Y.A. Deshmukh, Drug Utilization Study in Ophthalmology Outpatients at a Tertiary Care Teaching Hospital. ISRN Pharmacology, 2013. 2013: p. 768792.
21. Müller ME, van der Velde N, Krulder JW, van der Cammen TJ. Lesson of the week: Syncope and falls due to timolol eye drops. BMJ: British Medical Journal. 2006 Apr 22; 332(7547):960.
22. Sharma R, Khajuria R, Sharma P, Sadhotra P, Kapoor B, Kohli K, Sharma CL. Glaucoma therapy: Prescribing pattern and cost analysis.
23. Yadav AK, Patel V. Drug use in primary open angle glaucoma: A prospective study at a tertiary care teaching hospital. Indian journal of pharmacology. 2013 Mar; 45(2):117.
24. Rai S, Khilji S, Rao LG, Hegde P, Gonsalves SR, Shanbhag TV. Prescribing pattern and adverse events of drugs used in patients with primary open-angle glaucoma (POAG) attending a tertiary care hospital: Retrospective study. National Journal of Physiology, Pharmacy and Pharmacology. 2017; 7(2):189-93.
25. Babić N. Fixed combinations of glaucoma medications. Srpski arhiv za celokupno lekarstvo. 2015; 143(9-10):626-31.
26. Gary DN, Irving HL. The toxicity of topical ophthalmic beta blockers. Journal of Toxicology: Cutaneous and Ocular Toxicology. 1987 Jan 1; 6(4):283-97.
27. Zimmerman TJ. Topical ophthalmic beta blockers: a comparative review. Journal of Ocular Pharmacology and Therapeutics. 1993; 9(4):373-84.
28. Novack GD. Ophthalmic beta-blockers since timolol. Survey of ophthalmology. 1987 Mar 1; 31(5):307-27.
29. Sharma R, Khajuria R, Sharma P, Sadhotra P, Kapoor B, Kohli K, Sharma CL. Glaucoma therapy: Prescribing pattern and cost analysis.2004
30. Cantor LB. Brimonidine in the treatment of glaucoma and ocular hypertension. Therapeutics and clinical risk management. 2006 Dec; 2(4):337.
31. Digiuni M, Fogagnolo P, Rossetti L. A review of the use of latanoprost for glaucoma since its launch. Expert opinion on pharmacotherapy. 2012; 13(5):723-45.
32. Novack GD, O'Donnell MJ, Molloy DW. New glaucoma medications in the geriatric population: efficacy and safety. Journal of the American Geriatrics Society. 2002; 50(5):956-62.
33. Grierson I, Jonsson M, Cracknell K. Latanoprost and pigmentation. Japanese journal of ophthalmology. 2004; 48(6):602-12.
34. Feldman RM. Conjunctival hyperemia and the use of topical prostaglandins in glaucoma and ocular hypertension. Journal of ocular pharmacology and therapeutics. 2003; 19(1):23-35.
35. Wistrand PJ, Stjernschantz J, Olsson K. The incidence and time-course of latanoprost-induced iridial pigmentation as a function of eye color. Survey of ophthalmology. 1997; 41:S129-S38.
36. Johnstone MA. Hypertrichosis and increased pigmentation of eyelashes and adjacent hair in the region of the ipsilateral eyelids of patients treated with unilateral topical latanoprost. American journal of ophthalmology. 1997; 124(4):544-7.

37. Chan KB. Trends inthe Utilization of Antiglaucoma Medication: An Analysis of Canadian Drug Insurance Claims. 2014;
38. Sharma S, Trikha S, Perera SA, Aung T. Clinical effectiveness of brinzolamide 1%–brimonidine 0.2% fixed combination for primary open-angle glaucoma and ocular hypertension. Clinical ophthalmology (Auckland, NZ). 2015; 9:2201.
39. Mundorf TK, Rauchman SH, Williams RD, Notivol R, Brinzolamide/Timolol Preference Study Group. A patient preference comparison of Azarga™ (brinzolamide/timolol fixed combination) vs Cosopt® (dorzolamide/timolol fixed combination) in patients with open-angle glaucoma or ocular hypertension. Clinical ophthalmology (Auckland, NZ). 2008 Sep; 2(3):623.
40. Stewart WC, Day DG, Stewart JA, Holmes KT, Jenkins JN. Short-term ocular tolerability of dorzolamide 2% and brinzolamide 1% vs placebo in primary open-angle glaucoma and ocular hypertension subjects. Eye. 2004 Sep 1; 18(9):905-10.

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ORIGINAL ARTICLE

Pattern of Childhood Ocular Disorders in Patients Presenting at a Hospital of District Chakwal

Habiba Nisar[1], Momina Javed [1], Amna Yaqub[2], Fareeha Ambreen[3], Sohail Ahmad[4]

ABSTRACT:

Introduction: Approximately 19 million children in the world are visually impaired and 1.4 million are irreversibly blind. Common ocular disorders in 5-15 years of children include refractive error, strabismus, cataract, glaucoma, etc.

Objectives: The objective of research was to find out the pattern of various childhood ocular disorders and frequency of refractive errors of children presenting in eye department of a secondary care hospital.

Study Design and Settings: A cross sectional study conducted at a secondary care hospital in district Chakwal.

Subject and Methods: The study included 235 patients who fulfilled the inclusion criteria. Visual acuity, presence and type of refractive error were measured. Strabismus, amblyopia was also assessed. All patients were then referred to ophthalmologist for diagnosis of ocular diseases if present and noted. In case of ocular injuries, the source of injury was documented.

Results: Among patients presented in hospital of district Chakwal from October 2016 to January 2017. Females were 54.5% while 45.5% were males. Refractive errors were found in 57.1%, 24.7% had conjunctivitis / vernal keratoconjunctivitis, squint was present in 7.2%, amblyopia in 5.5% of patients. About 4.7% of children presented with ocular injuries.

Conclusion: Refractive errors followed by conjunctivitis are the most common ocular condition diagnosed in the children of 5 to 15 years of age presenting at the secondary eye care hospital in Chakwal. *Al-Shifa Journal of Ophthalmology 2018; 14(1): 44-51. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

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Introduction:

Children constitute almost one fourth of the world's population with an estimated count of 2.2 billion [1]. Approximately 19 million children in the world are visually impaired and 1.4 million are irreversibly blind [2]. Around one million of them reside in low resource areas of Asia and Africa [3]. Each year around 500,000 children become blind and in developing countries up to 60% children are believed to die within a year of losing sight [4].

There are many reasons for childhood visual impairment and childhood blindness. Causes of childhood blindness vary throughout the world and are different in poor, developing and developed countries. World Health Organization is taking active

part in the treatment and prevention of diseases. WHO's main areas of focus regarding childhood blindness are corneal blindness (70%), cataract (10-30%), retinopathy of prematurity (60%) and low vision. The treatable and preventable causes of childhood blindness are 15% and 28% respectively. The treatable causes include cataract, glaucoma and retinopathy of prematurity, uveitis, corneal diseases in children while preventable causes are corneal scaring due to vitamin A deficiency, measles, ophthalmia neonatorum and infections [5].

A study conducted in Tertiary Hospital of Karachi shows that vernal catarrh is the most common ocular disease with male preponderance [6]. Another study in Karak, Pakistan showed refractive error as most common pathology 51.62% followed by lid diseases 12.07%, spring catarrh 10.44%, trauma 7.02%, strabismus 5.47%, bacterial conjunctivitus5.22%, lens related disorders 3.16%, ptosis 1.62%, dacryocystitis 1.45%, retinal diseases 1.36% , glaucoma 0.5%, this difference can be attributed to climate and environment[7]. Childhood ophthalmic disorders are a serious threat for child's life as they have a major impact on child's education, future, communication and quality of life. About three fourth of learning of children is through vision[8]. Visual disability can have a devasting effect on child's behavior and if childhood disorders are not treated on time they will lead to permanent visual disabilities, ocular morbidities and ultimately blindness. Child's blindness not only affects the child adversely but also has an impact on the whole family.

World Health Organization (WHO) had taken an initiative which was launched in February 1999 in the form of VISION 2020; it provides guidance technical support and resources for the control of blindness in children. Major target of VISION 2020 is to reduce preventable and treatable causes which require primary level of service delivery and specialized paediatric ophthalmology units, systems for early identification, referral, follow-up, and increased public awareness respectively[9]. Pakistan is a developing country situated in Asia. Based on United Nations estimates the current population of Pakistan is about 195,323,754 and 90 million of the country's population comprises of children among which 1.5 million children are blind[10].

The aim of this study was to find out patterns of childhood ocular disorder and its effect on the visual acuity of patients being treated at the Hospital of District Chakwal, which is the largest and only government hospital having ophthalmologist in eye department. The hospital is providing services to patients of around 248 surrounding villages. The urban population of Chakwal is only 12.81% and the rest is rural among which the majority is living below poverty line[11]. According to 1998 census, population of Chakwal was 1.08 million which is expected to be increased to 1.5 million till now. The existing data present on childhood disorders in Pakistan is limited except a study done by Afghani et al[12].

Subjects and Methods:

A cross-sectional study was conducted from October 2016 to January 2017 at eye department of district hospital in Chakwal, Pakistan. Study was carried out in a secondary care eye hospital of district Chakwal which has the largest rural population in Punjab, Pakistan. Primary data was collected using structured interview-based questionnaire (annexure1). It consisted of following aspects Socio demographic variables, Presenting complaint, Ocular examination, Visual acuity and refractive error, Strabismus and amblyopic evaluation, Evaluation of source of ocular injury, Socio economic status evaluation, Number of siblings and number among siblings. Data collection tool was translated and explained in Urdu to increase the convenience for patients and to increase

the uniformity in questions asked to patients. The Study sample size was not prerecorded as we wished to include all patients visiting hospital on two specific OPD days of hospital i.e., Thursday and Saturday during October 2016 to January 2017.

The study included all patients of ages 5-15 years presenting in OPD days of eye department of district hospital Chakwal.
Inclusion criteria: Patients between ages 5-15 years.
Exclusion criteria: Post-operative patients and mentally handicapped patients.

Patients of ages 5-15 years were enrolled from OPD at specific days of week i.e., Thursday and Saturday. Chief complaint of patient was noted, and visual acuity was tested using Snellen Visual Acuity Chart by Optometrist which was recorded. Objective/subjective refraction was performed according to patients need and age by Optometrist using Cyclopentolate (for relaxation of accommodation), Snellen Acuity Chart, trial frame and trial box and type of refractive error was noted. Slit Lamp Bio-microscopy and Ophthalmoscopy was conducted by an Ophthalmologist to check anterior and posterior segment of eye. If any significant pathology was observed by ophthalmologist that was recorded. In case of any ocular injury, the source of injury was also recorded. Informed consent was taken. Questionnaire was filled by asking questions to patients or their care-givers.

Prevalence of refractive error, cases of ocular injuries and type of ocular disorders presented in hospital of district Chakwal were the outcome variables. Age, gender, socioeconomic status, education of the patient, education of father, education of mother, source of income, income range, monthly expenditures, area of living, number of siblings, number among siblings were independent variables.

Data was entered in SPSS V.17 for analysis. Before data analysis, data was cleaned by generating frequencies and any error in the data was corrected by rechecking the questionnaires. Data transformation was also done and converted continuous variables into categorical variables. Data analysis was done in two phases, descriptive analysis followed by inferential statistics.

Descriptive statistics were generated for all variables. Categorical data was presented in the form of frequencies and percentages. Valid percentages were reported in variables with missing numbers. Mean standard deviation was reported for continuous variables. Data transformations were carried out to convert the continuous variables into categories for statistical analysis. Data transformations were done for age, monthly income, patient's education, father and mother's education.

Chi square test for independence was used for finding association between outcome variable and independent variable. The test was applied on all applicable independent variables and outcome variables. A significance level of 5% was used for all inferential statistics.

Before formal data collection, approval was taken from the Institutional Review Board, Pakistan Institute of Ophthalmology (IRB). Permission was taken from the Medical Superintendent and Head of Eye department of respective hospital.

Results:

A total of 235 patients, participated in this study among the patients presented at eye department of a secondary care hospital during October 2016 to January 2017. Among them 107 (45.5%) were males and 128 (54.5%) were females. Majority of patients presented at OPD were from surrounding rural areas i.e., 169 (71.9%) and 66 (28.1%) were from urban area. The mean age of patients was 11 years (standard

deviation 3.13) ranging from 5 to 15 years of age. Details of other socio demographic characteristics of the patients are shown in table 1.

Out of 235 patients, 28 (11.9%) had complaint of watering, 25 (10.6%) had complaint of redness and 134 (57.0%) had presented with complaint of decreased visual acuity while 48 (20.4%) had other chief complaints which include pain, headache etc.

Presenting visual acuity of both right and left eyes of patients was assessed in this study. A huge number of patients i.e., 62.1% had visual acuity 6/18 to 6/6 in right and left eyes, 32.34% had visual acuity 6/60 to 6/24 in both eyes while 5.1% had visual acuity count finger (CF) in right and 5.53% had count finger in left eye. There were 87 (37.02%) patients who had refractive errors while 47 (20%) coexisted with other ocular findings. So, the sum of both is 134 (57.02%) among them 81 (60.44%) were myopic, 27 (20.14%) were hypermetropes, while 26(19.4%) had astigmatism.

A relationship between refractive error and independent variables had been found using chi square(X^2) which shows that there was significant association between refractive error with gender and father's education status while there was no association found between monthly income, working status of father, mother's education, patient's education, living status and age details are shown in Table 2.

A total of 235 patients were classified according to major ocular findings present in them. In which, the most common being refractive error is 87(37.02%) and ocular pathologies 72 (30.6%), while other ocular findings are present in small fraction of patients.

Among 235 patients, number of cases of trauma were 12 (5.1%) out of which 2 (0.8%) of them had trauma without any associated ocular findings, while 10 (4.2%) had associated pathologies which were because of ocular trauma. The sources of ocular trauma varied as pen (1.3%), ball (0.9%), stone (1.3%), fist (0.4%), metal (0.9%) and wood (0.4%). A p value of >0.05 shows the association is significant which was not found in any case so it is obvious that there's no significant relationship between ocular injury, gender, living area, age, patient's education, father's education, mother's education, monthly income and father's working status.

Major diagnosis of squint was reported in 10(4.2%) patients and amblyopia was present without any other finding in 1(0.4%) patient. While squint related to other ocular findings was 17(7.2%) and amblyopia related with other findings was 12(5.1%) out of total patients N=235.

Table 1: Socio-demographic Characteristics

Sociodemographic Characteristics	Frequency N=235	Percentages (%)
Gender		
Male	107	45.5
Female	128	54.5
Age		
5-10	89	37.87
11-15	146	62.1
Education of patient		
Illiterate	5	2.1
Quran/madrassah	11	4.7
Upto primary	109	46.4
Upto secondary	95	40.4
Matric	15	6.38
Area of living		
Rural	169	71.9
Urban	66	28.1
Monthly income of patients' family		
500<-10,000	73	31
11,000-20,000	100	42.5
21,000-30,000	37	15.7
31,000-40,000	15	6.4
More than 40,000	10	4.3
Father working status		
Unemployed	7	3
Govt employee	51	21.7
Non-govt employee	52	22.1
Farmer/labourer	73	31.1
Driver	9	3.8
Home-maker	9	3.8
Retired	23	9.8
Deceased	11	4.5
Number of siblings		
1-3	98	41.7
4-6	124	52.8
7-9	13	5.6

Table: 2 Relation of refractive error with independent variables

	Refractive Error		χ^2(df)	P value
	YES	NO		
Gender				
Male	4,945.8%	5,854.2%	**10.103(1)**	**0.001**
Female	8,566.4%	4,333.6%		
Living Status				
Rural	9,355.01%	7,645.01 %	**0.974(1)**	**0.324**
Urban	4,162.1%	2,537.9%		
Age				
5-8	2,953.7%	2,546.3%	**3.918(2)**	**0.141**
9-12	4,350.6%	4,249.4%		
13-15	6,264.6%	3,435.4%		

Table:3 Description of multiple ocular findings

OCULAR FINDINGS COMBINATION	FREQUENCY N*	PERCENGE %
Refractive error and ocular pathology	17	26.9
Refractive error and Amblyopia	12	19.04
Refractive error and Squint	11	17.4
Refractive error, amblyopia and Squint	6	9.5
Refractive error and Trauma	1	1.5
Ocular pathology and Amblyopia	0	0
Ocular pathology and Squint	6	9.5
Ocular pathology, amblyopia and squint	1	1.5
Ocular pathology and Trauma	9	14.2

*N=63 total number of patients with multiple ocular findings

Ocularpathology=cataract,glaucoma, stye, chlazion, blepharitis, trachoma, conjunctivitis / vkc, convergence insufficiency, corneal opacity / erosion, sub-conjuctival hemorrhage, optic atrophy, orbital cellulitis, stargardts disease, cone rod dystrophy.

Discussion:

This study reveals a slight female preponderance which was 54.5% and male were 45.5%. These findings are in agreement with the study of Farrukh et al. where male were 48% and female were 52%[13]. However, our findings are in contrast with a study conducted at eye department of Khyber Teaching Hospital, Peshawar where male patients were more than females in percentages of 68.9% and 31.1% respectively[14]. This can be due to many socio-economic factors of our society. Majority of patients (71.9 %) visiting eye department of district hospitals were from rural areas while a small number 28.1% belong to urban area which suggests that people from urban area do not prefer to visit government hospital but there is no other choice for people from rural areas due to lack of awareness or poverty. A few of patients i.e., 6.8% were illiterate while a large number 86.8% of presenting patients were studying in primary to middle.

Uncorrected refractive errors have a direct effect on learning capabilities of the children and their education. According to a study refractive errors are third largest cause of curable blindness in Pakistan. Most frequently reported disease in our study was refractive errors 57.1% which was near to 62.9% children, as reported by Iqbal Y. et al [15]. There were 72.8% females with myopia while 27.2% males were presented who had myopia, the high number of myopia in females can be because females are engaged in reading and writing activities while males are involved in outdoor activities. There was a statistically significant ($p<0.05$) female preponderance is similar to a previous report, suggesting that young females tend to report visual problems more than males. While there was no significant relationship with area of living, monthly income and refractive error.

After refractive error, Conjunctivitis/vernal kerato-conjunctivitis were the major ocular findings reported in 24.7% patients. Although vernal or allergic conjunctivitis is not usually cause of blindness except with complications. VKC was observed to be more common among individuals of Asian and African origin, with varying prevalence among the different ethnic groups suggested as being due to genetic factors[16].

Corneal opacity or corneal erosion was found out to be 1.3% while 0.9% cases of sub-conjunctival hemorrhage and only 1 case i.e., 0.4% prevalence of trachoma were found. The low prevalence of trachoma was due to the reason that trachoma is mainly found in people living in below than average living standards and their main problem is money not health. Eye injuries remain a major cause of unilateral visual impairment worldwide and a common cause of non-congenital unilateral blindness. Children are particularly at risk of ocular injury due to their decreased ability to detect and avoid potential hazards. Most childhood eye injuries are sustained during unsupervised play and domestic activities. The prevalence of eye injuries reported in our study was 4.7% while another study at Sindh Govt. trauma accounts for 9.6% cases[17]. There was no significant association $p<0.05$ found between ocular injury with age, gender, area of living, monthly income etc.

References:

1. The State of the World's Children 2014 in Numbers [Internet]. [cited 2017 Mar 12]. Available from: https://www.unicef.org/sowc2014/numbers/
2. WHO | Visual impairment and blindness. WHO. 2016;
3. Prevalence of blindness in Africa and Asia. Available from: World health organization: Preventing blindness in children. Report of WHOIAPB scientific meeting. 2000, Geneva: WHO/PBL/00.77, 9-
4. Omolas CO, Aina AS, Omolase BO, Omolade EO. Causes of blindness and

visual impairment at the school for the blind Owo, Nigeria. Annals of Ibadan postgraduate medicine. 2008; 6(1):49-52.
5. Gogate P, Kishore H, Dole K, Shetty J, Gilbert C, Ranade S, Kumar M, Srihari, Deshpande M. The pattern of childhood blindness in Karnataka, South India. Ophthalmic epidemiology. 2009 Jul 22;16(4):212-7.
6. Khatri B, Kashif A. Pattern of common eye diseases in children in a tertiary eye hospital, Karachi. Pak J Ophthalmol. 2014 Oct;30:193-8.
7. Alam M. Ocular diseases among school age children presenting at District Head Quarter Hospital Karak. Al-Shifa J Ophthalmol Jul 2010;6(2):68-73
8. Demissie BS, Demissie ES. Patterns of eye diseases in children visiting a tertiary teaching hospital: South-western Ethiopia. Ethiopian journal of health sciences. 2014;24(1):69-74.
9. World Health Organization. Global Initiative for the Elimination of Avoidable Blindness: action plan 2006-2011.
10. Worldometers. "world population." Worldometers.info. January 2017. http://www.worldometers.info/world-population/ [cited 2017 Feb 22]. Available from: http://www.worldometers.info/world-population/pakistanpopulation/
11. Chakwal district [Internet]. [cited 2016 Sep 20]. Available from: http://www.dawn.com/news/1011057/chakwal-district-falls-into-pml-ns-fold
12. Afghani T, Vine HA, Bhatti A, Qadir MS, Akhtar J, Tehzib M. Al-Shifa-Al-Noor (ASAN) refractive error study of one million school children. Pak J Ophthalmol. 2003 Oct;19(4):101-7.
13. Farrukh S, Atif MA, Klasra AH, Ali M. Pattern of Pediatric Eye Diseases. Pakistan Journal of Ophthalmology. 2015 Sep 30;31(3):147-50.
14. Fatima K, Shahid E, Shaikh A. Frequency of Common Eye Diseases in Pediatric Outpatient Department of A Tertiary Care Hospital. Pakistan Journal of Ophthalmology. 2015 Sep 30;31(3):154-7..
15. Iqbal Y, Niazi FK, Niazi MA. Frequency of Eye Diseases in School Age Children. Pak J Ophthalmol. 2009;25: 185-90.
16. G. Montan P, Ekström K, Hedlin G, Hage-Hamsten MV, Hjern A, Herrmann B. Vernal keratoconjunctivitis in a Stockholm ophthalmic centre-epidemiological, functional, and immunologic investigations. Acta Ophthalmologica Scandinavica. 1999 Oct;77(5):559-63.
17. Mahdi Z, Munami S, Shaikh ZA, Awan H, Wahab S. Pattern of eye diseases in children at secondary level eye department in Karachi. Pak J Ophthalmol. 2006;22:145-51.

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CASE REPORT

Bilateral Optic Nerve Aplasia in a Pre-School Child

Aziz Jan Bashir[1], Zeeshan Khan Oozeerkhan[1], Mohamud Walid Peerbux[1]

Abstract:
A 4-year-old girl was presented to the Vitreoretina OPD of Al-Shifa Trust Eye Hospital with absence of vision since birth. Her pupils were mid-dilated and non-reacting to light. Ultra-sonography showed clear vitreous with flat retina in each eye. Examination under anaesthesia revealed no anterior segment abnormalities, but the posterior segment showed absence of optic discs, retinal vasculature with prominence of choroidal vessels. Her cycloplegic refraction was +4.0 D in both eyes. Her OCT showed absence of the retinal ganglion cell layer. A neurological examination was done in a tertiary care hospital and showed normal milestones of development. After adequate consultation, an MRI was not deemed necessary for this child. Her parents were carefully counseled about the condition and she is now on regular 6 monthly follow ups in our Low Vision Clinic. *Al-Shifa Journal of Ophthalmology 2018; 14(1): 52-56.*

Background:

Optic disc aplasia (ODA) or optic nerve aplasia (ONA) is a very rare inborn neurological abnormality that occurs sporadically, isolated, or with various systemic ocular, neurological and even systemic abnormalities. It can be unilateral or bilateral. Some literature reviews have perceived that CNS malformations are commonly associated with bilateral cases [1-3]. Associated ocular findings are microphthalmos (most common), enophthalmos, ptosis, strabismus, microcornea, trabeculodysgenesis, embryotoxon, iris hypoplasia, iris coloboma, aniridia, persistent hyperplastic primary vitreous, retinal neovascularisation [3-8].

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Some cases of optic hypoplasia have been misdiagnosed as aplasia [9]. True ODA shows complete absence of optic discs, retinal vasculature and a decreased neurosensory thickness on OCT which is due to absence of the ganglion cell layer.
On ophthalmoscopic examination, ODA may take on any of the following appearances:
1. Absence of a normally defined optic nerve head, without retinal blood vessels and with an absence of macular differentiation;
2. A whitish area corresponding to the optic disc, with neither retinal blood vessels nor macular differentiation;
3. A deep avascular cavity at the location corresponding to the optic disc, surrounded by a white ring.

Case Presentation:

A 4-year-old girl was presented to the Vitreoretina OPD of Al-Shifa Trust Eye Hospital with vision being NPL (nil perception of light). General examination of the subject showed a well-rested child, very responsive to verbal commands by both parents and ability to maintain a straight gait while walking with the parents'

assistance; she also made adequate verbal response to her parents' commands. Her pupils were mid-dilated and non-responsive to light, and there was no ocular deviation. B scan ultrasonography showed a normal posterior segment echoes, and a less than normal optic nerve shadow, arising suspicion of pathology of neurological origin (Fig No. 1). Examination under general anaesthesia (EUA) was scheduled for the following week; in the meantime, a pediatric and neurological evaluation was advised and done revealing normal physical, developmental and neurological achievements as compared to other children of the same age group. Selected blood tests were advised (TORCH and Brucella serology), but the results came back negative. The EUA later showed bilateral corneal diameter of 10 mm, anterior segment was unremarkable. The posterior segment on the other hand showed complete absence of optic discs and retinal vasculature (Fig No. 2 and 3). Her retinoscopy showed a refraction of +4.0 D in both eyes. There was an abnormal foveal reflex which was appreciated in both eyes despite the tessellated choroidal vessels. An OCT of the macular area was warranted which demonstrated general retinal thinning and the absence of the retinal ganglion cell layer and confirmed that there was eventually no foveal depression (Fig No. 4). No abnormal bony deformity was noted on X-ray of the skull and orbits. The parents were counseled about the reality of the visual prognosis of their child and the lifestyle expectations. Regular 6 monthly visits in the Low Vision Clinic are being maintained to the best of our knowledge.

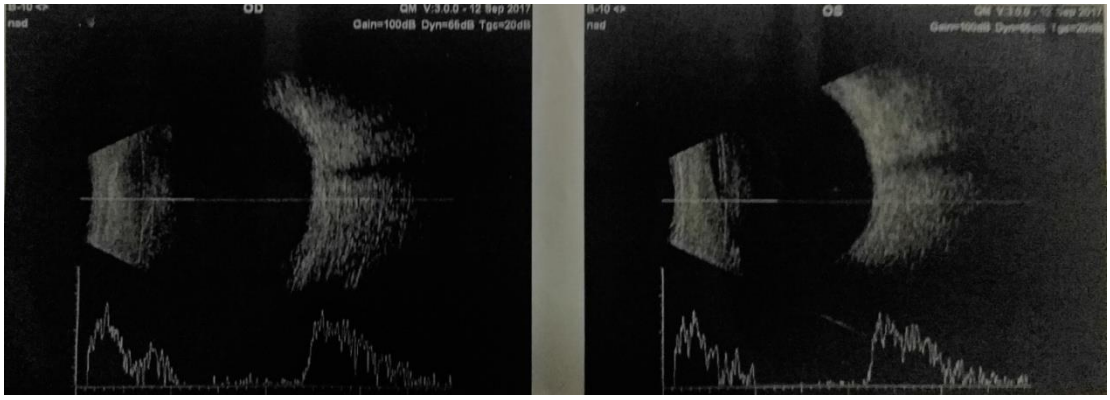

Fig No. 1: B-Scan USG demonstrating a normal posterior segment echoes, and a less than normal optic nerve shadow

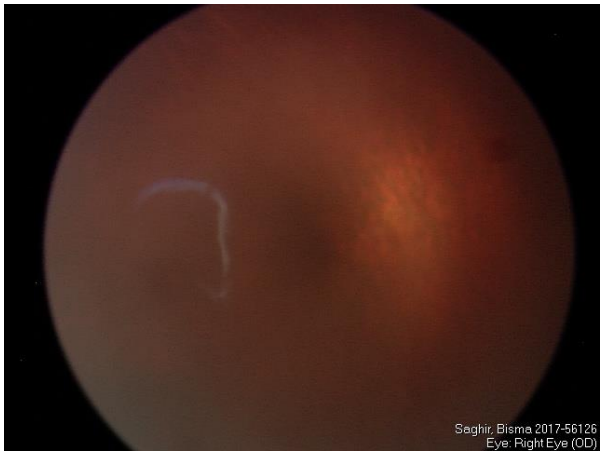

Fig No. 2: Right fundus showing complete absence of optic discs and retinal vasculature

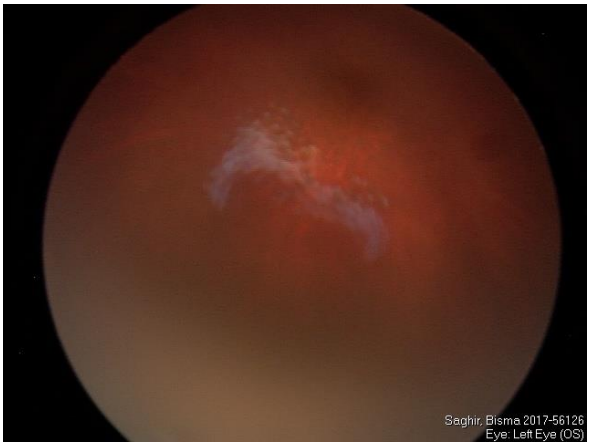

Fig No. 3: Left Fundus showing complete absence of optic discs and retinal vasculature

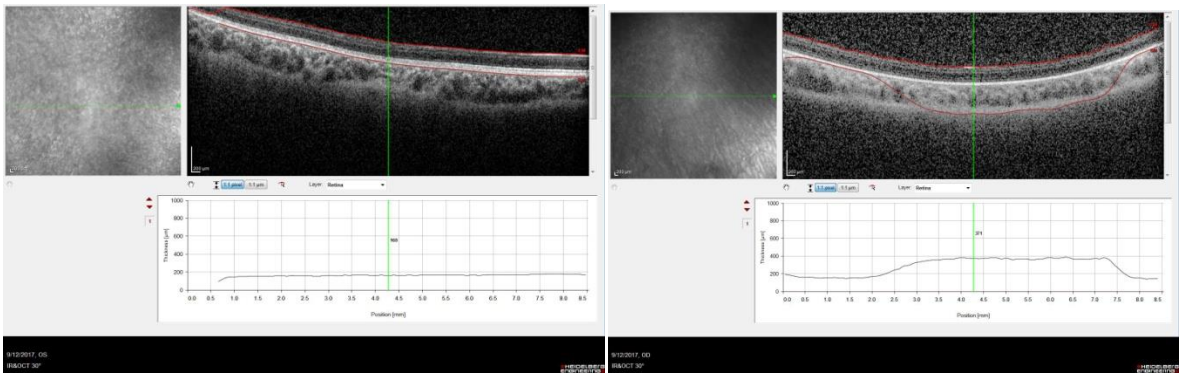

Fig No. 4: OCT Macula of Right and Left Eye showing absence foveal depression

Discussion:

Optic nerve aplasia is a very rare and untreatable inborn and non-hereditable maldevelopment of the anterior optic pathways. More cases show unilaterality over bilateral involvement and commonly associated with a multitude of different ocular findings, microphthalmos being the most common [1,2]. The other ocular findings which occurred in a multitude of patients are: enophthalmos, ptosis, strabismus (commonly esodeviation), microcornea, trabeculodysgenesis, embryotoxon, iris hypoplasia, iris coloboma, aniridia, persistent hyperplastic primary vitreous, retinal neovascularisation. Other rarer findings would include anterior and posterior staphyloma, retinal dysplasia, microphakia, cataract and corneal stromal hypoplasia[3-8]. While others have concurred with neuroimaging that there are associated central nervous system defect (hydrancephaly, pituitary abnormality, platycephaly) [1-3], this particular case did not pursue a MRI scan because after careful consideration of the low socioeconomic background of the family and analyzing the pediatrician's and neurologist's reports we voted to defer the neuroimaging for later. It is wise to say that a MRI scan of the brain, orbit and optic pathway is a must for all children with optic nerve aplasia and hypoplasia. Scott et al, Sanjari et al and Kumar et al have reported normal MRI-documented neuroanatomy in their respective case reports [10, 11]. Tang et al even reported normal optic tracs and optic radiation [12].

Up to this day, no gender or sexual bias has been noted. Thorough antenatal history of

the parents is usually relatively uneventful. Environmental factors have been related as possible causative agents in certain cases. Ginseng et al reported a viral-like illness in the first trimester; Barry et al saw acetone and cigarette exposure as positive points in pre-natal history [13,14].

Meire et al reported 2 related cases that showed a possible familial relation [15], and Behrens-Baumann et al suspected an autosomal recessive pattern since he found 2 cases of oculocerebral dysplasia in a brother and sister with healthy parents [16].

Conclusion / Recommendations:

Optic disc/nerve aplasia is a very rare entity without any treatment or visual rehabilitation. Once diagnosed the ophthalmologist must investigate for other ocular pathologies and further look into the possibility of cerebral defects. Hence MRI scan of brain and orbit is of paramount importance. The parents must be counseled adequately about the reality they will be dealing with, but that they should not give up hope of the child pursuing studies in school and centers focused on special education. Regular follow-ups with the concerned doctors besides the ophthalmologists are imperative for the well-being and development of a blind child.

References:

1. Storm R, PeBenito R. Bilateral optic nerve aplasia associated with hydranencephaly. Ann Ophthalmol. 1984;16988–992.
2. Brodsky M C, Atreides S P, Fowlkes J L. et al Optic nerve aplasia in an infant with congenital hypopituitarism and posterior pituitary ectopia. Arch Ophthalmol. 2004;122125–126.
3. Khandgave T, Kulkarni V, Muzumdar D, Puthran N. Bilateral optic nerve aplasia: A rare isolated central nervous system anomaly. Middle East African Journal of Ophthalmology. 2014;21(3):262.
4. Cavallini G, Forlini M, Gramajo A, Brombin A, Torlai G, et al. Optic Nerve Aplasia and Microphthalmos: A Case Report. J Genet Syndr Gene Ther. 2013;4:175.
5. Stankovic-Babic G, Oros A, Cekic S, Vujanovic M, Babic R. Unilateral optic nerve aplasia associated with microphthalmos. Vojnosanitetskipregled. 2012;69(3):286-290.
6. Lee B, Bateman J, Schwartz S. Posterior segment neovascularization associated with optic nerve aplasia. Am J Ophthalmol. 1996;122:131–133.
7. Brodsky M. Anomalies of the optic disc. In: Miller NR, Newman NJ editors. Walsh and Hoyt`s Clinical Neuro Ophthalmology. 5ed., Vol. 1. Baltimore: Williams and Wilkins; 1998. p. 799-800.
8. Brodsky M. Congenital optic disc anomalies. In: Taylor D, Hoyt G, editors. Pediatric Ophthalmology and Strabismus. 3ed. Baltimore: Elsevier-Saunders; 2005. p. 637-8
9. Little L, Whitmore P, Wells T. Aplasia of the optic nerve. J PediatrOphthalmol. 1976; 13: 84-88.
10. Scott I , Warman R, Altman N. Bilateral aplasia of the optic nerves, chiasm and tracts in an otherwise healthy infant. Am J Ophthalmol. 1997;124409–410.
11. Sanjari M, GhasemiFalavarjani K, Parvaresh M, Kharazi H, Kashkooli M. Bilateral aplasia of the optic nerve, chiasm, and tracts in an otherwise healthy infant. Br J Ophthalmol.2006;90: 513-514.
12. Tang D, Man E, Cheng S. Aplasia of the optic nerve. Hong Kong Medical Journal. 2015;366-368.
13. Barry DR.Aplasia of the optic nerves. IntOphthalmol. 1985;7: 235-242.
14. Ginsberg J, Bove K, Cuesta M. Aplasia of the optic nerve with aniridia. Ann Ophthalmol. 1980;12: 433-439.

15. Meire F, Delpierre I, Brachet C, Roulez F, Van Nechel C, et al. Nonsyndromic bilateral and unilateral optic nerve aplasia: first familial occurrence and potential implication of CYP26A1 and CYP26C1 genes. Mol Vis.2011;17: 2072-2079.

16. Behrens-Baumann W, Dust G, Rittmeier K, Langenbeck U, Vogel M. Oculo-cerebral dysplasia: aplasia of the optic nerve with familial microphthalmos and cryptophthalmus. Clinical and computer tomography study. KlinMonblAugenheilkd. 1981;179: 90-93.

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