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structure i.e. in 1850(38.54%)children, followed by NLD blockage involving 1040(21.66%) children. Refractive errors were detected in 775(16.14%) children while disorders of lens accounted for 607(12.64%).

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Vision Related Quality of Life Among Keratoconus Patients and Factors Affecting the Quality 201
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This cross-sectional study was conducted on 312 keratoconus patients out of which 109 had undergone corneal cross linkage (CXL) surgery. Convenient non-randomized sampling technique was used for selection of sample. Data were collected by using reliable scale of NEI VFQ-25. Vision related quality of life was found to be good in 51% patients while 35% respondents said that they remained worry about their eye sight most of the time. Visual acuity, education status, CXL surgery and type of CXL showed significant association with VQOL ($p < 0.05$).

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Recent Advances in Pharmacological Therapy of Glaucoma

Mahmood Ali

Glaucoma is the leading cause of irreversible blindness worldwide with an estimated global prevalence of 60.5 million people, affected by primary open-angle glaucoma and primary angle-closure glaucoma, in 2010¹. The total number of people, aged 40-80 years, with glaucoma was estimated to be 64.3 million, in 2013. Asia alone accounted for approximately 60% of the world's total glaucoma cases followed by Africa, contributing 13% of cases².

The recommendations in the management of glaucoma typically includes usage of drugs to lower the intraocular pressure (IOP), and regular follow-ups at clinics to monitor drug's efficacy and progression of disease. Other treatment modalities include laser and or surgery. Large clinical studies have shown that, with reduction in IOP, optic disc damage and progressive visual loss can be slowed.

There are five groups generally used as antiglaucoma drugs, which include β -blockers, α -agonists, parasympathomimetics (miotics), carbonic anhydrase inhibitors (CAI's), and prostaglandin analogues³. Many patients require more than one drug to control IOP, but unfortunately, they don't work for all patients. Clinical trials are underway for the discovery of new drugs, and, if successful, these drugs will greatly expand the glaucoma armamentarium that ophthalmologists require.

One such example of drugs is the Rho kinase (ROCK) inhibitors, a novel potential class of glaucoma therapeutics, proposed to act specifically on the target cells in the trabecular meshwork resulting in

enhancement of aqueous humor outflow. These agents work by relaxing the trabecular meshwork through inhibition of the actin cytoskeleton contractile tone of smooth muscle. This results in increased aqueous outflow directly through the trabecular meshwork, achieving lower intraocular pressures in a range similar to prostaglandins⁴. Recently, FDA has approved Rhopressa® (netarsudil ophthalmic solution 0.02%) for the lowering of elevated IOP in patients with open-angle glaucoma or ocular hypertension.

ROCK signaling regulates a wide spectrum of fundamental cellular events, including cell adhesion, motility, proliferation, differentiation, and apoptosis. Previous studies, found that ROCK inhibitors reduce IOP via a direct effect on the conventional aqueous outflow pathway, by regulation of contractile properties, fibrotic activity, and permeability of the trabecular meshwork and Schlemm's canal tissues, influencing extracellular matrix production. Moreover, long-term treatment also exerted an additional IOP-lowering effect, especially in ocular hypertension, suggesting that late-onset remodeling of the extracellular matrix may elicit mild and delayed changes in IOP. Additionally, ROCK inhibitors have shown several beneficial effects, including increased retinal perfusion, neuroprotection against various types of stress, and regulation of wound healing; these benefits may potentially be helpful in glaucoma management^{5,6}.

FDA has also approved the New Drug Application (NDA) for Vyzulta (latanoprostene bunod ophthalmic solution 0.024%), a nitric oxide-donating

prostaglandin F2-a analogue, indicated for the reduction of IOP in patients with open-angle glaucoma or ocular hypertension. Latanoprostene bunod is a dual mechanism molecule, which increases aqueous outflow through both unconventional and conventional pathway. It consists of latanoprost acid, which enhances uveoscleral outflow by up regulating matrix metalloproteinase expression. The enhancement of trabecular meshwork / Schlemm's canal outflow is linked to an NO-donating moiety, which causes remodeling of the ciliary muscle's extracellular matrix, by inducing cytoskeletal relaxation via the soluble guanylyl cyclase-cyclic guanosine monophosphate (sGC-cGMP) signaling pathway⁷. In various clinical trials, once-daily latanoprostene bunod 0.024% reduced IOP significantly more than latanoprost with comparable side effects^{8,9}.

Another drug, Trabodenoson (Inotek Pharmaceuticals), is currently in phase III clinical studies. Trabodenoson, an adenosine mimetic agent, acts by stimulating the A1 adenosine receptor in the trabecular meshwork. This stimulation leads to an upregulation of proteases, which work by digesting and removing accumulated proteins that impair the flow of aqueous humor. In phase II trials the IOP-reduction efficacy of trabodenoson was in the range of the prostaglandins and was sustained over time¹⁰.

These recent overtures have offered promising technological advances and in parallel, towering incursions have been made to understand the neurobiological basis of glaucoma. Recent clinical studies have also inexorably validated their immense potential in improving outcomes and paring down of the side effects associated with current medicines. The dearth of new innovative products in the treatment of glaucoma offer momentous opportunities and titanic challenges for the decades to come.

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Exploring Astigmatism and Visual Functions in Amblyopic Children

Sana Azam¹, Hina Sharif², Shadab Hassan¹

Abstract:

Objectives: To explore different types of astigmatism and levels of visual functions in amblyopic children. Also, to determine relationship of Astigmatism with color vision, stereoacuity and contrast.

Subjects and Methods: Cross-sectional study conducted at Pediatric Department of Al-Shifa Trust and Eye Hospital Rawalpindi with 150 children who were follow up cases of astigmatic amblyopia selected by convenient sampling.

Results: The most common type of astigmatism was Simple Myopic (33.3%) followed by Mixed Astigmatism (32.7%). Reduced stereopsis was more common in Simple Myopic astigmatism (14%) than other types of astigmatism by using TNO test for stereoacuity. About 88% of participants had stereopsis ranging from 1.80-2.25 with Pelli-Robson contrast chart. The same levels of contrast were reported in majority of Mixed Astigmatism (31%). Color vision was found normal in almost 87.3% of participants. Astigmatism showed a statistically significant relationship with amblyopia with p-value < 0.05. Stereoacuity and contrast both were found statistically related to type of astigmatism (p-value < 0.05). Colour Vision had no statistically significant relation with type of astigmatism (p-value > 0.05).

Conclusion: The most common types of astigmatism found in amblyopic children were Simple Myopic and Mixed Astigmatism. Visual functions were found more affected in Simple Myopic Astigmatism and least affected in Mixed Astigmatism. So there is a need for earlier and aggressive correction of astigmatism and to enhance the compliance with given treatment. *Al-Shifa Journal of Ophthalmology 2017; 13(4): 166-73. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

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Introduction:

Astigmatism is derived from a Greek letter 'astigma' meaning absence of point, so astigmatism is absence of point focus on retina inducing blur image due to formation of line foci. Physiological astigmatism is present in majority of population but it rarely causes any symptoms so it remains undetected. Almost 8-10% of population has astigmatism $\geq 1D$ which is significant to cause symptoms. An uncorrected astigmatic error of even 1D can cause significant deterioration in vision and if not corrected may affect quality of life by impairing visual functions¹. It is found that earlier correction of astigmatism gives better visual acuity and at the same time reduces the risk of refractive amblyopia².

Amblyopia, commonly known as Lazy Eye which may be a consequence of astigmatism because in astigmatism vision suffers in both near and distance ³. Amblyopia is main cause of visual deficit in children ⁴. The term Meridional Amblyopia is also associated with astigmatism. This type is most commonly observed in myopic and mixed astigmatism and can badly affects visual functions⁵. There are also evidences of reduced contrast in astigmatic amblyopes ⁶. At the same time, it affects stereopsis ⁷. Astigmatism should be corrected as earlier as possible in order to avoid all these serious consequences.

The objective of this study was to find out different type of astigmatism in amblyopic children and to determine level of visual functions in astigmatic amblyopes.

Subjects and Methods:

A cross-sectional study was conducted from 1st October 2016 to 31st January 2017 in Pediatric Department of Al-Shifa Trust Eye Hospital Rawalpindi. A sample of 150 patients was taken by considering amblyopic population as 2230, reported in one year at hospital setting and prevalence as 50%. The sampling technique was non-random convenient sampling. All patients with ages 5-15years having Best Corrected Visual Acuity (BCVA) of less than 6/9 in

either eye and having astigmatism of >1.5 DC were included. Cases with squint, ocular trauma, ocular pathologies and post-operative eyes were excluded.

A structured questionnaire was developed and pilot testing was done. Later it was administrated to all follow up amblyopes to collect data after recording Best Corrected Visual Acuity using ETDRS chart. Moreover, contrast was measured by using Pelli-Robson chart. TNO and PV-16 were used for determination of levels of stereopsis and colour vision respectively. Data analysis was done by using SPSS version 17. Descriptive statistics with number and percentages were used to report qualitative variables. Association of astigmatism with amblyopia and reduced visual functions was found by fisher's exact test with p-value <0.05 as significant.

Results:

PARTICIPANTS' INFORMATION:

A total of 150 patients participated in the study. Both the genders male (N=76, 50.7%) and female (N=74, 49.3%) were almost equal in proportion in our sample. Mean age of participants was 9.51 years (SD=2.996) ranging from 5-15 years. A proportion of 26.7% parents had bachelors or higher education followed by 32 (21.3%) parents with matriculation. Almost 64% participants were from rural areas.

Table 1 Demographic Features of respondents

Demographic Variables	
Gender	N (%)
Male	76 (50.7%)
Female	74 (49.3%)
Residence	N(%)
Urban	54 (36%)
Rural	96 (64%)
Parents Educational Status	N (%)
Illiterate	11 (7.3%)
Primary-Middle	39 (26%)
Matriculation-Intermediate	50 (40 %)
Bachelors or higher	40 (27%)

TYPE OF ASTIGMATISM:

Majority of participants 33.3% (N=50) were found with Simple Myopic Astigmatism followed by almost 32.7% (N=49) participants with Mixed Astigmatism. Other types of astigmatism were also observed (figure 1). A statistically significant association was found between amblyopia and type of astigmatism with p –value < 0.05 (Table 2).

STEREOACUITY:

On TNO 45.3% (N=68) had stereopsis of 480-240 sec of arc. About 32% participants had only qualitative stereopsis. Figure 2 is showing the values of stereopsis with TNO in all participants. Fourteen percent (N= 21) of participants with simple myopic astigmatism had only qualitative stereopsis. The study found a statistically significant association of stereopsis to the type of astigmatism by using TNO with χ^2 (df) = 28.479(16) and p – value < 0.05 (Table 1). Stereopsis was observed significantly reduced in simple myopic astigmatism.

CONTRAST SENSITIVITY:

Contrast sensitivity was observed within range of 1.80-2.25 by using Pelli-Robson chart in almost 88% (N=132) of participants. Majority of these participants 51.5 % (N=68) were male. The following chart shows the distribution of different levels of contrast among participants.

A close association was found between levels of contrast and type of astigmatism with χ^2 (df)=17.548(8), p < 0.05 (Table 1). Contrast was seen least effected in mixed astigmatism 31 % (N=47) whereas decreased levels were seen more in simple myopic astigmatism.

A close association was found between levels of contrast and type of astigmatism with χ^2 (df)=17.548(8), p < 0.05 (Table 1). Contrast was seen least effected in mixed astigmatism 31 % (N=47) whereas decreased levels were seen more in simple myopic astigmatism.

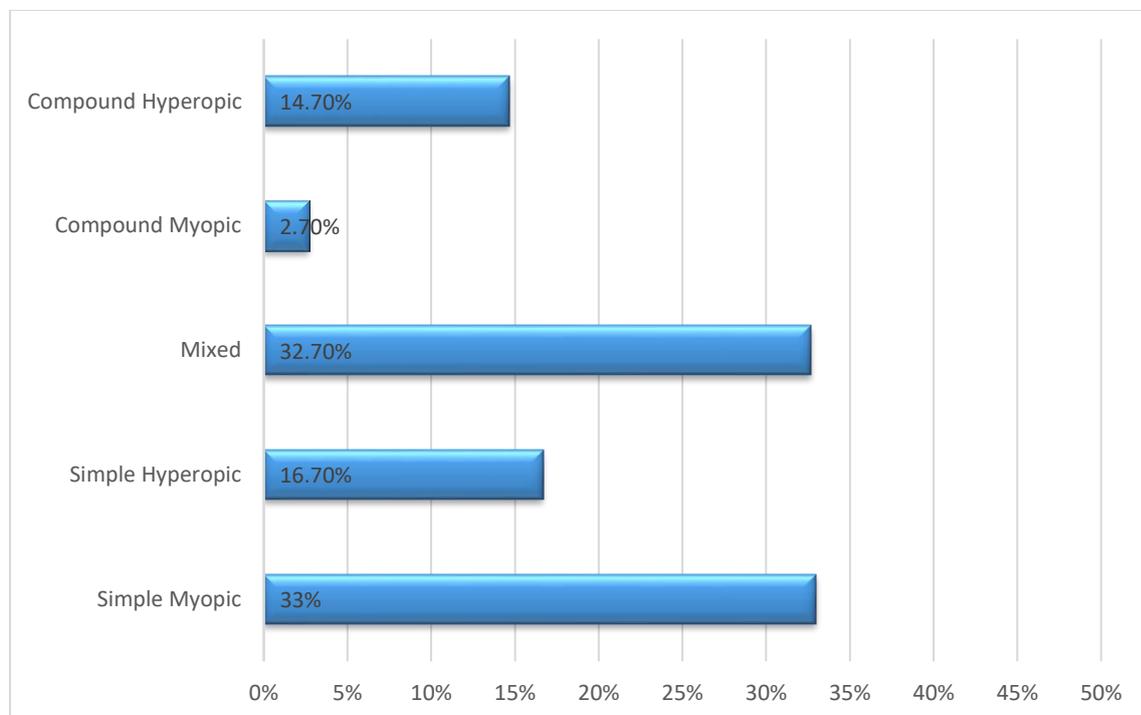


Figure 1 Types of Astigmatism

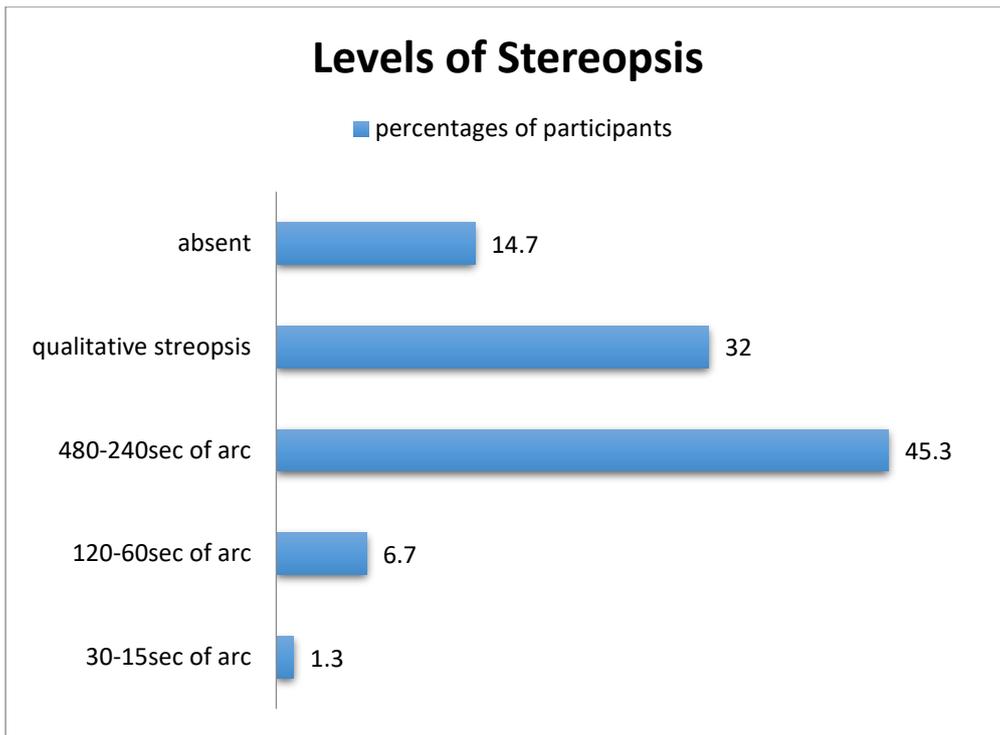


Fig 2: percentages of participants with different levels of stereopsis

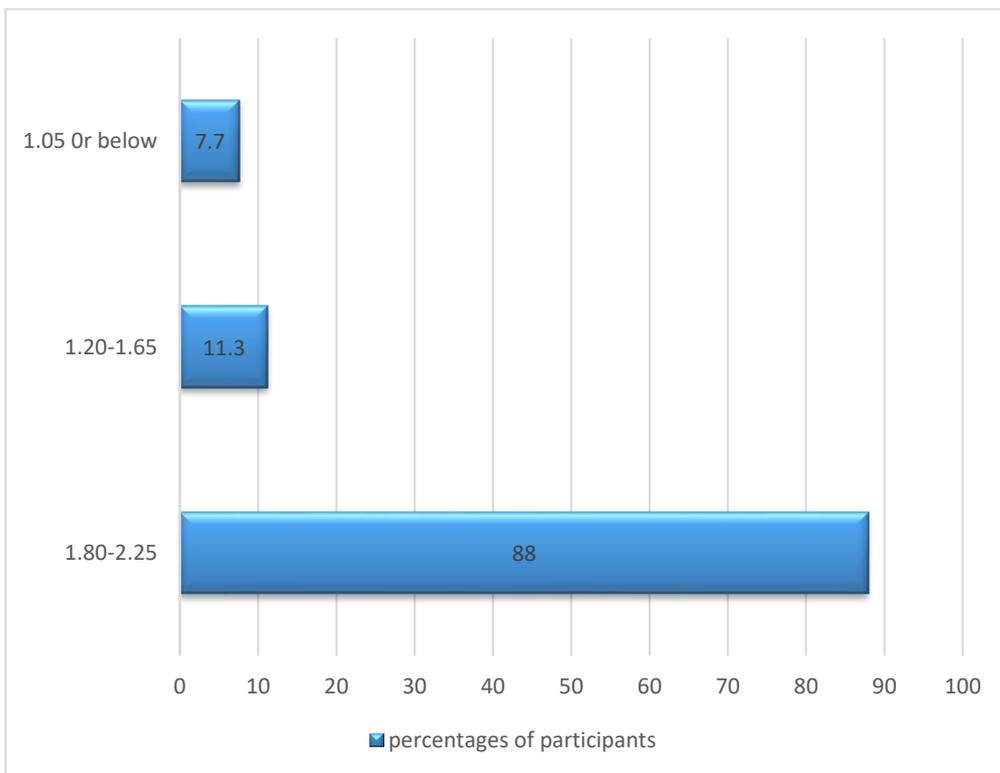


Figure 3: Distribution of levels of contrast

Table 2: Statistical Relationship between Type of Astigmatism and different variables

Amblyopic Eye	Type of Astigmatism N (%)					χ^2 (df)	p-value
	*SM	SH	MIX	CM	CH		
Right	9(6)	2(1.3)	18(12)	0(0)	7(5)	23.245(8)	0.003
Left	7(5)	7(5)	12(8)	0(0)	9(6)		
Both	34(23)	16(11)	19(13)	4(3)	6(4)		
Stereopsis (sec. of arc) N (%)						28.47(16)	0.002
30-15 1(0.7)	1(0.7)	0(0)	1(0.7)	0(0)	0(0)		
120-60 4(2.7)	4(3)	1(0.7)	5(3)	0(0)	0(0)		
480-240 16(11)	16(11)	11(7)	32(21)	3(2)	6(4)		
Qualitative 2 (14)	2(14)	11(7)	6(4)	1(0.7)	9(6)		
Absent 8(5.3)	8(5.3)	2(1.3)	5(3.3)	0(0)	7(5)		
Levels of Contrast						17.548(8)	0.025
1.05 or below	2 (1.3)	0(0)	1(0.7)	0(0)	4(3)		
1.20-1.65	6(4)	1(0.7)	1(0.7)	1(0.7)	2(1.3)		
1.80-2.25	42(28)	24(16)	47(31)	3(2)	16(11)		

*SM: Simple myopic, SH: Simple hyperopic, CM: Compound myopic, CH: Compound hyperopic

Discussion:

In the present study, most common type of astigmatism found in amblyopic children was simple myopic astigmatism (33%) followed by mixed astigmatism (32.7%). This study had also found a statistically significant association between type of astigmatism and amblyopia ($p < 0.05$). These two types of astigmatism were also

reported in another study in which simple myopic and mixed astigmatism were seen in astigmatic amblyopes due to significant impact causing reduction in acuity for horizontal gratings⁸. However, compound hyperopic astigmatism was also reported with higher prevalence in amblyopic children than other types of astigmatism⁹. In contrast to previous studies this study

had ruled out the common types of astigmatism leading towards Meridian Amblyopia on the basis of foci¹⁰. In this study visual functions were also determined and were seem to be affected by type of astigmatism ($p < 0.05$). Most of the participants (88%) had normal levels of contrast this result is not consistent with previous studies which supported the reduction of contrast in amblyopes¹¹. The present study normal levels of contrast were reported in majority of participants (31%) with mixed astigmatism ($p < 0.05$). Whereas in case of simple myopic astigmatism decreased levels of contrast were more as compare to other types of astigmatism. These results were different from a previously conducted study in which contrast was found reduction in hyperopic astigmatism¹². The result is same as in another study conducted earlier⁵. Likewise, another study in Great Britain showed the normal values of contrast in majority of astigmatic amblyopes ($p > 0.05$)¹³. This study depicted that the factor which seems to be related to normal levels of contrast is use of spectacles by participants. All of the participants were follow up amblyopes and were using glasses reported normal contrast.

In this study, levels of stereopsis were also measured through different charts. Levels of stereopsis varied depending on type of astigmatism and density of amblyopia. Previously conducted studies showed a reduction in stereopsis related to astigmatic amblyopia^{5,7}.

This reduced stereopsis may be due to difficulty in fusion of images in astigmatism which is a more complicated phenomenon in astigmatism as compared to pure spherical refractive error¹⁴. However, in this study gross stereopsis was reported but with reduced fine stereopsis. This might be due to large number of participants who were using glasses and we tested their stereoacuity with glasses that's why only fine stereopsis was found missing. A statistically significant association was

recorded between types of astigmatism and stereoacuity ($p < 0.05$). these results were supported by a previous study in which reduced stereoacuity was reported in astigmatic participants¹⁵. However, in present study along with amblyopia might be another contributing factor towards reduced stereopsis.

The results of this study exhibited that colour vision tests were consistent with previous studies and colour vision was recorded normal¹⁶. However, another study showed reduction in colour vision¹⁷. There is no certain reason for reduction in colour vision, probably it might be related to suppression of fovea and decrease in visual acuity¹⁸.

The strength of the study was that it included patients from different areas of Pakistan as it was a hospital-based study. Moreover, the use of appropriate instrumentation was also a strong point. Every participant included in study was selected after examination by trained optometrist and ophthalmologist.

The main limitation of study was small sample size and convenient sampling as the time duration was limited. The data were collected under supervision of qualified doctors with latest technology. The study showed a significant impact of astigmatism on developing amblyopia in children. At the same time visual functions were found to be affected in astigmatism related amblyopia.

Conclusions:

The study showed a significant impact of astigmatism on developing amblyopia in children. At the same time visual functions were found to be affected in astigmatism related amblyopia. These results had showed an increase need for screening and to provide spectacle treatment as earlier as possible. Moreover, quality of life greatly depends on visual functions. Reduced contrast and stereopsis can make a child

dependent and unable to cope with different challenges of life as compare to a normal subject. This can make a child unable to express all of his/her energies. As children are future of nation, so efforts should be made to lessen this burden of astigmatism related meridional amblyopia.

Recommendations:

These results had showed an increase need for screening and to provide spectacle treatment as earlier as possible. Moreover, it had revealed that there is a need for proper counseling of parents/guardians of children reported in hospitals for good compliance with any given treatment.

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Outcomes of Combined Extraction with Intraocular Lens Implant by A Fellow During Glaucoma Fellowship

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Abstract

Objectives: To determine the outcomes of combined extraction with intraocular lens implant performed by a fellow during glaucoma fellowship.

Study design: A retrospective study.

Methods: All the combined cataract and glaucoma surgeries performed by a glaucoma fellow during 1st November 2015 to 30th June 2016 were included in the study. All of the surgeries were performed under supervision of faculty and all intraoperative and early postoperative complications were recorded. The primary outcomes were the change in mean intraocular pressure (IOP) and best corrected visual acuity (BCVA) from the baseline. Secondary outcomes were the complications rate during surgery and in early postoperative phase.

Results: Total 19 eyes of 19 patients were included in the study, among which 11 (57.9%) were males and 8 (42.1%) were right eyes. Best corrected visual acuity (BCVA) improved in 17 (89.5%) eyes from the baseline while 1 eye showed no change and deterioration in 1 eye. There was improvement in IOP from baseline 20.11 ± 7.36 mmHg to 13.56 ± 3.28 mmHg ($p = 0.01$).

Conclusion: Combined cataract and glaucoma surgeries performed by glaucoma fellow have good results in terms of IOP control and BCVA. *Al-Shifa Journal of Ophthalmology 2017; 13(4): 174-79. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

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Introduction:

Cataract is the leading cause of blindness worldwide followed by glaucoma.¹ Although both are unrelated to each other in pathogenesis yet they can coexist at the same time. This can be explained by the argument that these entities are age-related and there is fair amount of chance that as the life-expectancy increases we will see more patients with coexistent cataract and glaucoma. In such situations, combining cataract and glaucoma surgery in one sitting is considered as a primary option by many glaucoma surgeons.²⁻⁵ Previously, conventional extracapsular cataract extraction (ECCE) with trabeculectomy was the procedure performed but since the advent of phacoemulsification, which is less traumatic to the eye, phacotrabeculectomy (Phacoemulsification and trabeculectomy) has gained much acceptance worldwide.^{6,7}

In the literature there is good amount of evidence available which has proven the safety and efficacy of combined extraction with IOL in experienced hands.^{8,9} However to our knowledge there is no study which has published results of combined extraction performed by a fellow during glaucoma fellowship in Pakistani population. So, we planned to carry out a study to determine the outcome of the fellow's performed combined surgeries.

Subjects and Methods:

We retrospectively reviewed all the combined surgeries including ECCE with IOL and phacotrabeculectomies performed by the glaucoma fellow during fellowship. A glaucoma fellow is a well-qualified ophthalmologist who is doing further training in glaucoma subspecialty. This study was started after the approval of research ethics committee of Al-Shifa eye trust hospital.

Surgical technique

A peripulbar local anesthesia was administered in all cases. A 7/0 vicryl corneal traction suture at 12 o'clock position was applied, a fornix based conjunctival flap followed by 3 x 3 mm partial thickness flap was created. After that 5-fluorouracil (5-FU, 50mg/ml) soaked sponges were applied to the scleral bed and subconjunctival space for 5 minutes. Sponges were then removed and thorough flushing with balanced electrolyte solution (BES) was carried out to wash out excess 5-FU. For ECCE, the limbal incision was extended on both sides of the scleral flap hinge to allow easy delivery of cataract and IOL implantation. Sclerostomy and peripheral iridectomy (PI) was done, limbal wound and scleral flap were stitched with 10/0 nylon to secure watertight limbal wound but slow oozing of aqueous through scleral flap. For phacotrabeculectomy, anterior chamber entry was made under the flap in one-site and separate 3.2 mm limbal incision on temporal side for two-site phacotrabeculectomy. Sclerostomy and PI

were followed by scleral flap closure with 10/0 nylon. Conjunctiva was closed in single layer with two wing sutures using 10/0 nylon suture. Patients' follow-up visits at day 1, 2 weeks, 1 month and 3 months findings like BCVA, IOP, number of IOP lowering medications and complications were recorded.

Primary outcome

The change in IOP and BCVA from baseline till the 3rd month postoperative visit and were recorded in every visit. Improvement in BCVA was defined as at least one-line improvement on Snellen's chart which was then converted to LogMAR (minimum angle of resolution).

Secondary outcome

The complications rate during the surgery and in early postoperative period.

Statistical analysis

Data was analyzed by using IBM SPSS Statistics version 24. Difference between baseline mean IOP, BCVA as well as number of IOP lowering medications and at final visit were analyzed using paired t test and a $p < 0.05$ was considered significant. Frequencies of all surgical complications, indications of surgery and diagnoses were also calculated.

Results:

Nineteen eyes of 19 patients were included in the study. Table I & II show the demographics of the patients. Male, left eye, primary open angle glaucoma (POAG) and LBCF were the most common findings. Phacotrabeculectomy with IOL was performed in 17 (89.5%) while ECCE with IOL in 2 (10.5%) eyes. Sixteen (84.2%) were one-site surgeries. Mean age of patients were 68.11 ± 8.96 years and mean duration of surgery was 60 ± 1 minutes. Mean preoperative IOP decreased from 20.11 ± 7.36 to 13.56 ± 3.28 mmHg ($p = 0.01$), BCVA from 1.28 ± 0.48 to 0.97 ± 0.56 ($p = 0.01$) and number of IOP lowering medications dropped from 3.22 ± 1.3 to

0.44 ± 0.73 (p < 0.001) as shown in table III. Seventeen eyes showed improvement in BCVA while no change and worsening of BCVA in 1 eye in both categories.

Intraoperative and early postoperative complications encountered are shown in table IV. Table V shows the effect of surgeries on patients' vision.

Table I: Demographics of Patient

		Frequency (n)	Percent
Gender	Male	11	57.9
	Female	8	42.1
Eye	Right	14	73.7
	Left	5	26.3
Diagnosis	Primary Open Angle Glaucoma	13	68.4
	Pseudoexfoliation Glaucoma	6	31.6
Indications	Advanced Glaucoma	5	26.3
	Uncontrolled IOP	7	36.8
	Failed Glaucoma Surgery	2	10.5
	Polypharmacy	5	26.3
Type of Surgery	Phacotrabeculectomy	17	89.5
	ECCE plus trabeculectomy	2	10.5
Surgical Site	One-site	16	82.4
	Two-site	3	33.3

n= number of patients, ECCE = Extracapsular Cataract Extraction.

Table II: Characteristics of Patients

	Minimum	Maximum	Mean	S.D.
Age of Patient (in years)	55	82	68.11	8.96
Surgical time (hh:mm)	1:00	1:05	1:00	0:01
Preoperative IOP (in mm of Hg)	12	36	20.11	7.36
Final IOP	8	18	13.56	3.28
Preoperative Medications	0	4	3.22	1.30
Final medications	0	2	0.44	0.73
Preoperative BCVA (in LogMAR)	0.8	2	1.28	0.48
Final BCVA	0.2	2	0.97	0.56

IOP= Intraocular Pressure, S.D. = Standard deviation, BCVA = Best Corrected Visual Acuity, LogMAR = Log of minimum angle of resolution.

Table III: Change in preoperative and final IOP, BCVA & no. of medications

	Mean	S.D.		Mean	S.D.	p value
Preoperative IOP	20.11	7.36	Final IOP	13.56	3.28	0.01
Preoperative medications	3.22	1.3	Final medications	0.44	0.73	< 0.001
Preoperative BCVA	1.28	0.48	Final BCVA	0.97	0.56	0.01

IOP= Intraocular pressure, S.D. = Standard Deviation, BCVA = Best corrected visual acuity
Paired t test was used.

Table IV: Intraoperative & Early Postoperative complications

		Frequency (n)	Percent
Intraoperative	Conjunctival buttonhole	1	5.3
	Hyphema	2	10.5
	Irregular PI	1	5.3
	Iris Prolapse	1	5.3
Early Postoperative	Shallow AC	3	15.8
	Tenon cyst	1	5.3

n= Number of cases, AC= Anterior Chamber, PI = Peripheral Iridectomy.

Table V: Outcome of surgery in terms of change in vision

	Frequency (n)	Percent
No Change	1	11.1
Improved	17	89.5
Deteriorated	1	11.1
Total	19	100

n = Number of Patients

Discussion:

Our study highlights the results of combined extraction with IOL by fellow during glaucoma fellowship. We found significant IOP control in our study with a mean decrease of 6.55 mmHg which is consistent with other studies.^{8,10} Although there is a question whether combined procedure is as efficacious as sequential surgery, we think that there is no right or wrong answer to this. There is evidence that trabeculectomy after cataract surgery has higher failure rate compared to stand-alone procedure and cataract surgery after trabeculectomy results in loss of IOP

control.¹¹⁻¹⁵ We know there are certain situations in clinical settings where sequential surgeries might not be the first option e.g. coexisting advanced glaucoma and cataract, non-compliance of patients with the IOP lowering drugs, high chances of patient's loss to follow-up and economic reasons. These are the cases most suitable for combined surgeries and as the life expectancy is increasing we are going to face more of them.

There was significant improvement in BCVA of our patients during the study period. Only 1 patient's vision deteriorated which can be explained by snuff out

phenomenon that can happen in advanced glaucoma patients. One downside of combined procedure is the delayed visual recovery which may take 4-6 weeks because of early hypotony, inflammation and wound healing. With the phacotrabeculectomy, this recovery time has been shortened to 3-4 weeks and may be in near future with new techniques we may be able to overcome this shortcoming. During intraoperative stage we had few complications like conjunctival buttonhole, hyphema and iris prolapse which were managed on the table with no consequences. Shallow anterior chamber was the most common early postoperative complication which was managed conservatively. We did not look in to the long-term complications and the failure rates of our surgeries which will give us more details.

The strength of our study is that it is the first study in Pakistani population where the results of a fellow are published. However, there are few limitations like retrospective design, smaller sample size and no direct comparison with the experienced surgeon's results. So, we recommend addressing all these shortcomings and conducting a multicenter approach where all the fellows are involved, this will be a very good project for investigators in future.

Conclusion:

Combined surgeries done by a glaucoma fellow is safe and effective as compared to the international data available. Phacotrabeculectomy offers shorter visual rehabilitation time as compared to ECCE with trabeculectomy.

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Pattern of Ocular Diseases in Children Presenting at Eye Out Patient Department, Khyber Teaching Hospital, Peshawar

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ABSTRACT

Objective: To report ocular disease pattern in children in order to enable early diagnosis and treatment of such conditions.

Subjects and Methods: This was a descriptive cross-sectional study conducted in Department of Ophthalmology, Khyber Teaching Hospital, Peshawar from 1st September 2014 to 31 August 2015. In this study 4800 children in the age group of up to 16 years were included which presented to eye OPD. A proforma was developed to record personal history, clinical examination and treatment given.

Results: Total of 4800 children attended eye OPD during this study duration which is 25.34% of total patients (18940). Out of this 3100(64.58%) were male and 1700 (35.42%) were female children. Conjunctiva was the most commonly involved structure i.e. in 1850(38.54%) children, followed by NLD blockage involving 1040(21.66%) children. Refractive errors were detected in 775(16.14%) children while disorders of lens accounted for 607(12.64%). Regarding management 2004 (41.75%) children got medical treatment alone while 1966(40.96%) children got both medical and surgical treatment. In other treatment modalities, 783(16.31%) children were treated optically and orthoptically and 47(0.98%) children were referred to specialized units.

Conclusion: Most children affected by eye conditions were male and conjunctival diseases were the commonest. This is followed by NLD blockage which required probing. Cataracts were the common disease which required surgery which is preventable blindness. Also refractive errors were high which need refraction and glasses. *Al-Shifa Journal of Ophthalmology 2017; 13(4): 180-85. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

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Introduction

There is wide variation of presentation of eye diseases worldwide^{1,2}. Factors affecting the type of eye diseases include age, sex, residence, socioeconomic, occupation, geographical, racial, dietary, customs, tradition, and the major environmental factors prevalent in that region. Children are mostly affected by eye diseases that can be treated. Ocular diseases in children are important because of its impact on child development. These disorders are due to causes in prenatal, neonatal and childhood periods.

The prevalence of blindness in children ranges from approximately 0.3/1000 children in developed countries to 1.5/1000 in developing countries⁴. Globally there are estimated to be 1.4 million blind children, almost three quarters of who live in the poorest regions of Africa and Asia⁵. Almost 50% of all childhood blindness in poor countries are avoidable. Population-based data on the prevalence and major causes of childhood blindness are essential for every country, in order to set priorities for control programs and to monitor the changing patterns over time.

According to a population census in 1998, Pakistan has an estimated population of 142 million in 2003. It is estimated that 40% of the population is below 16 years of age. The prevalence of blindness in children in Pakistan is estimated to be about 10 per 10,000 children, which means there are about 60,000 blind children. A further 100,000 to 180,000 children are estimated to have low vision⁶. Cataract is the main preventable cause of blindness. Almost 190,000 children worldwide are blind from cataract alone⁷. Therefore, children need special attention for early diagnosis and treatment of their ocular diseases so that they can live happy and productive life. This will lessen economic burden on their family and they will be better for their country.

Subjects and Methods:

This was a hospital based descriptive cross-sectional study conducted at eye department, Khyber teaching hospital, Peshawar from 1st September 2014 to 31st August 2015. Children up to ages 16 years were included in this study. A proforma was developed to record personal history, clinical examination and treatment given. During the study, a detailed history of each child, father's occupation, immunization, was asked. Children of 0-3 years were examined with a magnifying loop. All children of age group 7-15 were examined on slit lamp and visual acuity checked with

illiterate Snellen E chart directly and with pinhole. Refraction was performed under cycloplegia. Posterior segment examination was performed after pupil dilatation with direct and indirect ophthalmoscope and with 78D. Intraocular pressure was checked with Perkin's tonometer. Squint assessment was done with prisms and tests of stereopsis. Treatment was medical, surgical and optical.

Results:

A total of 4800 children were examined and enrolled in this study at Eye department Khalifa Gul Nawaz Teaching Hospital, Bannu. In this 3700 (64.58%) were male and 1700 (35.42%) were female. Their age wise distribution is given in table 1.

In 1850 (38.54%) children, conjunctiva was involved (table 2). In conjunctival diseases, vernal keratoconjunctivitis was diagnosed in 863 (46.64%), bacterial conjunctivitis in 426 (23.04%), follicular conjunctivitis in 395 (21.35%), vitamin A deficiency in 111 (6%) and subconjunctival hemorrhage in 55 (2.97%) children. Cornea and sclera were involved in 195 (4.06%) children. Corneal foreign body was present in 107 (54.87%), corneal ulcer in 42 (21.55%), Corneoscleral perforation in 37 (18.97%) and keratoconus was diagnosed in 9 (4.61%) children. Lens disorders were seen in 607 (12.64%) of total children which were either congenital cataracts or traumatic cataracts. Disorders of the whole globe were present in 52 (1.08%) children in which buphthalmos was in 33 (63.46%) and phthisis in 19 (36.54%). Disorders of vitreous and retina were present in 86 (1.79%) of total children, including retinoblastoma in 26 (30.23%), retinitis pigmentosa in 24 (27.90%), Stargardt's disease in 15 (17.44%), congenital vitreous degenerations in 13 (15.11%) and retinal detachment in 8 (9.32%) cases.

Lids and orbit were involved in 75 (1.56%) of total children. In the diseases of lid and

orbit, blepharitis was seen in 28(37.35%) children, chalazion in 21(28%), stye in 13(17.33%), ptosis in 8(10.66%) and congenital malformation were present in 5(6.66%) cases. Nasolacrimal duct was involved in 1040(21.66%) of children.

Refractive errors were present in 775(16.14%) of children in which astigmatism was seen in 315(40.65%), hypermetropia in 278(35.87%) and myopia in 182(23.48%) of patients. Ocular motility was affected in 106(2.24%) children.

Among these 76(71.39%) were convergent squints, 25(23.38%) were divergent squints and 6(5.33%) cases were of Duane's syndrome.

Medical treatment was provided to 2004 (41.75%) patients, while medical and surgical treatment was given to 1966(40.96%) children. Optical and orthoptic correction was advised in 783(16.31%) children. In addition, 47(0.98%) children were referred to specialized units for further management.

Table 1: Age wise distribution of patients

Patient's age	Numbers	Percentage
0-5	1752	36.51%
6-10	2192	45.66%
11-16	856	17.83%

Table 2: Disease wise distribution of patients

Disease	No of patients
Conjunctiva involved	1850(38.54%)
Cornea/sclera involved	196(4.06%)
Globe involved	52(1.08%)
Lens disorders	607(12.64%)
Uveitis	14(0.29%)
Vitreous and retina	86(1.79%)
Ocular motility	106(2.24%)
Lids and orbit	75(1.56%)
NLD related disorders	1040(21.66%)
Refractive errors	775(16.14%)

Discussion:

Total 4800 children were examined, of which 64.58% were males and 35.42% were female children. These findings are comparable to a study done at Mayo Hospital Lahore, with 63.6% male and 36.4% female.

In this study conjunctiva was involved in 38.54% cases. Vernal keratoconjunctivitis was the most common disorder affecting 46.64% of children and is a recurrent, bilateral, external, ocular inflammation primarily affecting boys and young adults living in warm, dry climates. Bacterial conjunctivitis which was found in 23.04% patients. Bacterial conjunctivitis was diagnosed on the presence of purulent discharge in eye. This is different from results obtained by Awan and Usman i.e. 34.18%.⁸

Conjunctivitis of the newborn is a very serious problem in many parts of the developing world. The great damage to sight is infection, which involves the cornea. As the condition usually affects both eyes, the tragedy of an otherwise healthy child becoming blind is avoidable [9]. Bacterial conjunctivitis could be due several factors i.e. due to overcrowding, poor hygiene, poor nutrition and lack of health education of mothers, as the children were coming from very poor community having large family size, and in most of families, absence of mothers from home, as they were also working.

Corneal diseases accounted for 4.06% of all the childhood ocular diseases. This is less in comparison to other studies. Afghani et al in a survey of blind school reported corneal diseases as a cause of blindness in 12%¹⁰. Rahi et al in their study in a blind school in India showed 26.4% of corneal diseases responsible for visual impairment and blindness¹¹. Most of corneal problems were due to trauma and corneal foreign body. Large families and lack of proper care put children at risk of sustaining

trauma. This is in comparison with a study conducted at Hayatabad Medical Complex Peshawar which reported 49% of childhood ocular trauma¹². Corneal ulcers in this study were mostly due to foreign body, bacterial keratitis, and herpes infections and lime burn. Vitamin A deficiency may be a contributing factor to corneal opacity, which was found in 6% children and which could not be confirmed due to lack of laboratory support. According to WHO report about 3 million children have clinically xerophthalmia throughout the world¹³. Majority of corneal ulcers follow the occurrence of often trivial corneal abrasions. In a study by Jatoi S, causes of corneal ulcers were found to be trauma in 63.5% of cases¹⁴.

In Pakistan, various studies have been carried out which have so far suggested Vitamin A deficiency as a problem. No in-depth survey has been carried out. A survey in four districts of Punjab covering 21 villages showed prevalence of Vitamin A deficiency in children as 6.4 % and among these, frequency in children of 5-6 years age was 50 %¹⁵.

Cataract in this study was 12.64% of cases, including all types, congenital, traumatic, and developmental and it found to be the cause of monocular blindness. Cataract is leading cause of preventable blindness globally. Bilateral congenital cataract is the most common cause of treatable childhood blindness. Nuclear cataract is usually present at birth and is non-progressive whereas lamellar cataract usually develops later and is progressive¹⁶. The major causes of bilateral cataract in South Asia are idiopathic (50%), hereditary (25%) and secondary to Rubella infection (25%)¹¹.

In our study ocular motility disorders were seen in 2.24% cases. Squints are common all over the world but do not have any special association with developing countries or tropical environments¹⁷. A study from Nepal reported that the

prevalence of squint was 1.6%¹⁸. Diagnosis of squint at early age is important because of its amblyogenic effect. Esotropia is more likely to be amblyogenic than exotropia¹⁹.

Congenital glaucoma causing buphthalmos constitute about 33(63.46%) cases out of 52 cases of whole globe involvement. The incidence of congenital glaucoma varies among different geographic locations and ethnic groups with the highest recorded incidence found in the Gypsy population of Slovakia (1:1250), followed by general population of Middle East (1:2500) and the western nations (1:10,000)²⁰. In our study there were 26 cases of retinoblastoma. In a study done at Agha Khan University hospital, Karachi, 101 cases of retinoblastoma were reported between 1998-2002²¹. In order to detect retinoblastoma as early as possible, health education for parents and health care provider and improved training for ophthalmologist is essential. Genetic testing of siblings and children for retinoblastoma and identification of high risk children would also be helpful.

Refractive errors in our study were reported in 16.14% of cases. A population-based study conducted by Memon in 1987- 90 showed that 11.4% of blindness was due to refractive errors and amblyopia²². Refractive errors which account mostly for low vision are the third largest cause of treatable blindness in Pakistan²³. It accounts for 8% cases of unocular blindness in Khyber Pakhtunkhwa province²⁴. Astigmatism was most common and accounted for 40.65% of refractive errors in our study. This is different from other studies where hypermetropia was common error of refraction in children²⁵.

In our study, congenital NLD blockage was seen in 21.66% which is very high as compared to other studies done like study conducted at Khyber Teaching Hospital, Peshawar which showed NLD blockage in 5.4%²⁶. Eyelid problems (Chalazion, sty) in our study were 21 and 13 cases respectively.

In countries with warm climate, the prevalence of staphylococci is as high as 95% in culture, and sub clinical and mild lid infections are quite common²⁷.

Conclusion:

Most common eye disease in this study was conjunctivitis either allergic or bacterial which is mostly due to warm and dry climate and unhygienic conditions in this area which is comparable to other areas in Pakistan. Males were affected more than females and most common age group affected was between 7-10years. This study showed that pediatric eye diseases are quite common and most of them are treatable so there is need for proper training of ophthalmic care providers in paediatric ophthalmology.

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Comparative Study of Single Versus Double Site Peribulbar Anaesthesia Injection for Cataract Surgery in Terms of Efficacy and Safety

Maqsood Ahmad¹, Hussain Ahmad¹, Muhammad Sajid¹, Ubaidullah¹

Objective: To compare the efficacy & safety of single versus double-site injections of peribulbar anaesthesia for cataract surgery

Subjects and Methods: This study was conducted in the department of Ophthalmology, Khyber Teaching Hospital Peshawar from March 2016-August 2016. Through a randomized controlled trial Study Design, a total of 190 patients presenting with age related cataract were randomly allocated in two groups, patients in group A were subjected to fixed single injection peribulbar anaesthesia and in group B to classic double injection peribulbar anaesthesia. All patients were followed up 15 minutes to record efficacy in terms of akinesia and safety in terms of chemosis & subconjunctival haemorrhage.

Results: The mean age of the patients in group A was 50.5 ± 6.1 years while in group B it was 51.8 ± 4.8 years (p value 0.098). The mean akinesia score in group A was 1.7 ± 1.3 while in group B it was 2.1 ± 1.4 (p value 0.102). Efficacy was 85.3% in group A and 74.7% in group B. Chemosis was seen in 14.7% patients of group A compared to 5.3% of group B. Subconjunctival hemorrhage was seen in 5.3% of group A and 14.7% of group B. 80% of safety was observed in both group A and group B with a p value of 1.000.

Conclusion: Although we didn't find any significant difference in efficacy and safety of single vs double peribulbar injection anesthesia, the overall study result suggest single injection is effective than double injection. However, we recommend further research to develop future guidelines. *Al-Shifa Journal of Ophthalmology 2017; 13(4): 186-95.* © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.

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Introduction:

Cataract is the leading cause of blindness worldwide. Approximately 17.6 million people, accounting for 39% of all the causes of blindness, are blind as a result of bilateral cataract globally.¹ In Pakistan cataract accounts for 51.5% of the avoidable causes of blindness.² Approximately 570,000 adults are estimated to be blind and 3,560,000 have visual impairment as a result of cataract in Pakistan.³ Phacoemulsification, a standard technique for cataract surgery in developed countries, is not routinely practiced in developing countries including Pakistan due to its complex and expensive equipment and the requirement for a more advanced surgical training.⁴ Manual Small Incision Cataract Surgery (MSICS) is a good alternative to

phacoemulsification that is gaining popularity in developing countries including Pakistan due to its early wound stability, minimally induced astigmatism, low complication rate and cost-effectiveness.⁵⁻⁶

Despite various modifications that have been devised over the decades to reduce the potential risks of injuring intra orbital structures, the "blind" insertion of a needle into the retrobulbar space has never been completely free of several sight and life-threatening complications which includes⁷ haemorrhage, ptosis, conjunctival or eyelid bruising, globe penetration, optic nerve damage, central retinal vein and artery occlusion, and brain stem anaesthesia and death. The advantages of peribulbar anaesthesia include its ease of application, minimal to absent discomfort on administration, rapid onset of anaesthesia and, most importantly, elimination of the potential risks associated with retrobulbar injections⁸. In addition to all of these advantages, the technique is economical, avoids undesirable cosmetic adverse effects, and allows instant visual rehabilitation⁹.

The single-injection technique for percutaneous peribulbar anaesthesia with a short needle as described by Rizzo et al has been proved to be a simple and easy-to-perform technique with less pain using a decreased volume of local anaesthetic. It requires a single puncture rather than multiple punctures and provides adequate analgesia and akinesia^{10, 11}. Low-volume two-injection technique gives acceptable conditions for ophthalmic operation. However, it is suggested that percutaneous single injection is safer in eye surgery¹².

Several studies have demonstrated that peribulbar anaesthesia provided optimal conditions for cataract surgery. Furthermore, the injection of local anesthetic external to the muscle cone may decrease the likelihood of optic nerve

damage and globe perforation¹³. In one study, both techniques provided similar successful akinesia after 10 min (87% vs 76%) and 15 min (93% vs 84%) in the single-injection group and the double-injection group respectively. Moreover, chemosis was recorded (16% vs 5%), subconjunctival hemorrhage (9% vs 2%) and moderate to severe pain (19% vs 53%) in single-injection group and the double-injection group respectively¹¹.

The present study is designed to compare the efficacy & safety of single versus double-site injections of peribulbar anaesthesia for cataract surgery. Local anaesthesia is the most commonly chosen method of anaesthesia before cataract surgery and peribulbar method is most commonly utilized by our ophthalmologists. This study will provide us with local statistics for the efficacy & safety of single versus double-site injections of peribulbar anaesthesia before cataract surgery and in our study single site injection is found to either equally or more effective and safer than double site, we want to share the results of this study and will suggest local ophthalmologists for further research and its routine use for administering anaesthesia before cataract surgery.

Subjects and Methods:

This was a Randomized Controlled Trial conducted over a period of 6 months at Department of Ophthalmology, Khyber teaching Hospital Peshawar. Sample size was 95 in each group using 16% vs 5%¹¹ proportion of chemosis in single-injection group and the double-injection group respectively (peribulbar anaesthesia), 95% confidence interval and 80% power of the test using WHO sample size estimation formula. Sampling Technique was consecutive (non-probability) sampling.

Inclusion Criteria:

- All patients with age related cataract admitted for phacoemulsification.

- Adults with age range of 40-60 years
- Either gender.

Exclusion Criteria:

- Patients with history of chronic glaucoma on medical records.
- Patients with trauma to the eye on history.
- Any history of ocular or refractive surgery.
- Alcoholic or heavy smoker.
- Patients with history of cardiac or neurologic disease.

The study was conducted after approval from hospital ethical and research committee.

All patients meeting the inclusion criteria i.e. patients with age related cataract were included in the study through OPD department. The purpose and benefits of the study were explained to all patients and a written informed consent was obtained.

A detailed history followed by a complete ophthalmologic examination was done on all patients that will also include slit lamp examination and fundoscopy where possible. The patients were randomly allocated in two groups by lottery method. Patients in group A were subjected to single site injection of peribulbar anaesthesia while patients in group B were subjected to double site injection of peribulbar anaesthesia.

In the single-injection group, the injection site was percutaneous in the inferior margin of the orbit and in the same line with the inferior lacrimal canaliculus. The needle was advanced in posterior direction for half of its length and then obliquely in the direction of the optic foramen. After negative aspiration, 6 mL of the local anaesthetic solution was slowly injected. In the double injection group, the first injection of 3 mL of the local anaesthetic was given percutaneously at the junction of the lateral one- third and medial two-thirds of the lower orbital margin and the second

injection of 3 mL was given percutaneously just lateral to the supratrochlear notch. Mechanical orbital compression was applied for 10 min in both groups, using a Honan balloon set at 30 mm Hg.

Once injected, a gap of 15 minutes was left before the patient is examined for akinesia, chemosis and subconjunctival haemorrhage for determining the efficacy and safety of procedure.

All the above-mentioned information was recorded in a pre-designed proforma. Strict exclusion criteria were followed to control confounders and bias in the study results.

Data collected was analyzed in SPSS version 10. Mean \pm SD was calculated for numerical variable like age. Frequency and percentages were calculated for categorical variables like gender, akinesia, chemosis, subconjunctival haemorrhage, safety and efficacy. Chi square test was used to compare the efficacy & safety of both the groups while keeping 'p' value of ≤ 0.05 as significant. Efficacy & safety in both the groups were stratified among age & gender to see the effect modification.

Results:

The study comprised a total of 190 patients diagnosed with age related cataract according to operational definitions. The mean age of the patients of the whole study population was 51.23 ± 5.5 years. The mean age of patients in group A was 50.5 ± 6.1 years while in group B it was 51.8 ± 4.8 years. The difference was statistically not significant while applying Student T test with a p value of 0.098.

We also distributed the patients with regards to different age groups. We took four age group i.e. up to 45 years, 45.01 to 50.00 years, 50.01 to 55.00 years and 55.01 to 60.00 years. We distributed patients as per these age groups for both study groups.

While distributing the sample with regards to gender, in group A; there were 72.6% males and 27.4% females while in group B there were 80% males and 20% females. On applying chi square test, the difference was not statistically significant with p value of 0.232.

All the patients were subjected to standard injection of anesthesia according to their respective groups and followed up at 15 minutes to determine the akinesia, chemosis and subconjunctival hemorrhage.

On follow up, the mean akinesia score of the whole study population was 1.93 ± 1.4 . The mean follow-up akinesia score in group A was 1.7 ± 1.3 while in group B it was 2.1 ± 1.4 . The difference was statistically insignificant while applying student T test having a p value of 0.102[table 1]

While applying the definition of efficacy, we observed that a value of ≤ 3 was observed in 85.3% of group A patients compared to 74.7 of group B patients. The difference was statistically insignificant after applying chi square test with a p value of 0.07.[table 2]

As per our operational definition of safety, the occurrence of either chemosis or subconjunctival hemorrhage will be considered unsafe for any group. In our study, chemosis was seen in 14.7% patients of group A compared to 5.3% of group B. [table 3] Subconjunctival hemorrhage was seen in 5.3% of group A and 14.7% of group B. According to definition of safety, [table 4] 80% of safety was observed in both group A and group B with a p value of 1.000 [table 5].

Table no. 1: Comparison of mean akinesia score at 15 mintues (n=95 in each group)

	Treatment Groups	N	Mean	Std. Deviation	Std. Error Mean
Scoring on Akinesia Scale	Single Injection Group	95	1.7684	1.34838	.13834
	Double Injection Group	95	2.1053	1.47658	.15149

p value: 0.102

Table no. 2: Comparison of efficacy between both groups (n=95 in each group)

Efficacy * Treatment Groups Cross tabulation					
			Treatment Groups		Total
			Single Injection Group	Double Injection Group	
Efficacy	Yes	Count	81	71	152
		% within Treatment Groups	85.3%	74.7%	80.0%
	No	Count	14	24	38
		% within Treatment Groups	14.7%	25.3%	20.0%
Total		Count	95	95	190
		% within Treatment Groups	100.0%	100.0%	100.0%

p value: 0.070

Table no. 3: Comparison of chemosis between groups (n = 95 each)

Chemosis * Treatment Groups Cross tabulation					
			Treatment Groups		Total
			Single Injection Group	Double Injection Group	
Chemosis	Yes	Count	14	5	19
		% within Treatment Groups	14.7%	5.3%	10.0%
	No	Count	81	90	171
		% within Treatment Groups	85.3%	94.7%	90.0%
Total		Count	95	95	190
		% within Treatment Groups	100.0%	100.0%	100.0%

Table no. 4: Comparison of subconjunctival hemorrhage between groups (n = 95 each)

Subconjunctival Hemorrhage * Treatment Groups Cross tabulation					
			Treatment Groups		Total
			Single Injection Group	Double Injection Group	
Subconjunctival Hemorrhage	Yes	Count	5	14	19
		% within Treatment Groups	5.3%	14.7%	10.0%
	No	Count	90	81	171
		% within Treatment Groups	94.7%	85.3%	90.0%
Total		Count	95	95	190
		% within Treatment Groups	100.0%	100.0%	100.0%

Table no. 5: Comparison of safety between groups (n = 95 each)

Safety * Treatment Groups Cross tabulation					
			Treatment Groups		Total
			Single Injection Group	Double Injection Group	
Safety	Yes	Count	76	76	152
		% within Treatment Groups	80.0%	80.0%	80.0%
	No	Count	19	19	38
		% within Treatment Groups	20.0%	20.0%	20.0%
Total		Count	95	95	190
		% within Treatment Groups	100.0%	100.0%	100.0%

p value: 1.000

Discussion:

Peribulbar anesthesia remains a popular choice for patients undergoing cataract surgery¹⁴. Several studies have demonstrated that peribulbar anesthesia provided optimal conditions for cataract surgery¹⁵. Furthermore, the injection of local anesthetic external to the muscle cone may decrease the likelihood of optic nerve injury and globe perforation¹⁶.

Local anaesthesia is now the main method employed for cataract surgery¹⁷⁻²⁰. When compared with general anaesthesia, it is more popular with surgeons¹⁸, more cost-effective^{18, 21} and improves patient well being^{22,23}. Compared with retrobulbar techniques, peribulbar anaesthesia takes longer to establish²⁴ and requires larger volumes of local anaesthetic²⁵ but has fewer complications^{17, 19, 26, 27} and provides better patient comfort and operating conditions¹⁷.

Reported complications of peribulbar anaesthesia include damage to intra-orbital contents, central nervous and intravascular penetration^{24, 27}, and unpredictable increase in intra-ocular pressure²⁸⁻³⁰. The volume of potential intra-orbital space available for injection has been shown to vary considerably³¹. This is due to the variation in orbit and globe sizes seen in the general population³² and the density of connective tissue surrounding the eye ball^{32,33}. Ophthalmologists use a variety of methods to decide how much local anaesthetic should be injected. However, no universally accepted end-point marker of the local anaesthetic volume sufficient to provide akinesia or anaesthesia exists. Usual practice appears to involve injecting predetermined volumes between 5 and 10 ml^{34, 35}. An excessive increase in intra-ocular pressure may cause intolerable pain on injection³⁶, triggering of the oculocardiac reflex²⁷, acute ischaemic optic neuropathy and, rarely, amaurosis^{24,27}.

Our results demonstrated that both techniques are similar in terms of efficacy (both groups had a comparable adequate akinesia), with a lower total volume of local anesthetic in the single-injection group. These findings are in agreement with those of Mahfouz and Katheri³⁶, Clausel et al⁸, and Riad and Nauman³⁷. Previous studies using B-scan ultrasonography to determine the exact pattern of distribution of the injectate in peribulbar anaesthesia^{38,39} reported that a small volume of local anesthetic (5–6.5 mL) injected in this space is adequate to surround the eyeball and produce analgesia. The circumferential diffusion of the local anesthetic with the addition of hyaluronidase to sub-Tenon's space where the extraocular muscles and sensory and motor nerves of the eye are located explains the adequate akinesia achieved and the higher incidence of chemosis in the single-injection group⁴⁰.

Needle length is an important consideration in needle-related complications. Relatively short needles (16 or 25 mm) used in single- or double - injection techniques, respectively, were associated with a low incidence of needle-related complications (hematoma and globe perforation) in both groups. Moreover, the shorter needles were associated with a lower incidence of moderate and severe pain in patients undergoing the single-injection technique³⁶. The higher incidence of subconjunctival hemorrhage in the short-needle technique is attributable to the restriction of bleeding to the anterior orbit.

Our results, with high efficacy in achieving akinesia by 15 min after injection, are compare with other studies where adequate akinesia was achieved in 90.6–100% of cases while using ocular compression³⁵. Different criteria for a successful block were used, making accurate comparison difficult.

In a study, the medial canthus single-injection peribulbar anesthesia was

significantly less painful and required less anesthetic agent than the double-injection peribulbar anesthesia. Akinesia score and the reinjection rate were similar in the 2 groups, whereas chemosis was significantly more frequent in the double-injection group⁴¹. The results of 50 consecutive single-injection peribulbar anaesthetics performed by the same surgeon are reported and a description of the procedure is included. The technique produced adequate conditions for surgery in all cases. Only 4% (two cases) were considered to have inadequate akinesia five minutes after the injection and required additional injections. None of the complications described with retrobulbar and other forms of peribulbar anaesthesia were observed. The procedure is relatively easy to master. The study shows it to be a safe and reliable alternative to previously described methods of local anaesthesia⁴².

The delivery of single percutaneous peribulbar technique is effective and reliable in providing both analgesia and akinesia⁴³. It appears to get closer to the characteristics of an ideal block than the classic peribulbar technique. It uses smaller injectate volume and had speed of onset comparable to the classic technique. It also prevents many of the complications associated with the double injection technique. Another advantage of the single percutaneous technique is that it is usually associated with only minor discomfort, which may explain the excellent degree of patient acceptability³⁸. Single percutaneous peribulbar technique was more comfortable for the patient at the time of anesthetic administration and during surgery. Supplemental block in peribulbar anesthesia remains the major constraint of the technique. The reported incidence is between 5 and 63% in various studies^{44,45}.

According to Ball et al⁴⁵ an adequate block can be achieved with a single peribulbar injection placed either inferotemporally (classic technique)¹⁶ or medially (single

percutaneous technique)⁴⁰ and there is no evidence that a second primary injection decreases the rate of supplemental injection required. We also therefore propose that a second primary peribulbar injection is unnecessary and many carry an increased risk of globe perforation.

The sensitivity of the eyeball is provided by the ciliary nerves, which cross the episcleral space after they emerge from the globe. The fascial sheath of the eyeball (tenon's capsule) extends to rectus muscle sheath. This explains why the anesthetic is preferentially guided to this muscle sheath to produce good akinesia; also, the fascial sheath of the eyeball guides the injected solution to the lids, especially to the orbicularis muscle preventing blinking during surgery without performing any facial nerve block. This explains why single percutaneous technique is more effective than the classic peribulbar technique.

Anesthesia - related chemosis, subconjunctival hemorrhage, ecchymosis occurred mainly in the first group. No patient had globe injury, perforation or retrobulbar hemorrhage in both the groups. In the peribulbar anesthesia by a medial percutaneous single injection (group 2), infrequent complications were observed; this site of injection is relatively avascular, which may decrease the risk of hematoma⁴⁶.

Conclusion:

Based on our results, we can conclude that the application of the single percutaneous technique provides a level of comfort during intraocular surgery. This technique is a simple and satisfactory alternative approach for ocular regional anesthesia. The advantages include decreased pain with percutaneous and short needle insertion, decreased volume of anesthetic, single rather than multiple punctures with less complications.

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Different Morphological Patterns of Cataract at Doctors Trust Teaching Hospital Sargodha

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ABSTRACT

Background: Various studies of cataract, most of which are population based, have reported that the distribution of cataract may differ in different populations. This study presents the frequency of various types of cataracts among adult population presenting at a teaching hospital in Sargodha region of Punjab.

Subjects and Methods: It was a hospital based cross sectional study. Cataract was diagnosed and its pattern was noted by a senior ophthalmologist on the basis of clinical examination. Demographic data was of age, sex and occupation, which was recorded on a proforma along with the clinical findings. Frequency and percentages of various types of cataract were calculated using SPSS version 17.

Results: Total patients were 100 in number. The mean age of presentation was of 57.78 (\pm 9.63) years, with a range of age from 35 years to 80 years. The most frequent type was nuclear cataract in 67% of patients. Nuclear cataract was 77.41 % in older people (of age more than 60 years). Frequency of nuclear + posterior sub capsular cataract was 23.68% which was comparatively more in subjects with age <60. The frequency of nuclear cataract and nuclear +posterior sub capsular cataract was highest in housewives.

Conclusion: Frequency of nuclear type of cataract was found to be the highest in our study conducted at a teaching hospital in Sargodha district. *Al-Shifa Journal of Ophthalmology* 2017; 13(4): 196-200. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.

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Introduction:

Cataract is the main cause of blindness and visual deficiencies around the globe, accounting for almost half of the 45 million blind people¹. Along with visual impairment, cataract is related with social disability, curtailment of the daily activities and highly increased risk of falls². World Health Organization reports that more than 80% of blind individuals are aged 50 years and above³. Over 85% cataracts are senile in nature. Other types of cataracts are congenital cataract, metabolic cataract, endocrinological cataract, toxic cataract, traumatic cataract⁴.

Morphologically, cataract is divided into three main types: nuclear, cortical, subcapsular and mature⁵. Other than age, risk factors for cataract are age, alcohol, smoking, trauma and increased exposure of UV light⁶. Moreover, Diabetes mellitus is

strongly related with cataract⁴. Studies have shown that Na/K imbalance in aqueous humor is also found to be cataractogenesis⁷. Research also suggests that viral infection like hepatitis C virus (HCV) increases the oxidative stress which may supposedly cause cataract⁸. At genetic level, mutations in various genes including FOXE3, EYA1, PITX3 and NHS are proposed to be cause of cataract⁹. Conversely, high use of riboflavin and vitamin B12 has been found to be inversely related with cataract progression⁶. Diet containing 6 to 20 mg of lutein and zeaxanthin is associated with reduced risk of cataract¹⁰.

Various studies on cataract, most of which are population based, have reported that its distribution may differ in different populations. Cataract is among the priority areas of Vision 2020 program, a global initiative to eradicate the preventive blindness. As a result, we are expecting that the number of patients presenting with mature cataracts will decrease in the years to come. This study was aimed at presenting the frequency of various types of cataracts, in the adult patients presenting at a teaching hospital in Sargodha region of Punjab.

Subjects and Methods:

It was a descriptive cross-sectional study which was carried out at the out-patient department (OPD) of Ophthalmology in Doctors Trust Teaching Hospital attached with Rai Medical College, Sargodha. The study was carried out over a span of four months from May 2017 to August 2017, after taking permission from the ethical committee. Cataract was simply defined as opacity of lens and didn't include any other criteria for its diagnosis. The inclusion criteria consisted of patients who came to the Ophthalmology department and were identified as a case of cataract in one or both eyes. The exclusion criteria comprised of eyes with history of trauma, surgery, or infection and patients using any known cataractogenous medications like steroids.

Cataract was identified and classified by a senior ophthalmologist using slit lamp biomicroscope after dilation of pupils with tropicamide. Demographic data of age, sex and occupation were recorded on a proforma and frequency and percentages of various types of cataract were calculated using SPSS 17.0.

Results:

A data of 100 patients was collected for this study, which comprised of 41(41 %) males and 59(59 %) females. The mean age of presentation was 57.78 +/- 8.34 years with a range from 35 to 80 years. Nuclear cataract (NC) was present in 67% of patients. Posterior sub-capsular cataract (PSCC) was present in 11 % while nuclear cataract + posterior sub-capsular cataract (NC + PSCC) was present in 16 % eyes. Cortical cataract (CC) was only present in 1% and the mature cataract (MC) was present in 5% eyes. No case was diagnosed with Posterior polar cataract (PPC) and nuclear + cortical cataract (NC+CC) in our study [Table 1].

The frequency of nuclear cataract was 48 (77.41%) in subjects with age of above >60 while its frequency was 19 (50%) in subjects with age <60. This difference was found to be significant ($\chi^2 = 8.0113$, $P < 0.05$). The prevalence of nuclear cataract + posterior sub capsular cataract was 9 (23.68%) which was significantly more in subjects with age <60 in comparison to subjects with age >60. The prevalence of nuclear cataract + posterior sub-capsular cataract was 7 (11.29%) in subjects with age >60. This difference was not significant ($\chi^2 = 2.6972$, $P < 0.05$). The frequency of posterior sub capsular cataract was 8 (21.05%) which was also higher in subjects with age <60 compared to subjects with age >60. The difference was significant ($\chi^2 = 6.3266$, $P < 0.05$). Frequency of mature cataract (MC) was 4(6.45%) in older age (>60) and there was no significant difference from subjects of age < 60 years ($\chi^2 = 0.7238$, $P < 0.05$) [Table 2].

Regarding occupation, majority of house wives were diagnosed to have the nuclear cataract and nuclear cataract + posterior sub-capsular cataract. The frequency of

nuclear cataract and nuclear cataract + posterior sub capsular cataract was 40 (68.96%) and 11 (18.96%) in housewives. [Table 3].

Table 1: SHOWING DISTRIBUTION OF CATARACT MORPHOLOGY

MORPHOLOGY	NUMBER	PERCENTAGE
NC	67	67%
NC + PSCC	16	16%
PSCC	11	11%
MC	5	5%
CC	1	1%
NC + CC	0	0%

NC = Nuclear Cataract, PSCC = Posterior Sub Capsular Cataract, MC = Mature Cataract, CC = Cortical Cataract, PPC = Posterior Polar Cataract

TABLE 2: DISTRIBUTION OF CATARACT WRT AGE GROUP

AGE	NC%	NC+PSCC%	PSCC%	MC%	CC%	NC + CC%	PPC%	TOTAL %
>65	48	7	3	4	0	0	0	62
	77.41%	11.29%	4.83%	6.45%	0%	0%	0%	100%
<65	19	9	8	1	1	0	0	38
	50%	23.68%	21.05%	2.63%	2.63%	0%	0%	100%
Total	67	16	11	5	1	0	0	100
	67%	16%	11%	5%	1%	0%	0%	100%

NC = Nuclear Cataract, PSCC = Posterior Sub Capsular Cataract, MC = Mature Cataract, CC = Cortical Cataract, PPC = Posterior Polar Cataract

TABLE 3: TYPE OF OCCUPATION AND MORPHOLOGY OF CATARACT

Occupation	NC	NC+PSC	PSCC	MC	CC	NC+CC	PPC	Total
House Wife	40	11	3	3	1	0	0	58
	68.96%	18.96%	5.17%	5.17%	1.72%	0%	0%	100%
Retired / No Job	18	3	3	2	0	0	0	26
	69.23%	11.53%	11.53%	7.69%	0%	0%	0%	100%
Office Jobs	9	2	5	0	0	0	0	16
	56.25%	12.5%	31.25%	0%	0%	0%	0%	100%
Total	67	16	11	5	1	0	0	100
	67%	16%	11%	5%	1%	0%	0%	100%

NC = Nuclear Cataract, PSCC = Posterior Sub Capsular Cataract, MC = Mature Cataract, CC = Cortical Cataract, PPC = Posterior Polar Cataract

Discussion:

The average age of presentation in this study was 57.78 years. This is comparatively less than the mean age reported in an Indian study (64.14 years)¹¹. This could be attributed to difference in sample size and environmental conditions. The mean age of cataract in African population was 66.5 years¹².

In our study, we had noticed that nuclear cataract had the highest incidence in older age >60 years but nuclear cataract with its mixed form was found to be higher in subjects with age <60 years. The frequency of posterior sub-capsular cataract and nuclear cataract + posterior sub-capsular cataract was also high in younger age subjects. Nuclear cataract typically develops as the result of age related sclerotic changes in lens. Because of this fact, nuclear cataract is sometimes referred to as an age-related nuclear cataract. Signs of Nuclear cataract include hardening and yellowing of the nucleus of the lens, while in advanced stages the colour may turn brown or rarely black.

An important finding of this study was that mature cataract was diagnosed in only 5% of the total cases. This indicates that there is a growing level of awareness among our local population to seek medical consultation at an earlier level. This might also be attributed to the services provided by the surgical eye camps which are primarily organized to eradicate the cataract related blindness.

A study shows that subjects who worked indoor had a high frequency of nuclear cataract (NC) and cortical cataract¹³. So, in our present study nuclear cataract (NC) and cortical cataract (CC) were found to be higher in housewives. Surprisingly, in our study more females presented to the Ophthalmology department than males. This is in contrast to majority of studies conducted in Pakistan. The study was conducted in a general hospital, so many

subjects presenting to other departments might have visited the eye department for their ocular problems and were diagnosed for cataract. Women in this region are mostly involved in house hold activities like cooking. Smoke from firewood might be a factor causing cataract. A significant number of patients were not actively involved in any profession or were living retirement life.

This study must be appraised as a brief time study of various morphologies of cataract in Sargodha. A long-term study must be carried out in this region to examine the various trends and morphologies of cataract and include a higher number of populations.

Conclusion:

In our study, the most frequent type was nuclear cataract (NC) alone and also with its mixed form with a higher frequency in age >60 years. Further studies must be carried out to find different types and trends in this area.

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Vision Related Quality of Life Among Keratoconus Patients and Factors Affecting the Quality

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ABSTRACT:

Objectives: The purpose of this study was to assess vision related quality of life among keratoconus patient and also to identify associated factors that can affect vision related quality of life among keratoconus patients.

Subjects and Methods: It was a cross sectional study conducted on 312 keratoconus patients, out of which 109 had undergone corneal cross linkage (CXL) surgery. Convenient non-randomized sampling technique was used for selection of sample. Sample was selected from outpatient department of Al-Shifa Trust eye hospital Rawalpindi. Data were collected by using reliable scale of NEI VFQ-25 and analyzed by using SPSS version 17. Chi square test of independence was used to assess any association of vision related quality of life of keratoconus patients with other variables.

Results: Vision related quality of life was found to be good in 51% patients while 35% respondents said that they remained worry about their eye sight most of the time. Visual acuity, education status, CXL surgery and type of CXL showed significant association with VQOL ($p < 0.05$).

Conclusion: Keratoconus affects vision related quality of life of patients but CXL surgery and stability in visual acuity can help to improve it. Therefore, our study suggests maintaining visual acuity of keratoconus patients by timely diagnosis and CXL surgery. *Al-Shifa Journal of Ophthalmology 2017; 13(4): 201-9. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

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Introduction:

According to WHO health is "a state of complete physical, mental, and social well-being of individuals and not merely the absence of disease". Vision is a sense of sight through which we perceive shapes, color, distance and movement of an object. Visual acuity is the resolving power of an eye and is a sensitive test for integrity of visual system. Decrease in vision may drastically affect the individual's daily life activities and may cause social disability. Quality of life (QOL) is a broad multidimensional concept that usually includes subjective evaluations of both positive and negative aspects of life. Reduced vision sets limit on daily life activities, may cause negative effect on "vision related quality of life"¹.

Keratoconus is non-inflammatory, progressive disease of eye in which normal

dome shaped cornea becomes thin and changes into cone shape with the apex of the cone being forward, this ectasia of the cornea induces irregular astigmatism, resulting visual impairment. Incidence of keratoconus has been estimated to be 5-23 per 10,000 and prevalence of keratoconus has been estimated to be 5.4 per 10,000². A study suggested that the male-to-female ratio of prevalence of keratoconus was 1: 2.5³.

The prevalence of keratoconus varies according to the geographical location, ranging from 0.3 per 100,000 in Russia to the 2300 per 100,000 in central India. The 1st population-based study was done by Hofstetter using a Placido disc and the reported incidence of keratoconus in this study was 600 per 100,000⁴.

As keratoconus is usually diagnosed during young age and it causes painless progressive deterioration of vision for near and distance, photophobia and monocular diplopia, so it has an impact on vision related quality of life and life planning of the patients⁵. 'Corneal collagen cross-linking is a medical procedure to strengthen the corneal tissues by using riboflavin and UVA irradiation'. Corneal collagen cross-linking (CXL) is the first and only treatment option, which actually stops or slows down the progression of keratoconus. Corneal collagen cross-linking is a treatment and management option which is not only supposed to prevent disease or improve prognosis but also has a strong psychological impact on patients, for their mental and physical wellbeing, therefore, it is also believed that there will be change in quality of life of an individual comparative to the pre-CXL⁶. In early age of life this procedure is effective because cornea is flexible and vision worsening chances are more so disease progression halting is very necessary but in the late 30's CXL is not usually required because cornea

stiffens and chances of disease progression are less⁷.

The purpose of this study was to assess vision related quality of life (VQOL) among keratoconus patient and also to identify associated factors that can affect vision related quality of life among keratoconus patients.

Subjects and Methods:

This cross-sectional study was conducted on patients having keratoconus of all stages, not gone through CXL procedure and also keratoconus patients reporting after 6 months of CXL procedure at Cornea clinic of Al Shifa trust eye hospital Rawalpindi. Study was conducted at Cornea department of Al-Shifa Trust Eye hospital from October 2016 to Feb 2017. Sample size was 312, calculated with the help of open epi online available software and sample was collected by non-random convenient sampling.

Questionnaire included mainly three sections, demographic, clinical aspects and modified NEI VFQ-25 which was further divided into general vision, difficulty with vision related activities and response against vision problems. The responses for NEI VFQ were taken on three-point Likert scale. The dependent variable (VQOL) was basically computed by adding all responses from NEI VFQ and was transformed into binary variable by taking mean value. Chi-square test of independence (Fisher's exact was used where needed) was used to assess associations with p-value <0.05 considered as significant.

Results:

Sixty percent of the respondents were male and majority of them were from rural areas (N=200 - 64%). Married participants constituted 21% (N=65) and 53% reported education level of primary to matriculation (Table 1).

Ninety seven percent (N=303) respondents had bilateral keratoconus. Majority of the participants (N=203, 65%) had not undergone CXL procedure (Table 2). Among those who went through CXL procedure, 74% were treated free of cost, while 48 % had undergone CXL >12 months ago. Unilateral surgery was reported by 27% respondents and use of contact lens was not common among participants (6.4%).

The mean vision related quality of life score was 99 ± 15 , ranging from 42 to 133 (Figure 1). Sixty two percent respondents rated their health in good state while 35% respondents said that they remained worried about their eye sight most of the time. When they were asked about further items of NEI VFQ, 49% of them said that they never felt difficulty in using stairs. Forty three percent participants highlighted severe difficulty in recognizing people's face and 44% were facing severe difficulty in watching TV (Table 3).

When respondents were asked about their response regarding vision problems, 68% participants said that they go out of their home for different activities, despite of the disease. Among those who had good VQOL, 30% were male and 18% females. However, statistically significant association was not found between gender and VQOL, $\chi^2(1) = 1.024$, $p = 0.31$.

Comparison of VQOL with different age groups showed 109(35%) participants in 14-22 years age category & there was no statistical significant association between age and VQOL in keratoconus patients ($p > 0.05$) and χ^2 (df) = 1.964(1). Education was found to be significantly associated with VQOL, χ^2 (df) = 6.48(2) & $P < 0.05$. There was no significant difference between impact of unilateral and bilateral keratoconus on VQOL, with χ^2 (df) = 3.134(1) & $P > 0.05$.

CXL surgery had a significant impact on VQOL among keratoconus patients, with χ^2 (df) = 5.53(1) & $P < 0.05$, while 58% participants who had undergone surgery, showed good VQOL. Seventy five percent of eyes that had undergone CXL, with visual acuity of 6/36-6/18 & 6/12-6/6, reported good VQOL. In comparison, 54% eyes with CXL having visual acuity CF-6/60, reported a poor VQOL. The difference was statistically significant with χ^2 (df) = 7.68(2) & $P < 0.05$.

Patients who had undergone bilateral CXL surgery (N=25) reported good VQOL in 68% cases as compared to those who underwent unilateral procedure (N=84), reporting good VQOL in 55% cases. With χ^2 (df) = 6.88(2) & $P < 0.05$, the difference was statistically significant. (Table 4)

Table 1 Demographic Characteristics

Demographic characteristics	Frequency (N=312)	Percentages
Age(years)		
14-22	201	64
23-50	111	36
Gender		
Male	186	60
Female	126	40
Education		
Illiterate	16	5
Primary to metric	166	53
Higher	129	41
Employment status		
Non-Working	233	75
Working	78	25
Monthly income*		
Up to 20,000	67	83
20-50,000	12	15
Above 50,000	2	2.5
Living area		
Urban	112	36
Rural	200	64
Marital status		
Married	65	21
Unmarried	246	79
Others	1	0.3
Province		
Punjab	176	56.4
KPK	95	30.4
Kashmir	32	10.3
Others	9	2.9

*N=81(because of missing values)

Table 2 Clinical Characteristics

Clinical variables	Frequency (N=312)	Percentage
Keratoconus		
Unilateral	9	2.9
Bilateral	303	97
CXL surgery		
Unilateral	84	27
Bilateral	25	8
No CXL	203	65
Visual Acuity (Eye with CXL)*		
Cf-6/60	48	44
6/36-6/18	40	36.6
6/12-6/6	21	19.3
Contact Lens		
Yes	20	6.4
No	292	93.6
Other ocular surgery		
Yes	50	16
No	262	84

*N=109 (Because of missing values)

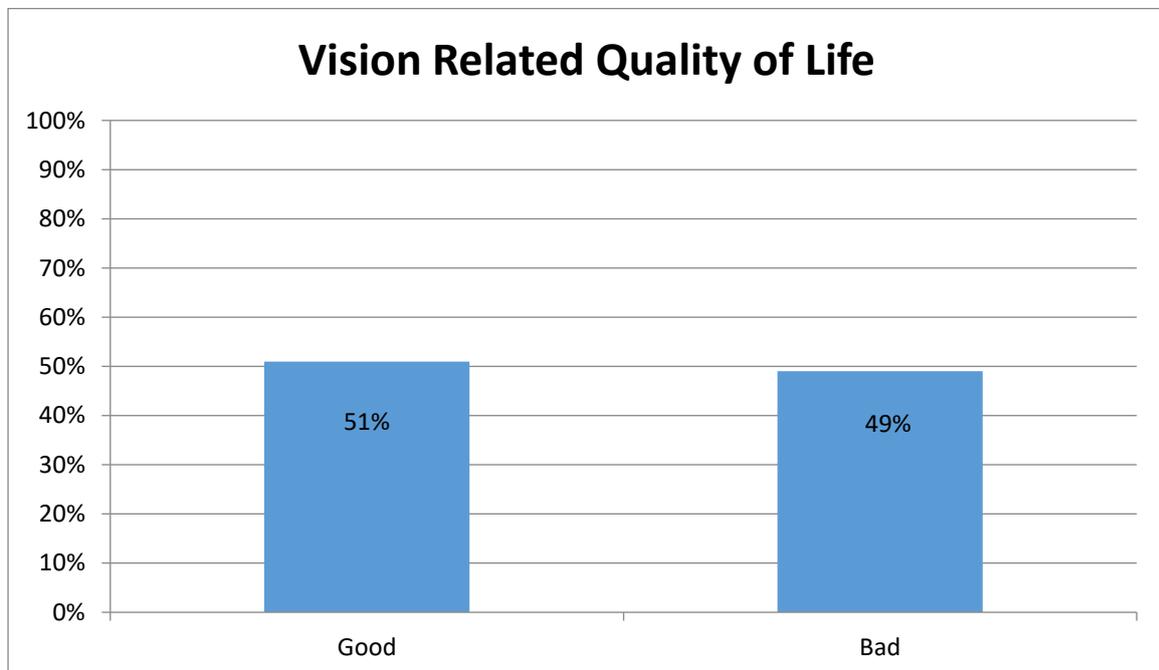


Figure 1 VQOL of Keratoconus Patients

Table 3 NEI-VFQ 25 Items Description

VQOL Items	Severe (%)	Moderate (%)	None (%)
Pain or discomfort in and around your eyes	20	20	30
Difficulty, you have using stairs	6	14	49
Difficulty noticing objects while walking	3	9	70
Difficulty in doing work/ hobbies	14	28	13
Difficulty you have while reading ordinary print	17	29	24
Difficulty you have seeing yourself in mirror	10	18	20
Difficulty you have finding objects from mess	9	26	6
Difficulty you have seeing people's face	43	24	17
Difficulty you have matching colors of clothes	1	2	91
Difficulty you have visiting others homes	2	7	72
Difficulty you have going out to see movies or sports	4	9	68
Difficulty you have in doing job/home chores	3	7	72
Difficulty you have in watching TV	44	29	3

Table 4 Determinants of Vision Related Quality of Life (VQOL) among Keratoconus patients

Variable	VQOL		X ² (df)	p-value
	Poor N (%)	Good N (%)		
Gender Male Female	82 (12%) 69 (22%)	95(30%) 57(18%)	1.024(1)	0.31
Age(years) 14-22 23-50	109(35%) 51 (16%)	92(29%) 60(19%)	1.964(1)	0.16
Education Illiterate ≤ Matric Higher	12(75%) 90 (54%) 58 (45%)	4(25%) 76(46%) 72(55%)	6.48(2)	0.03
Keratoconus Monocular Binocular	2 (22%) 158 (52%)	7 (78%) 145 (48%)	3.14 (1)*	0.07
CXL Surgery Yes No	46 (42%) 114 (56%)	63 (58%) 89 (44%)	5.53 (1)	0.01
Visual Acuity (Eye with CXL) CF-6/60 6/36-6/18 6/12-6/6	26(54%) 10(25%) 9(43%)	22(46%) 30(75%) 12(57%)	7.68 (2)	0.02
CXL (Type) Monocular Binocular	38 (45%) 8 (32%)	46 (55%) 17 (68%)	6.88 (1)	0.03

*Fisher exact (expected count in a cell<5)

Discussion:

Keratoconus is characterized by progressive corneal thinning that leads to protrusion of cornea, irregular astigmatism and also loss of vision. In spite of all laboratory and clinical investigations, etiology of Keratoconus is still unclear. Our study used NEI VFQ-25 questionnaire, which is currently the most appropriate tool to assess psychological, social and physical aspects of the patient's health with any eye

diseases⁸. According to our knowledge this is the only study which categorized VQOL into binary (poor and good) response, that gave an accurate demarcation between good and poor VQOL among keratoconus patients, which previous studies could not exhibit⁹.

This study was conducted to find the vision related quality of life among keratoconus patients. Moreover, the study also assessed

difference of outcome for the factors that can affect VQOL in keratoconus patients. Our study showed mean level of 99 ± 15 (51% respondents with good VQOL). In comparison, a case control study reported a mean composite score of 75.2 ± 17.2 for keratoconus, which is different from our findings⁹.

Visual acuity (eye with CXL) was found to be statistically associated with VQOL and it is similar to the findings of another study, while gender of keratoconus patients was not found to be associated with VQOL, which is different from previous studies¹⁰.

The present study has also found a statistically significant association between education & VQOL ($p < 0.05$), this is supported by another study which showed education to be significantly associated with VQOL¹¹. Sixty five percent respondents did not have CXL surgery and among these 56% showed poor VQOL. On the other hand, those who had undergone CXL showed (58%) good VQOL which depicted positive effect of this surgery on VQOL and this association was statistically significant ($P < 0.05$). Moreover, this finding was also reported by many other researches. In this study association between CXL surgery (monocular or binocular) and VQOL was also statistically significant ($P < 0.05$). The findings revealed a better VQOL among those who had surgery of either type. However, binocular surgery exhibited 68% good VQOL as compared to 55% among monocular, these results were supported by previous researches as well^{10, 11, 12}.

The possible limitation of our study can be the inclusion of all those patients who reported at a hospital, which are considered to be more concerned about their health which may show bias for NEI-VFQ items. Moreover, we used convenient sampling. However, our study filled a conspicuous gap in literature

especially for Pakistan. We further suggest cohort-based study to analyze VRQOL with varying stages of Keratoconus.

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