ISSN 1990-3863

A
S
J
O

Al-Shifa
Journal of Ophthalmology

Vol. 17, No. 3, July – September 2021

QUARTERLY PUBLISHED

Logo

Abstracts available at http://www.alshifa-eye.org.pk/Journal.php and
http://www.pakmedinet.com/ASJO
Manuscript submission through online platform ejmanager.com

Indexed in Index Medicus -EMR

Recognized by Pakistan Medical & Dental Council – IP/033

Al-Shifa Journal of Ophthalmology

A Journal of
Al-Shifa Trust Eye Hospital, Rawalpindi

Aims and Scope: ASJO, the official journal of Al-Shifa Trust Eye Hospital, Rawalpindi, publishes original reports of research in Ophthalmology mostly in the form of clinical studies. Topics may include new diagnostic and surgical techniques, treatment methods, atypical case reports, major and mini-reviews, preventive ophthalmology including health economics and applied research findings.

Inquiries or comments regarding the journal may be directed to the editorial board, anonymously if so desired. Addresses of board members may be obtained from the editorial office or official website of Al-Shifa Trust; www.**alshifaeye**.org

Information for Authors

Authors are required to enclose the following statement, properly signed, with the manuscript at the time of submission.

"In consideration of the Al-Shifa Journal of Ophthalmology's taking action in reviewing and editing my (our) submission, the author(s) undersigned hereby transfer(s), assign(s), or otherwise convey(s) all copyright ownership to the Al-Shifa Journal of Ophthalmology in the event that such work is published by the Al-Shifa Journal of Ophthalmology".

Type **DOUBLE-SPACE** on 8½ x 11- inch white sheets, leaving ONE INCH margin on ALL SIDES. Arrange contents as follows:

1. **TITLE PAGE** should be numbered as page 1 and should have on it only (a) the title, (b) name(s) of author(s), (c) the institution(s), (d) address for reprints and inquiries, and (e) the name(s) of sponsoring organization(s) - NOTHING ELSE.
2. **ABSTRACT** should be the only material on page 2. It should be no more than 250 words. Give here the author's OWN exact data, amount, percentages, etc., as presented in the paper and the conclusions drawn there from. Use "active voice" in writing.
3. **TEXT** of the articles should be divided in sections of**:** (A) INTRODUCTION**,** (B) PARTICIPANTS AND METHODS (or CASE REPORT), (C) RESULTS and (D) DISCUSSION. Write the whole paper in "active voice" and avoid "passive voice".
4. **ACKNOWLEDGEMENT:** Keep these to an absolute minimum, and be specific, e.g., "thanks are due to Mr. …for Fig.2".
5. **REFERENCES** should be consecutively cited in the body of the paper and listed at the end in the same order following Vancouver citation style [For Journal Articles; Author(s)-Family name and initials. Title of article. Title of journal –abbreviated Publication year, month, day (month & day only if available); volume(issue):pages]

Each listed reference must give full title of the paper or book and the names of ALL the authors and don't use 'et al'. Adhere to the following style in typing them.

FOR ARTICLES:

1. Afghani T, Qureshi N, Chaudhry KSA. Screening for Diabetic Retinopathy: a comparative study between hospital and community-based screening and between paying and non-paying. J Ayub Med Coll Abbottabad. 2007; 19; 16-22.
2. Cochereau I, Goldschmidt P, Goepogui A, Afghani T, Delval L, Pouliquen P, Bourcier T, Robert PY. Efficacy and safety of short duration azithromycin eye drops versus azithromycin single oral dose for the treatment of trachoma in children - a randomised, controlled, double-masked clinical trial. Br J Ophthalmol. 2007; 91:667-72.

(Reconfirm the spelling of names, Vol. pages, year, title, etc.).

FOR BOOKS

1. Newell FW: Ophthalmology: Principles and Concepts. 6th ed., St. Louis. C.V. Mosby Company, 1986, p.73.
2. Duke- Elder S, and Leigh AG: Diseases of the Outer Eye. Cornea and Sclera. In Duke-Elder S (ed): System of Ophthalmology, Vol. 8, Part 2. St. Louis C.V. Mosby Company, 1965, pp.110-114.

(Recheck publisher, City, etc.).

FOR CITING FROM INTERNET SOURCES

Step 1: Name the author, last name first. If no author is listed, then skip this step.

Step 2: Put the title of the work next. This is not the title of the website but the title of the page within the website that you are accessing. Put this information in quotation marks.

Step 3: Place the title of the overall website next and underline it. Look at the web address or find the link to the homepage in order to find the title.

Step 4: List the publication information. Most articles (or web pages) have a "last updated" date if you can't find an actual date for the specific article you are quoting.
Step 5: Include the date of access. This is the date you accessed the Internet source.
Step 6: Place the URL (the website address) at the end of the citation. Copy and paste the URL so that you ensure you have it down accurately.
Step 7: Check your Internet citation for accuracy. The final Internet source citation should look like this:
Structure:
Author or originator. Title of item. Title of website [Online] Date of document or download (day, month, year). URL <http://address/filename>
Example:
U.S. Census Bureau. "American Fact Finder: Facts About My Community." [Online] 17 Aug 2001. <http://factfinder.census.gov/servlet/BasicFactsServlet>.

6. **FIGURES** should be numbered in order of appearance in the text. Each figure should have pasted on its back a label with (1) figure's number, (2) the last names of authors, and (3) an arrow indicating the top of the figure. Nothing else should be written or pasted on the back of the figure or a photograph. Legends of the figure should be typed DOUBLE-SPACED on a SEPARATE SHEET, and should include description of features shown, name of author, name of structures, kind of stain, magnification, etc. Example

Figure 1 (Haq, Afghani, and Qadir). Right eye. Histologic section of tumor, spindle-B type malignant epithelioid cells at the right upper corner, (Hematoxyline and eosin x 400).

7. **TABLES:** should be typed DOUBLE-SPACED, with NOTHING underlined TRIPLE-CHECK all numbers and percentages.

Previously published material and figures should include permission to reproduce from original publication and original author. Photographs with faces should be accompanied by permission to publish from the subject of the photograph or by a parent in case of minor. Photographs should be color printed.

THE JOURNAL only accepts manuscripts in ENGLISH

Type EVERYTHING double-spaced, and underline nothing. An abbreviated title of four or less words, the last names of the authors and the page number should be provided in the upper right-hand corner of all pages. DON'T use abbreviations. DOUBLE-CHECK the number and percentages in tables. Incomplete manuscripts will not be acknowledged, and those received without duplicate will be returned to the authors. Papers will be accepted on the understanding that these are not simultaneously being submitted to any journal or publication, and that these have not been previously published. All papers will be subject to reviews by referees and, if necessary, to revisions. THE JOURNAL will also consider for publication, letters, short notes, useful diagnostic and therapeutic tips, announcements, and interesting photographic documentation.

Al-Shifa Journal of Ophthalmology accepts manuscript submissions through ejmanager.com online submission platform. For submission of manuscripts authors should register an account using the link http://www.ejmanager.com/my/ajo/

Al-Shifa Journal of Ophthalmology

Editorial inquiries should be addressed to Prof. Dr. Tayyab Afghani, Department of Orbit and Oculoplastics, Al-Shifa Trust Eye Hospital, Jhelum Road Rawalpindi, Pakistan.
Tel: 0092 51 5487820-25, Fax: 0092 51 5487827: Email:aqrcpio@yahoo.com ;
Web site: www.alshifaeye.org.pk

EDITORIAL

Role of Pachymetry in Glaucoma Management

Mahmood Ali

Goldmann Applanation Tonometer (GAT) is considered the "gold standard" method for intraocular pressure IOP evaluation, however, many factors may affect its precision. Among these, there are factors related to the morphology of the eye, such as central corneal thickness (CCT) or corneal curvature, and those related to corneal biomechanical properties like corneal hysteresis and ocular pulse amplitude. [1]

The first indication that CCT could influence GAT measurements came from the work of Ehler, who in 1975 cannulated 29 eyes and correlated CCT to the differences between "true" and "IOP measured by GAT". The study suggested that GAT error could be as large as 6 mmHg in otherwise normal eyes, with most accurate readings achieved in corneas with CCT of 520 μm. However, due to relatively small sample size and racial homogeneity; the significance of the work did not gain widespread recognition until the publications of the Ocular Hypertension Treatment Study (OHTS) which found an association between thin CCT and progression of ocular hypertension to Primary Open Angle Glaucoma. However, 25 % of the cohort of OHTS had CCT values above 600 μm and almost half of OHTS subjects had "corrected" IOP values of ≤21 mmHg if Ehler's correction of 7 mmHg for every 100 μm deviation from 520 μm is applied. [2]

On average, thicker corneas lead to erroneously elevated GAT measurements, and thinner corneas result in false low readings. Various formulas have been used to improve precision of GAT measurements, by adjusting IOP on the basis of CCT. Although CCT has been identified as a risk factor for development of glaucoma but the evidence of this parameter as an independent risk has not been established in randomized controlled trials. The European Glaucoma Society recent guidelines do not recommend the practice of applying correction factors to IOP readings on the basis of pachymetry since none of the correction tables have been validated and the relationship is not a linear one. Simply categorizing corneas as "thin, average, or thick" rather than trying to be more specific may be a more practical approach while evaluating glaucoma cases. This means that dealing with a case with thin pachymetry may be taken as a caution that the IOP readings in that particular case are likely to be underestimated. The correlation of having a thin cornea to the pathophysiology of glaucomatous damage at lamina cribrosa is also a huge topic that invites the interest of investigators for further research.[3]

References:

1. Wang J, Cayer MM, Descovich D, Kamdeu-Fansi A, Harasymowycz PJ, Li G, Lesk MR. Assessment of factors affecting the difference in intraocular pressure measurements between dynamic contour tonometry and Goldmann applanation tonometry. J Glaucoma. 2011;20(8):482-7.
2. Sng CC, Ang M, Barton K. Central corneal thickness in glaucoma. Curr Opin Ophthalmol. 2017;28(2):120-126.
3. Medeiros FA, Meira-Freitas D, Lisboa R, et al. Corneal hysteresis as a risk factor for glaucoma progression: a prospective longitudinal study. Ophthalmology. 2013; 120:1533–40.

ORIGINAL ARTICLE

Role of Ultrasonography in Detecting the Posterior Segment Pathologies in Pre-operative Cataract Patients

Samina Karim[1], Hamid ur Rehman[1], Adnan Ahmad[2]

Abstract

Objectives: To study the role of B scan in detecting the posterior segment pathology in pre-operative cataract patients

Study design: A cross sectional descriptive study

Place and Duration of Study: The study was carried out at Department of Clinical Ophthalmology, Khyber girl's medical college, Hayatabad Medical Complex (HMC), Peshawar from 15th August 2019 to 15th February 2020.

Materials and Methods: This was a cross-sectional descriptive study. There were 317 eyes of 260 patients and both male and female were included in the study. First the visual acuity and detail slit lamp examination of all the patients was carried out in the OPD. Then ultra-sonography was performed in all the patients with dense cataract to evaluate the posterior segment pathology and the findings was documented in proforma.

Results: In this study, we evaluated 317 eyes of 260 patients who present with dense cataract to the OPD of eye department. Among 260 patients, 58 (22.3%) patients develop cataract after a history of trauma while 202 (77.7%) have no history of trauma. On ultrasound examination 215 (67.8%) patients have no posterior segment pathology but in 102 (32.2%) patients a significant posterior segment pathology was detected. Posterior vitreous detachment (PVD) and vitreous opacities was the most common pathology among the dense cataract eyes which was 7.6% and 5.7% respectively. Which was followed by retinal detachment (4.7%) and vitreous hemorrhage in 4.7% eyes of dense cataract.

Conclusions: It was concluded that in the preoperative dense cataract patients, the two-dimensional ultrasonography was the most effective tool in detecting the posterior segment pathology. It will also affect the strategy of the surgical procedure, outcome of the surgery and postoperative visual prognosis. *Al-Shifa Journal of Ophthalmology 2021; 17(3):103-108.*

1. *MTI KGMC Hayatabad Medical Complex Peshawar*
2. *Nowshera Medical College Nowshera*

Originally Received: 13 April 2021
Revised: 19 June 2021
Accepted: 22 July 2021

Correspondence to:
Dr. Hamid ur Rehman
Email: hamidwaziry@hotmail.com

Introduction:

Cataract is considered to be the common cause of blindness in the world and according to the WHO, cataract is responsible for about 47.8% of the blindness[1].While in Pakistan cataract is responsible for 51.5% of blindness[2]. Cataract surgery is one of the most common and affordable procedure to prevent this blindness.

Cataract has been defined as the opacity of the lens which preclude the visualization of posterior segment. For the prognosis of vision, the visualization of the posterior segment is necessary after cataract surgery.

In such cases ultrasonography (USG) provided information regarding the posterior segment pathologies before cataract surgery[3].

Ophthalmic USG consist of two types of scans, A and B and both of these important for the diagnosis of the posterior segment pathology. A-scan can be used for the biometric calculation and for the measurement of the tumor size, while B-scan used for quantifying the reflectivity of lesions in the eye and orbit. In the diagnostic ophthalmology different types of probes used for the eye examination which have different frequencies. The frequency of the probe for the posterior segment examination is 8-10 MHz. Over the last few decades ultrasonography has greatly advanced and this has enabled us to study the posterior segment of the eye in the presence of opaque media[1].

B-scan gives exceptionally detailed bi-dimensional images of the posterior segment in eyes with advanced cataracts. Detection of significant abnormalities using ultrasound prior to cataract surgery helps in planning surgery and allows the surgeon to provide an appropriate prognosis to the patient. On B scan examination, various studies shown the incidence of the posterior segment pathology in dense cataract varying from 8.6% to 66%[4,5].

The aim of this study was to visualize the pathologies of the posterior segment of eye in dense cataract patient by using the diagnostic tool of B-Scan ultrasonography, which precluding a direct visualization of fundus prior to cataract surgery, to find out any posterior segment lesion and to help the surgeon in determining the surgical strategy and postoperative visual prognosis.

Materials and Methods:

This cross-sectional descriptive study was conducted on the outdoor patients in the department of ophthalmology, HMC Peshawar over a period of 6 months from 15th August 2019 to 15th February 2020. Data was collected with the help of proforma.

Inclusion criteria:

- Patient send for routine ultrasound examination with dense cataract.
- All age group and either sex
- Traumatic and non-traumatic patients

Exclusion criteria:

- transmittable ocular surface infections such as viral conjunctivitis,
- Penetrating ocular trauma with iris or vitreous prolapse
- History of previous glaucoma or vitro retinal surgery
- Siliconized eyes

For the purpose of co-operation, the procedure of the B-Scan was explained to the patient. The patient was comfortably lie down on the couch and a probe of 8-10MHz frequency was placed on the surface of the globe with closed lid after applying of the gel. Then the globe was examined by using different position of the probe such as axial, longitudinal and transverse position of the B –Scan along with A-Scan. Both High gain (80 to 90dB) and low gain (60 to 70dB) sensitivity were used during ultrasonography for the detection of different posterior segment pathologies. The findings were documented in the proforma and the data was then analyzed by using SPSS.

Results:

In this study, we evaluated 317 eyes of 260 patients who presented with dense cataract in the eye OPD during a period of six months. In our study the range of the age was 3-60 years. In which male were 131(50.4%) and female were 129 (49.6%).

In 260 patients, 58 (22.3%) patients have post-traumatic cataract and 202 (77.7%) have non-traumatic dense cataract, in which posterior segment was not visible on slit lamp examination. The eyes involvement

was given in the table 1, in which the bilateral dense cataract seen in 58 (22.3%) cases. While Different posterior segment findings on B-Scan ultrasonography were shown in table-2 in which the normal ultrasound findings were observed in 215 (67.8%) eyes while abnormal USG findings observed in 102 eyes (32.2%). The Commonest posterior segment lesion were posterior vitreous detachment (7.6%) and vitreous opacities (5.7%) followed by retinal detachment (4.7%) and vitreous haemorrhage (4.7%). The percentage of others pathologies are 4.1% which most commonly include optic disc swelling. Similarly, the vitreous inflammation seen in 3.5% eyes. While IOFB, posterior staphyloma and PHPV seen in 0.9%, 0.6%,0.3% eyes respectively.

Table 1: Eyes involvement (N=260)

EYES	Number	Percentage
RIGHT	97	37.3
LEFT	105	40.4
BOTH	58	22.3
TOTAL	260	100

Table 2: Posterior segment findings on USG

USG findings	**Total no of eyes**	**Percentage**
Normal	215	67.8
Retinal Detachment	15	4.7
Posterior Vitreous Detachment	24	7.6
Vitreous Haemorrhage	15	4.7
Intra Ocular Foreign Body	3	0.9
Asteroid Hyalosis/Vitreous Opacities	18	5.7
Vitreous Inflammation	11	3.5
Persistent Hyperplastic Primary Vitreous	1	0.3
Posterior Staphyloma	2	0.6
Others	13	4.1
Total	317	100

Discussion:

Ophthalmic ultrasound plays an important role in the diagnosis of various ocular and orbital diseases. Ultrasonography is indicated whenever the opacification of the ocular media does not allow the examiner to see the posterior segment and to identify the various posterior segment pathology[1,2]. In dense cataract patient the posterior segment is also not visible. So, the surgeon is unable to determine the visual outcome in

such patients. B scan help in the assessment of the visual outcome in such cases[1].

In our study a total of 260 patients with dense cataract are examined by ultrasonography. The range of the age in our study is from 1 to 65 years. While Qureshi reported a range of age 1-79 years of the patients with dense cataract in which the posterior segment was not visible[1]. While in Mobin et al study the range of the age was 1-80 years and 40.2% of cataract patients among them were lies between 61-70 years of age group.[6]

In our study, male and female ratio is almost equal that is 50.4% and 49.6% respectively. While in Mobin6 et al study the male (61.8%) with the dense cataract were more than the female 38.2%.In the study of Gareeballah A[7] et al the female with the dense cataract were more than male patients.

Bilateral dense cataract is also very common in our population, in our study, the bilateral dense cataract seen in 22.3% cases. While in Salman Aet al study there were only 24 patients of bilateral cataract out of 394 patients, this because in Pakistan the blindness due to cataract was51.5% according to the Hussain Z et al study because of the unawareness of population in the ruler areas.[4,4]
Most of the cataract patients belong to the non-traumatic group (77.7%) but traumatic group is also very common in our study (22.3%). This is similar to Jain A et al study in which the non-traumatic group is 82% and traumatic group is 18%.[8] But in Qureshi MA et alstudy90.53% patients belong to the non-traumatic group and only 9.4% were from traumatic group.[1] This is because trauma in young patients is more common in our population.

In our study 67.8% had normal ultrasound findings while in 32.2 % cases different types of posterior segment pathologies are seen. While in Amjad et al study the posterior segment pathology were identified on ultrasonography was only 8.6%.[4] While12% patients had ultrasonically detectable posterior segment lesions in Qureshi MA et al study.[1] Similarly, in the study of Bello TO et al and Ngweme G et al , the normal posterior segment seen in 94.8% and 91.08% patients while posterior segment pathologies seen in 5.2% and 8.92% cases respectively.[9.10] The percentage of the posterior segment pathology is also more common in our study because of the traumatic cataract patients which percentage is high in our study as compare to the other studies.

In our study, the most common posterior segment pathology is the posterior vitreous detachment (7.6%) which is almost similar to Mutwaly Ret al study which was 6.36%. While according to the Mobin M et al the PVD was only 2%.[6,11] This finding is much lower than the previous studies in which the percentage of PVD on B Scan was very high such as in Carrero et al, Gareeballah et al and Correa et al who reported the prevalence of PVD was 26.1%, 19.6% and 26.1% respectively.[7,12,13]

While according to the Mobin M 6et al study the retinal detachment (4%) was more common than PVD (2%). This finding is different from the previous studies, particularly to the studies in which prevalence of various abnormalities were assessed by B-Scan. It is also different from the Mendes et al (2009) study, in which the vitreous opacity was the most common pathology in preoperative cataract patients who underwent B-Scan ultrasonography examination which is about 12.1%.[14]

In our study the next most common posterior segment pathology is the vitreous opacity/asteroid hyalosis which is 5.7%. While in Qureshi MA et al study the incidence of asteroid hyalosis was 1.77% in non-traumatic preoperative cataract patients and in Jacob JM et al study it was 0.2%.[1,15] The incidence of this posterior

segment pathology is much lower as compared to the Mendes et al study, in which the vitreous opacities (12.1%) in cataract patient was the most common finding on the ultrasonography. [14]

In our study, the percentage of the retinal detachment and vitreous haemorrhage is 4.7% and 4.7% respectively. These findings of retinal detachment are similar to the Mobin M et al, Bello TO et al and Parrey MUR et al who reported 4% and 5.2% and 6% retinal detachment in cataract patients.[6,9,16] While according to the Qureshi MA et al and Ali and Rehman study, the retinal detachment in non-traumatic cataract patients was 1.47% and 3.3%, while in the traumatic cataract patients it was 21.12% and 29.26% respectively.[1,17] Similarly in Naik A et al study the retinal detachment in traumatic cataract patient was 17.1% while vitreous haemorrhage was 3.4% in Kumar J et al and 3.2 % in the Qureshi MA et al study. [1,18,19]

In our study, IOFB, PHPV and posterior staphyloma found in 3 (0.9 %), 2(0.6%), and 1(0.3%) patients respectively. Similar findings also present in Rafi et al study in which five (2.5%) eyes showed persistent fetal vasculature and 0.5% eyes have posterior staphyloma.[20] While in the study of Haile Met at and Chanchlani M, the percentage of IOFB and posterior staphyloma was more than our study.[21,22] The remaining 13 (4.1%) patients have other different types of miscellaneous lesions.

Thus, Ultrasonographic examination in dense cataract patients can provide information regarding the posterior segment pathology which helps in explaining accurate prognosis postoperatively. Although in some pathologies such as diabetic maculopathy, macular hole, branch and central retinal vein occlusion could not be diagnosed preoperatively on B Scan. Thus, it is advisable that patients undergoing cataract surgery should be warned of these limitations of ultrasonography.[23]

Conclusion:

It was concluded that in the preoperative dense cataract patients, the two-dimensional ultrasonography was the most effective tool in detecting the posterior segment pathology. It will also affect the strategy of the surgical procedure, outcome of the surgery and postoperative visual prognosis.

References:

1. Qureshi MA, Laghari K. Role of B-Scan Ultrasonography in Pre-Operative Cataract Patients. Int J Health Sci (Qassim Univ). 2010; 4: 31–7.
2. Dineen B, Bourne RRA, Jadoon Z, Shah S P, Khan M A, Foster A, et al . Causes of blindness and visual impairment in Pakistan. The Pakistan national blindness and visual impairment survey.Br J Ophthalmol. 2007; 91: 1005–10.
3. Madhu C and Roshan C. A Study of Posterior Segment Evaluation by B-Scan in Hyper Mature Cataract. J Clin Exp Ophthalmol 2016, 7:1.
4. Salman A, Parmar P, Vanila CG, Thomas PA, Nelson Jesudasan CA. Is ultrasonography essential before surgery in eyes with advanced cataracts? J Postgrad Med 2006; 52:19-22.
5. Awan ZH, Mahar PS, Memon M.S. Blindness and Poverty. Pak J Ophthalmol 2011; 27: 3.
6. Mobin M, Kanodia P, Malhotra R, Akaram SM, Yadav D. Role of B scan ultrasonography before cataract surgery in eyes with dense cataracts. JMSCR 2019; 7:890-894.
7. Gareeballah A, Gameraddin M B, Ali G, Babiker MS, ElzakMaisa. Sonographic findings in posterior segment of the eye in Sudanese adult patients examined with cataract. Sudanese J Opthalmol 2017; 9: 50-4.

8. Jain A, Gauba N, Kaur I, Singh S, Jaswal H. Role of B-Scan in Cataract Patients. Indian J ApplRadiol. 2017;3: 110.
9. Bello TO, Adeoti CO. Ultrasonic assessment in pre-operative cataract patients. Niger Postgrad Med J. 2006; 13:326-8.
10. Ngweme G, Bambi N, Lutete LF , Kilangalanga NJ , Hopkins A , Stachs O et al. Ophthalmic Ultrasonography in Sub-Saharan Africa—A Kinshasa Experience Diagnostics 2021, 11, 2009 .
11. Mutwaly R, Gammoh Y and Abdu M. Evaluation of role of ophthalmic ultrasonography in ophthalmic examination precataract surgery. SJOpthal,2020;12:23-26.
12. Carrero JL. Incomplete posterior vitreous detachment: Prevalence and clinical relevance. Am J Ophthalmol 2012; 153:497-503.
13. Corrêa ZM, Goldhardt R, Marcon AS, Marcon IM. Ultrasound findings in patients with dense cataracts. Arq Bras Oftalmol 2002; 65:609-13.
14. Mendes MH, Betinjane AJ, Cavalcante Ade S, Cheng CT, Kara-José N. Ultra-sonographic findings in patients examined in cataract detection-and treatment campaigns: A retrospective study. Clinics (Sao Paulo) 2009; 64:637- 40.
15. Jacob JM,Thadam JJK,Goudinho S. Evaluation of the relation between pre-operative b-scan findings and post – operative Fundus findings in patients with opaque media undergoing cataract surgery .IJAHR, 2019;2:30-33.
16. Parrey MUR,Bhatti MO, Channa S, Alswailmi FK. Posterior segment eye diseases detected by b-scan ultrasonography in advanced cataract. Indo Am. J. P. Sci, 2019; 06. 11261-11266.
17. Ali SI, Rehman H. Role of B-scan in preoperative detection of posterior segment pathologies in cataract patients. Pak J Ophthalmol. 1997; 13:108–112.
18. Naik A, Prasad S andMagdum R .Role of b-scan ultrasonography in detecting obscured ocular abnormalities in mature traumatic cataract.IJSR. 2019; 10:127-30.
19. Kumar J, Prasad K, NathRam A. Role of B-Scan in Advanced cataract Patients. IOSR-JDMS.2018; 17: 29-32.
20. Rafi P.M.M, Khan MR, Azhar MN. Evaluation of the Frequency of Posterior Segment Pathologies Determined by B-Scan Ultrasonography in Patients with Congenital Cataract. Pak J Ophthalmol 2013; 29: 210-13.
21. Haile M, Mengistu Z B-scan ultrasonography in ophthalmic diseases. East Afr Med J 1996; 73(11):703-7.
22. Chanchlani M. A study of B-Scan Ultrasonography in Detecting Posterior Segment Pathologies in Senile Mature Cataracts. Ophthalmology and Allied Sciences. 2018; 4:160-62.
23. Shaikh FU, Narsani AK, Jatoi SM, Shaikh ZA. Preoperative Posterior Segment Evaluation by Ultrasonography in Dense Cataract. Pak J Ophthalmol 2009; 25:135-8.

Authors Contribution

Concept and Design: Samina Karim, Hamid ur Rehman
Data Collection / Assembly: Samina Karim, Hamid ur Rehman
Drafting: Samina Karim, Hamid ur Rehman
Statistical expertise: Samina Karim, Hamid ur Rehman
Critical Revision: Adnan Ahmed

ORIGINAL ARTICLE

Association Between Central Corneal Thickness and Intra Ocular Pressure in Management of Primary Open Angle Glaucoma

Saman Ali[1], Muhammad Ali Haider[2], Nida Usman[3], Hafiza Ummara Rasheed[4]

ABSTRACT

Purpose: To assess the differences between intraocular pressure measured by Goldman Applanation Tonometer and adjusted value of intraocular pressure (IOP) based on central corneal thickness (CCT) and emphasize the significance of use of this adjusted value IOP based on central corneal thickness for management of Glaucoma.

Methodology: Patients of primary open angle glaucoma meeting the criterion coming to glaucoma clinic Mayo Hospital Lahore were included in the study. After taking informed consent patients were examined on slit lamp, IOP by GAT was taken with & without CCT(done by pachymeter). Probe of pachymeter after sterilization touched the center of the cornea and average of five connective readings in micrometer with standard deviation of three were taken. The adjusted IOP and target IOP was calculated. Visual field (VF) and Optical Coherence Tomography (OCT) were performed and previous treatment noted and change in treatment made according to adjusted IOP. Comparison was seen between the both treatment strategies that is treatment on bases of IOP without CCT and with CCT.

Results: Out of 105 patients, 40.9% males and 59% females were included in this study. The male corneas were found to be thinner in the range 445-617 micrometer with the mean 523 micrometers than females in the range of 475-650 micrometers with the mean of 552 micrometers. In our study it was found that there is a positive relationship between adjusted IOP based on CCT and treatment according to it where r = 0.723 and p = 0.000, which is less than p = 0.05 and shows significant results. Pearson correlation results shows positive direct relationship by adjusting IOP based on CCT and treatment affect according to adjusted IOP.

Conclusion: Exact/adjusted IOP help in accurate assessment and management of glaucoma and imparts less financial burden on the society. *Al-Shifa Journal of Ophthalmology 2021; 17(3):109-116. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

1. *Mayo Hospital Lahore*
2. *PGMI/AMC/LGH*
3. *Rahbar Medical &Dental College*
4. *COAVS Mayo Hospital Lahore*

Originally Received: 13 April 2021
Revised: 19 June 2021
Accepted: 22 July 2021

Correspondence to:
Muhammad Ali Haider, PGMI/AMC/LGH
Email: alihaider_189@yahoo.com

Introduction:

Glaucoma is the optic neuropathy with certain characteristics alterations in the optic disc and related defects in the visual field. The only treatable risk factor is intraocular pressure. There are several types of glaucoma. The two main types are open-angle and angle-closure. Primary open angle glaucoma is one of the variants of open angle glaucoma others being glaucoma suspects, ocular hypertension and normal tension glaucoma and secondary open angle glaucoma. Similarly, angle-closure can be classified as primary and secondary. Primary open angle

glaucoma is the prime cause of irreversible blindness worldwide having socioeconomic burden on the society. It had the prevalence of 1.96% in 2010.[1]
Intraocular pressure is one of the foremost factors in the diagnosis and treatment of ocular diseases like glaucoma. IOP is the pressure of eye ball balanced by aqueous production and its outflow. IOP ranges from 11-21 mmHg.[2, 3, 4]

Best method of measuring IOP is by Goldmann Applanation Tonometer based on the Imbert Fick Principle. Goldmann, 1957 proved that the intraocular pressure could be affected by CCT if measured by applanation tonometry.[5] Intraocular pressure measured by applanation tonometer in the patients with thin cornea were underestimated and those patients with thick cornea tended to be1. overestimated.[5,6, 7] Central corneal2. thickness is the thickness of central cornea which ranges from 490-560 micrometer with an average of 545 micrometer.[8] It can be accurately measured by a device called Pachymeter. The measure of Central Corneal Thickness is very important regarding Glaucoma management strategy in 15% patients[9, 10] and determining the Intra Ocular Pressure so as to calculate the adjusted Intraocular Pressure (IOP). Open angle glaucoma is a silent killer of vision and in primary open angle glaucoma the only modifiable risk factor in treatment is IOP.[11, 12, 13] Intraocular Pressure (IOP) is monitored very carefully with Goldmann Applanation Tonometer (GAT).Central corneal thickness effects the Intra Ocular Pressure measured by Goldmann Applanation tonometer.[9] Progression of primary open angle glaucoma is checked by monitoring intraocular pressure clinically and by visual field and Optical Coherent Tomography (OCT). Optical Coherent Tomography (OCT) detects structural defect due to primary open angle glaucoma and can be detected early as it depicts the ganglion cell complex.[14, 15]

Treatment of primary open angle glaucoma is based only on alteration of intraocular pressure. Many studies favor the fact that lowering the Intraocular Pressure (IOP) is presently the only way to reduce the progression of glaucoma. Target Intraocular Pressure (IOP) calculated on the basis adjusted Intraocular Pressure (IOP) as initial pressure leads to treatment with maybe one drug who were taking two drugs before and vice versa.[16]

Materials and Methods:

The research design of the current study is based on comparative cross-sectional study conducted at Glaucoma clinic, Mayo Hospital KEMU, Lahore. The sampling technique of the research study was Non probability purposive sampling.
Sample Selection
Both genders
Age 30-55yrs and above
Inclusion Criteria

- Ages between 30 to 55 years
- Primary open angle glaucoma with IOP >21mmhg ,visual field defects ,OCT defects

Exclusion Criteria

- Any corneal disease or scar on slit lamp examination
- Corneal Ectasia on slit lamp examination
- Any refractive corneal surgery such as LASIK & PRK on history irrespective of time duration.
- Retinal disease affecting optic nerve head on examination
- Secondary open angle glaucoma (pseudoexfoliation or pigmentary glaucoma) on slit lamp examination

Study Duration was 6 months during which 105 patients were taken for survey meeting the inclusion criteria selected by random sampling from the out-patient-department of Mayo hospital Lahore. The intra-ocular-pressure measured by Goldman Applanation tonometer, central corneal thickness was measured by pachymeter,

gonioscopy, visual fields, optical coherence tomography (OCT) was done. Informed consent was taken from all the participants. Adjusted IOP was measured and target IOP was calculated for each patient. A change in treatment regarding instillation of number of drops was noted in the same patients with IOP taken by Goldman Applanation tonometer and after measuring the adjusted IOP.

Normally the central corneal thickness averages 540 microns and average IOP is between the 10 to 20 mm of mercury. It was noted that thick cornea gave an over estimation of IOP and we had to deduct one millimeter of mercury for every 14.23 microns. On the contrary thin corneas under estimated the IOP and an addition of one millimeter of mercury for every 14.23 microns was done. Then we also noted the treatment taken by patients of primary open angle glaucoma with IOP measured by Goldmann applanation tonometer and change in treatment in the same patient with adjusted IOP.

Patients of primary open angle glaucoma coming to glaucoma clinic mayo hospital Lahore were included in the study meeting the criterion. After taking informed consent patients were examined on slit lamp, IOP by GAT taken with& without CCT. CCT done by pachymeter. Patient's eye were anaesthetized with Alcaine. Probe of pachymeter after sterilization touched the center of the cornea and average of five connective readings in micrometer with standard deviation of three were taken, adjusted IOP and target IOP calculated, VF and OCT was performed and previous treatment noted and change in treatment was made according to adjusted IOP. Comparison was seen between both treatment strategies.

Data Entry & Analysis was done by using SPSS 20. Quantitative variables were presented by using mean ± standard deviation. Qualitative variables presented by using frequency table & percentages comparison of the results of OCT and VF was compared in both treatment groups.
All the calculated information was examined by using SPSS. For quantitative data Spearmen Correlation was applied and for qualitative data CHI square test was applied.

Results:

The mean age of patients of POAG is 44.94 and standard deviation is 7.329. There were 59.05 % females and 40.95 % were males. Results are evident that males were at higher risk below 40 and females have high risk at older age i.e., 40 and above and males had thin corneas and females had thickness of corneas in range of 400 microns and 600 microns respectively.

Table 1 shows the average IOP of males in right eye was 18.1163±6.28001 and in left eye mean IOP was 17.9302± 6.5078. The average IOP of females in right eye was 21.1452± 9.00791 and in left eye mean IOP was 23.7419 ± 9.09681. Mean CCT of males in right eye 521.6977 ± 55.49283 and in left eye the mean CCT was 527.9535± 52.96268. Mean CCT of females in right eye 553.1935± 50.08447 and in left eye the mean CCT was 552.1935± 46.36379.
There is a positive relationship between adjusted IOP based on CCT and treatment. According to it where r = 0.723 and p = 0.000, which is less than p = 0.05 and shows significant results.
Pearson correlation results shows positive direct relationship by adjusting IOP based on CCT and treatment affect according to adjusted IOP. Results shows significant effect on treatment for CCT where r = 0.564 and p = 0.000 at 0.01 level of significance.

By applying ANOVA test to find out the significant difference between adjusted IOP, primary treatment and treatment based on CCT results (right eye) were F= 87.334, p-value = 0.0002 which is < 0.05, so there is a difference between management of

primary open angle glaucoma based on intraocular pressure measured with or without central corneal thickness by adjusting the dosage / Number of drops instilled.

After applying ANOVA test to find out the significant difference between adjusted IOP, primary treatment and treatment based on CCT results (left eye) were F= 37.878, p-value = 0.0002 which is < 0.05, so there is a difference between management of primary open angle glaucoma based on intraocular pressure measured with or without central corneal thickness by adjusting the dosage / Number of drops instilled.

Table 1: Measurements of IOP and CCT for right and left eye in males and females

Right Eye	Gender	N	Mean	Std. Deviation	Std. Error Mean
CCT_Micrometer	male	43	521.6977	55.49283	8.46258
	female	62	553.1935	50.08447	6.36073
IOP_GAT	male	43	18.1163	6.28001	.95769
	female	62	21.1452	9.00791	1.14401

Left Eye	Gender	N	Mean	Std. Deviation	Std. Error Mean
CCT_Micrometer	Male	43	527.9535	52.96268	8.07673
	Female	62	552.1935	46.36379	5.88821
IOP_GAT	Male	43	17.9302	6.50785	.99244
	Female	62	23.7419	9.09681	1.15530

Discussion:

There is a strong association between CCT and IOP as thin corneas lead to an underestimation and thick corneas lead to overestimation thus affecting the adjusted IOP especially effecting the extreme ranges of corneal thickness. Another study shows that when the corneal thickness is in the normal range it has small effect on GAT while having a significant relation when corneal thickness is markedly different.[17] Although some studies favor that this relationship is more useful for normal or thin corneas as ocular hypotensive agents/antiglaucoma drugs result in decrease in IOP. Thus, CCT measurements might be helpful in patient management in initiating the drugs. [18]

Positive correlation results in right eye revealed that there was a significant effect on treatment with adjusted IOP based on CCT where r = 0.564 and p = 0.000 at 0.01 level of significance. For left eye positive direct relationship was found to be significant by adjusting IOP based on CCT and treatment according to adjusted IOP, where r = 0.564 and p = 0.000 at 0.01 level of significance. These results are compatible with another study[13] however study by James D. concludes that simple IOP is equivalent in treating glaucoma rather than adjusted IOP.[19,20]

The total no of patients 105 were included in this study, where 59.05% females and 40.95% were males. The mean age and standard deviation of the patients was 44.94 ± 7.329.

In our study we observed that males were at higher risk below 40 and females have high risk at older age i.e., above 40.[21] For males it was contrary to what other studies have stated. One of the reasons being that males have thin corneas observed in our study and females have thick corneas in range of 400 microns and 600 microns respectively. In our study the mean IOP in females is more than males and CCT is also noted to be higher in females than males as opposed to another study conducted in Al-Ibrahim hospital in Karachi.[9] However another study shows that there was no association among IOP, CCT, age and gender. [22] another study by Graham Lee reported that there is an association between IOP and CCT but the amount of affect is dependent on individual variation.[23]

In our study the results of right eye with IOP measured by GAT where out of a total of 105 patients 53(50.48%) were taking single treatment, 38(36.19%) were taking double treatment and 8(7.62%) patients already taking triple treatment.

The results of right eye with adjusted IOP based on CCT show that out of 105 patients 61(58.1%) were currently taking single treatment, 36(34.29%) were now taking double treatment, and 8(7.62%) patients were taking triple treatment at present. The results of left eye with IOP measured by GAT where out of 105 patients 35(33.33%) were taking single treatment, 47(44.8%) were taking double treatment and 19(18.10%) patients already taking triple treatment. All the previous studies have compared the different treatment strategies in the form of medical, laser and surgical[24] whereas we have observed difference in number of drops in medical treatment alone.

The results of left eye with adjusted IOP based on CCT show that out of 105 patients 55(52.38%) were now taking single treatment, 42(40.00%) were now taking double treatment, and 8(7.62%) patients were now taking triple treatment.

Conclusion:

There is a strong association between CCT and IOP as thin corneas lead to an underestimation and thick corneas lead to overestimation thus affecting the adjusted IOP especially effecting the extreme ranges of corneal thickness. Adjusted IOP also has a direct effect on the treatment of POAG in the form of change in number of drugs.

Our results have revealed that males have relatively thin corneas than females. There is a difference of CCT and thus treatment based on adjusted IOP in right and left eye in patients of primary open angle glaucoma.

Recommendations:

Pachymetry should be included as a mandatory investigation of glaucoma because if missed IOP will not be accurate and will affect the treatment of the patients especially of ocular hypertension and primary open angle glaucoma. Males should get examined earlier as thin corneas present at a later stage of optic disc damage. Further studies should be done to see the reason for difference of CCT in right and left eye.

References:

1. Quigley HA, Broman AT. The number of people with glaucoma worldwide in 2010 and 2020. Br J Ophthalmol. 2006;90(3):262-7. doi: 10.1136/bjo.2005.081224, PMID 16488940.
2. Goldmann H, Schmidt T. On applanation tonography. Ophthalmologica. 1965;150(1):65-75. doi: 10.1159/000304827, PMID 5863398.
3. Kanski JJ. Glaucoma. In: Kanski JJ, editor. Clinical ophthalmology:A systemic approach.Elsevier. Saunders; 2011. p. 339-40.
4. Suzuki Y, Iwase A, Makoto Araie MD, Tetsuya Yamamoto MD, Haruki Abe MD, Shiroaki Shirato MD, Yasuaki Kuwayama MD, Hiromu K, Mishima MD, Hiroyuki Shimizu MD, Goji Tomita MD, Yoichi Inoue MD, Yoshiaki Kitazawa MD. Tajimi study group risk factors for open-angle glaucoma in a Japanese population: the Tajimi study. Vol. 113(9, September); 2006. p. 1613-7.
5. Bhan A, Browning AC, Shah S, Hamilton R, Dave D, Dua HS. Effect of corneal thickness on intraocular pressure measurements with the pneumotonometer, Goldmann applanation tonometer, and Tono-Pen. Invest Ophthalmol Vis Sci. 2002;43(5):1389-92. PMID 11980851.
6. Rootman DS, Insler MS, Thompson HW, Parelman J, Poland D, Unterman SR. Accuracy and precision of the Tono-Pen in measuring intraocular pressure after keratoplasty and epikeratophakia and in scarred corneas. Arch Ophthalmol. 1988;106(12):1697-700. doi: 10.1001/archopht.1988.01060140869030, PMID 3058102.
7. Browning AC, Bhan A, Rotchford AP, Shah S, Dua HS. The effect of corneal thickness on intraocular pressure measurement in patients with corneal pathology. Br J Ophthalmol. 2004;88(11):1395-9. doi: 10.1136/bjo.2003.037887, PMID 15489480.
8. Shafiq I. Influence of central corneal thickness (CCT) on intraocular pressure (IOP) measures with Goldmann applanation tonometer (GAT) in normal individuals. Pak J Ophthalmol. 2008;24(4):197-200.
9. Hassan M, Rehman A, Abbas M, Umar F, Bhatti N, Daud A. Relationship between central corneal thickness and intraocular pressure in selected Pakistani population. Pak J Ophthalmol. 2010;26(2);79(80. 26 (2)):79-82.
10. Doughty MJ, Zaman ML. Human corneal thickness and its impact on intraocular pressure measures: a review and meta-analysis approach. Surv Ophthalmol. 2000;44(5):367-408. doi: 10.1016/s0039-6257(00)00110-7, PMID 10734239.
11. Weizer JS, Stinnett SS, Herndon LW. Longitudinal changes in central corneal thickness and their relation to glaucoma status: an 8 year follow up study. Br J Ophthalmol. 2006;90(6):732-6. doi: 10.1136/bjo.2005.087155, PMID 16481376.
12. Heijl A, Leske MC, Bengtsson B, Hyman L, Bengtsson B, Hussein M,

Early Manifest Glaucoma Trial Group. Reduction of intraocular pressure and glaucoma progression: results from the Early Manifest Glaucoma Trial. Arch Ophthalmol. 2002;120(10):1268-79. doi: 10.1001/archopht.120.10.1268, PMID 12365904.

13. Iyamu E, Ituah I. The relationship between central corneal thickness and intraocular pressure: a comparative study of normals and glaucoma subjects. Afr J Med Med Sci. 2008;37(4):345-53. PMID 19301712.
14. Schuman JS, Hee MR, Arya AV, Pedut-Kloizman T, Puliafito CA, Fujimoto JG, Swanson EA. Optical coherence tomography: a new tool for glaucoma diagnosis. Curr Opin Ophthalmol. 1995;6(2):89-95. doi: 10.1097/00055735-199504000-00014, PMID 10150863.
15. Sharma P, Sample PA, Zangwill LM, Schuman JS. Diagnostic tools for glaucoma detection and management. Surv Ophthalmol. 2008;53;Suppl:S17-32. doi: 10.1016/j.survophthal.2008.08.003, PMID 19038620.
16. Parikh RS, Parikh SR, Navin S, Arun E, Thomas R. Practical approach to medical management of glaucoma. Ind J Ophthalmol. 2008;56(3):223-30. doi: 10.4103/0301-4738.40362, PMID 18417824.
17. Singh RP, Goldberg IF, Graham SL, Sharma A, Mohsin M. Central corneal thickness, tonometry, and ocular dimensions in glaucoma and ocular hypertension. J Glaucoma. June 2001–;10(3):206-10. doi: 10.1097/00061198-200106000-00011. -. Issue. Vol. 3 - pp 206-210.
18. Brandt JD, Beiser JA, Gordon MO, Kass MA; Ocular Hypertension Treatment Study (OHTS) Group. Central corneal thickness and measured IOP response to topical ocular hypotensive medication in the Ocular Hypertension Treatment Study. 2004;138(5):717-22.
19. Brandt JD, Gordon MO, Gao F, Beiser JA, Miller JP, Kass MA. Adjusting intraocular pressure for central corneal thickness does not improve prediction models for primary open-angle glaucoma. Ophthalmology. 2012 March;119(3):437-42. doi: 10.1016/j.ophtha.2011.03.018.
20. Iester M, Mete M, Figus M, Frezzotti P. Incorporating corneal pachymetry into the management of glaucoma. Vol. 35(9); 2009. p. 1623-8.
21. Tielsch JM, Sommer A, Katz J, Royall RM, Quigley HA, Javitt J. Racial Variations in the Prevalence of Primary Open-angle Glaucoma. The Baltimore Eye Survey. JAMA. 1991;266(3):369-74. doi: 10.1001/jama.1991.03470030069026, PMID 2056646.
22. Rivera JL, Bell NP, Feldman RM. Risk factors for primary open angle glaucoma progression: what we know and what we need to know. Curr Opin Ophthalmol Budenz. March 2008–;19(2):102-6. doi: 10.1097/ICU.0b013e3282f493b3, PMID 18301282.
23. Lee GA, Khaw PT, Ficker LA, Shah P. The corneal thickness and intraocular pressure story: where are we now? Vol. 30(5, October); 2002. p. 334-7.
24. Boland MV, Ervin A-M, Friedman DS, Jampel HD, Hawkins BS, Daniela Vollenweider MD, Yohalakshmi Chelladurai MBBS, Ward D, Catalina Suarez-Cuervo MD, Karen A, Robinson. PhD comparative effectiveness of treatments for open-angle glaucoma: A systematic review for the U.S. Preventive Services Task Force. Ann Intern Med. 2013;158(4):271-9.

Authors Contribution:

Concept and Design: Saman Ali, Muhammad Ali Haider
Data Collection/ Assembly: , Nida Usman, Hafiza Ummara Rasheed
Drafting: Saman Ali, Muhammad Ali Haider
Statistical Expertise: Muhammad Ali Haider
Critical Revision: Saman Ali

ORIGINAL ARTICLE

Association Between Manifest Horizontal Ocular Deviation and Color Vision Deficiency: A Cross-Sectional Study

Bushra Sajid[1], Nisma Sehar[2], Khizar Nabeel[3], Nusrat Sharif[1], Fareeha Ayyub[4]

Abstract:

Objectives: The main objective of the study was to determine the effect of manifest horizontal ocular deviation on color vision.

Materials and Methods: A cross-sectional study was carried out in the Orthoptics department of Al-Shifa Trust Eye Hospital from November, 2018 to March, 2019. A total of 100 patients who were diagnosed with manifest horizontal ocular deviation were included in this study. Horizontal deviation was categorized into esotropia, exotropia, alternate esotropia and alternate exotropia. To achieve the objective of the study data was collected from patients through a structured Performa after taking informed consent.

Results: A total of 100 patients participated in this study. Almost half 50% (n=50) of the patients were female with the age ranging from 5 to 30 years. Color vision deficiency was found to be present in only 4% of the patients with manifest horizontal ocular deviation. Out of the total patients, 2% were found to have protanopia while 2% had deuteranopia. Chi-square test of independence was used to find the association between color vision deficiency and manifest ocular deviation.

Conclusion: The results of the present study showed that there is no significant association between manifest horizontal ocular deviation and color vision. *Al-Shifa Journal of Ophthalmology 2021; 17(3):117-122.*

1. *Al-Shifa Trust Eye Hospital, Rawalpindi*
2. *University of Cardiff, UK*
3. *Al-Shifa School of Public Health, Rawalpindi*
4. *Pakistan Institute of Ophthalmology, Rawalpindi*

Originally Received: 3 April 2021
Revised: 6 September 2021
Accepted: 25 September 2021

Correspondence to:
fareeha.ayub74@gmail.com

Introduction

Binocular single vision (BSV) is defined as the state of simultaneous vision, which is achieved by the coordination of both eyes, so that separate and slightly dissimilar images formed in each eye are appreciated as a single image, achieved by the process of fusion.[1] In case of abnormal BSV and motor fusion; disorders are produced such as amblyopia, constant or intermittent strabismus, horizontal eye misalignment (convergence insufficiency, convergence excess, divergence insufficiency and divergence excess) and vertical heterophoria.[2] This study is mainly concerned with the manifest horizontal ocular deviation, which has two types; Esotropia and Exotropia. Esotropia is the inward turning of the eye/s (or crossed eyes).[3] Color vision is the ability of an organism to distinguish objects based on the wavelengths or frequencies of light;

they reflect, emit or transmit. [4] Color vision deficiencies is the inability to differentiate between certain shades of colors. Most people with color vision deficiency cannot differentiate between particular shades of "reds and greens" and "blues and yellows" although they can see colors.[5] According to the different studies conducted in US and Sudan prevalence of horizontal strabismus is 3.3% and 2.8% respectively.[6, 7] Another study conducted in Iran shows that out of all the strabismic patients, 63.03% had eso-deviation followed by Exo-deviation with prevalence of 24.53%.[8,9] In case of ocular deviation images of an object are falling on parafoveal region and due to inequality of the number of the cone cells in the macular region there may be chances of the Colour vision deterioration with increasing ocular deviation. In case of Eso-deviation the images of an object are placed at the nasal retinal side and due to its intermittent stages is very low compare to Exodeviation.[10] According to the best of our knowledge there is very scant literature regarding this So aim of this study is to find the co-relation of horizontal ocular deviation and color vision.

Materials and Methods:

This study was conducted at Orthoptics department of Al-Shifa Trust Eye Hospital, Rawalpindi. This cross-sectional study included the patients of age between 4 to 30 years presenting at Orthoptics department having manifest horizontal ocular deviation between 10-70 prism diopters and visual acuity of better than 6/18. Moreover, patients having any ocular pathology, any co-morbidities and dense amblyopia were excluded. By using the universal non-probability convenient sampling technique, data was collected from the patients over four months from October 2018 to January 2019. Sample size was 95 patients and it was calculated by using Open epi software. Data was collected form 100 patients to cater the loss of data from any patient.

A structured clinical Performa was used for data collection. The first part collected information about the independent variables like socio-demographics of the patients while the second part consist of ocular examination of the patient i.e., visual acuity which was measured by using ETDRs chart and Orthoptic assessment to find the manifest of ocular deviation and the third part consist of color vision which was measured by using City university chat. The clinical Performa was written into English language and it was not translated into any local language because the Performa was filled by primary researcher itself.

Permission was also taken from Ethical review committee of Al- Shifa trust eye hospital and before data collection. Moreover, verbal informed consent was also taken from every patient before their participation in this study. Face and content validity was checked by circulating it to experts in the field. Confidentiality of the patient's data was maintained and ethical values of research were properly considered and followed at every step of the study.

The responses recorded in the questionnaire were recorded and analyzed using SPSS version 17. The descriptive analysis was done on the categorical and continuous variables. Percentages and frequencies were reported for categorical variables and mean score and standard deviation was reported for continuous variables. Chi-square independence test was applied in the inferential part of analysis to check the association between dependent and independent variables.

Result:

A total of 100 patients included in the study, out of which 50% (n=50) were female. The patients were divided into 3 age groups, of which the majority i.e., 62% (n=62) were 5 to 11 years old. Fifty nine percent (n=59) patients were residing in urban areas. Approximately 80% (n=80) of the patients were students. Around 72% (n=72) had

primary education, whereas 12% (n=12) had education of secondary education. Seventy one percent of the patients had visual acuity between 6/6 and 6/9 and forty seven percent were hyperopic. (Table 1) Ocular manifest deviation was divided into 4 categories of which majority i.e., 41% were alternate exotropia. Majority 37% (n=37) of the patient had their magnitude of manifest ocular deviation between 26-40 prism diopters. Color vision of all the subjects was assessed through City University color vision test chart which classifies the subject as normal, protanopic, deuteranopic or tritanopic. 96% of the subjects were classified as normal while 2% were protanopic and 2% were deuteranopic. (Table 2) Chi square test of independence was run to check the association between independent variables and dependent variables. Preliminary analysis was performed to check that there is no violation of assumptions. No statistically significant association was found between color vision and age, gender, family history of squint, visual acuity, refractive status, type of horizontal deviation and magnitude of deviation as $p > 0.05$ for all the variables. The following table gives the value of Chi square and p value of each variable. (Table 3)

Table: 1 Socio-Demographic characteristics of the patients

S. No.	**Variable**	**Categories**	**Percentage (%)**
1.	Gender	Male	50
		Female	50
2.	Residence	Rural	41
		Urban	59
3.	Education	Illiterate	3
		Primary	72
		Secondary-intermediate	12
		Bachelors	8
		Others	5
4.	Occupation	Student	82
		Job	4
		Business	1
		Others	13
5.	Family history of squint	Positive	40
		Negative	60
6.	Family history of color vision deficiency	Positive	0
		Negative	100
7.	Visual Acuity	6/6-6/9	71
		6/12-6/18	29
8.	Refractive Status	Emmetrope	28
		Hyperope	47
		Myope	11
		Astigmatic	14

Table 2: Ocular characteristics of the Patients (n=100)

S. No	Characteristic Variable	Categories	Percentage (%)
1	Type of Ocular Deviation	Eso-deviation	12
		Exo-deviation	10
		Alternate Eso-deviation	37
		Alternate Exo-deviation	41
2	Magnitude of Ocular Deviation	11-25	27
		26-40	37
		41-55	30
		56-70	6
3	Type of color vision deficiency	Normal	96
		Protanopia	2
		Deuteranopia	2
		Tritanopia	0

Table 3: Association between dependent and independent variables

S. No.	Variable	Categories	Color vision			p-value
			Normal	Protanopia	Deuteranopia	
1.	Age	5-11	60	2	0	7.042* (df= 6)
		12-18	16	0	1	
		19-25	9	0	1	
		26-30	11	0	0	
2.	Gender	Male	46	2	2	3.421* (df= 2)
		Female	50	0	0	
3.	Family history of squint	Positive	39	1	0	1.342* (df= 2)
		Negative	57	1	2	
4.	Visual Acuity	6/6-6/9	69	1	1	1.666* (df= 2)
		6/12-6/18	27	1	1	
5.	Refractive Status	Emmetropes	27	1	0	6.514* (df= 6)
		Hyperopes	46	0	1	
		Myopes	11	0	0	
		Astigmatic	12	1	1	
6.	Type of manifest horizontal deviation	Esotropia	11	0	1	7.277* (df= 6)
		Exotropia	9	0	1	
		Alternate Esotropia	36	1	0	
		Alternate Exotropia	40	1	0	
7.	Magnitude of horizontal deviation	11-25	27	0	0	7.183* (df= 6)
		26-40	36	0	1	
		41-55	28	1	1	
		56-70	5	1	0	

***values for fisher's exact test; as the no of values in most of the cells were less than 5.**

Discussion:

The main objective of the study was to assess the effect of manifest horizontal ocular deviation on color vision. Moreover, color vision was related with various variables such as age, gender, family history of squint, visual acuity and refractive status, type of horizontal ocular deviation and magnitude of deviation to find any association between them. The study included a total of 100 participants with 50% (n=50) males. In the present study, color vision deficiency was found in only 4% of the participants. In a previous study conducted in Tehran, prevalence of color vision deficiency was found to be 2.2%.[4] According to a population-based study conducted on secondary school children, prevalence of color vision deficiencies is 4.71%.[11]

In the present study there was no significant association found between color vision deficiency and gender of patients as well as with age of the patient. However, a study conducted in Southern Ethiopia suggested a color vision deficiency of 4.1%, out of which 3.6% were boys and 0.6% was girls.[12] Another study was conducted which compared male versus female color vision in the near peripheral retina; where females showed substantially less saturation loss than males.[14] It means that gender could have effect on color vision but the present research failed to prove an association. Another study was conducted to assess the effect of increasing age on color vision and it concluded that the failure to perceive normal colors markedly increased in older age groups especially in those who were older than 70 years.[13] This study however included participants of age between 58 and 102 years, which is far different from the age group of present study i.e., 4-30 years.

The present study fails to prove an association between age and color vision, and to assess this association, a larger study sample size with bigger range of age is needed. 40% of the subjects had positive family history of squint in the study. In the present study there is no association between color vision deficiency and manifest ocular deviation. In the present study, 47% of the participants were hypermetropes while 11% were having myopia. However no statistically significant association was found between the type of refractive error and color vision. Similar results were found in a study conducted previously; where no statistically significant association was found between refractive error and color vision. [14] In this study, 41% of the participants had alternate exotropia and 37% had alternate esotropia. Although there was no statistically significant association found between type of horizontal ocular deviation and color vision. 37% of the participants had magnitude of deviation between 26 and 40 prism diopters while 30% had deviation between 41 and 55 prism diopters.

References:

1. Partha Haradhan Chowdhury D, Haren shah B. Basics of binocular single vision and strabismus. Acta Sci Ophthalmol. 2021 Apr 9;4(5):35-7.
2. Piano ME, O'Connor AR. The effect of degrading binocular single vision on fine visuomotor skill task performance. Invest Ophthalmol Vis Sci. 2013 Dec 1;54(13):8204-13. doi: 10.1167/iovs.12-10934, PMID 24222309.
3. Khorrami-Nejad M, Akbari MR, Khosravi B. The prevalence of strabismus types in strabismic Iranian patients. Clin Optom (Auckl). 2018;10:19-24. doi: 10.2147/OPTO.S147642, PMID 30214338.
4. Rajavi Z, Sabbaghi H, Baghini AS, Yaseri M, Sheibani K, Norouzi G. Prevalence of color vision deficiency and its correlation with amblyopia and refractive errors among primary school children. J Ophthalmic Vis Res. 2015

Apr;10(2):130-8. doi: 10.4103/2008-322X.163778, PMID 26425314.
5. Woldeamanuel GG, Geta TG. Prevalence of color vision deficiency among school children in Wolkite, Southern Ethiopia. BMC Res Notes. 2018 Dec;11(1):838. doi: 10.1186/s13104-018-3943-z, PMID 30486898.
6. Taha AO, Ibrahim SM. Prevalence of manifest horizontal strabismus among basic school children in Khartoum City, Sudan. Sudanese J Ophthalmol. 2015 Jul 1;7(2):53. doi: 10.4103/1858-540X.169437.
7. Friedman DS, Repka MX, Katz J, Giordano L, Ibironke J, Hawse P, Tielsch JM. Prevalence of amblyopia and strabismus in white and African American children aged 6 through 71 months: the Baltimore Pediatric Eye Disease Study. Ophthalmology. 2009 Nov 1;116(11):2128-34.e1. doi: 10.1016/j.ophtha.2009.04.034, PMID 19762084.
8. Khorrami-Nejad M, Akbari MR, Khosravi B. The prevalence of strabismus types in strabismic Iranian patients. Clin Optom (Auckl). 2018;10:19-24. doi: 10.2147/OPTO.S147642, PMID 30214338.
9. Hashemi H, Nabovati P, Yekta A, Ostadimoghaddam H, Behnia B, Khabazkhoob M. The prevalence of strabismus, heterophorias, and their associated factors in underserved rural areas of Iran. Strabismus. 2017 Apr 3;25(2):60-6. doi: 10.1080/09273972.2017.1317820, PMID 28463575.
10. Wright KW, Spiegel PH, Thompson L. Handbook of pediatric strabismus and amblyopia. 1st (Edn.); 2006.
11. Modarres M, Mirsamadi M, Peyman GA. Prevalence of congenital color deficiencies in secondary-school students in Tehran. Int Ophthalmol. 1996-1997;20(4):221-2. doi: 10.1007/BF00175263, PMID 9112190.
12. Woldeamanuel GG, Geta TG. Prevalence of color vision deficiency among school children in Wolkite, Southern Ethiopia. BMC Res Notes. 2018 Dec;11(1):838. doi: 10.1186/s13104-018-3943-z, PMID 30486898.
13. Murray IJ, Parry NR, McKeefry DJ, Panorgias A. Sex-related differences in peripheral human color vision: a color matching study. J Vis. 2012 Jan 1;12(1):18-. doi: 10.1167/12.1.18, PMID 22275467.
14. Cooper BA, Ward M, Gowland CA, McIntosh JM. The use of the Lanthony New Color Test in determining the effects of aging on color vision. J Gerontol. 1991 Nov 1;46(6):P320-4. doi: 10.1093/geronj/46.6.p320, PMID 1940087.

Authors Contribution

Concept and Design: Bushra Sajid, Nisma Sehar
Data Collection / Assembly:
Drafting: Bushra Sajid
Statistical expertise: Khizar Nabeel
Critical Revision: Nusrat Sharif, Fareeha Ayyub

ORIGINAL ARTICLE

Assessment of Tear Film Stability in Patients with Pterygium

Ayesha Kiran[1], Shakeela Abbas[1], Nimra Gul[1], Maryam Jabbar[1], Sadaf Qayyum[2]

Abstract:

Objectives: To assess tear film instability in pterygium patients and to compare tear film stability in different grades of pterygium.

Methodology: Descriptive cross-sectional study was carried out from October 2017 to May 2018 at Madina Teaching Hospital, Faisalabad Ophthalmology Department. Pterygium patients of all grading with age ranging from 30 to 60 years were included. Total population of 30 subjects of both genders was included. Slit lamp examination was performed to assess ocular surface pathologies and tear breakup time test was measured with fluorescein strips. Data analyzation was done, using SPSS 20 software. To compare tear film stability in different grades of pterygium, the association was determined using chi-square test.

Results: Total 30 subjects; there were 20 (66%) males and 10 (33%) females. Tear film instability was noted in majority of pterygium patients with TBUT < 10 seconds. The results were significant with level of significance 0.001. The mean of TBUT test value was 5.567± 2.956 seconds. In total 20 right eye cases, 7(35%) had Grade-I pterygium, 3 (15%) had Grade-II pterygium and 10(50%) patients had Grade III pterygium. In total 10 left eye cases, 2(20%) cases had Grade I pterygium, 7(70%) cases had Grade II and 1(10%) case had present Grade III.

Conclusion: The result showed that there was significantly tear film instability present in pterygium patients and mostly patient reported in grade 3 showed that as disease worsens TBUT also decreases. *Al-Shifa Journal of Ophthalmology 2021; 17(3):123-127.*

1. *The University of Faisalabad, Faisalabad*
2. *Pakistan institute of Community Ophthalmology, Peshawar*

Originally Received: 14 July 2021
Revised: 20 September 2021
Accepted: 6 October2021

Correspondence to:
Sadaf Qayyum

Email: sadaf77712@gmail.com

Phone:
Mobile: 92 3318878753

Introduction

Pterygium is derived from a Greek word meaning "wing", first time reported by Hippocrates[1]. Pterygium is a triangular, bulbar conjunctival degeneration that progresses onto the cornea in horizontal manner [2]. Pterygium is an ocular surface disease and benign non-cancerous. Growth is characterized by the fibro vascular, sub-epithelial growth onto the cornea in the interpalpebral area[3]. Ninety percent of pterygium is located nasally[1]. Pterygium is most likely related to ultraviolet radiation (240-400nm) which causes mutation in limbal basal stem cells and abnormal expression of p-53 protein, tissue growth factor and matrix metalloproteinases[4].

The p53 gene is thought to act as a transcription factor that activates or represses the expression of a growth control gene and is abnormally expressed in a variety of human cancers. Thus, pterygium can be thought to be a sort of tumor-like (non-cancerous) disorder induced by UV light[5]. Pterygium is a potentially blinding disease [6]. It may be multifactorial so its etiology has not been explained adequately. It occurs more often in people who live in warm climates and spend a lot of time in outdoors in sunny or windy environments. People whose eyes are exposed to certain elements like sand, smoke, wind and pollens on a regular basis have a higher risk of developing this condition[7].

Tear film dryness occurs not only when the atmosphere humidity is low but also when there is exposure to constant wind [2]. Tear film abnormalities have also been another important etiologic factor for pterygium[8]. The first defense mechanism of the eye is preocular tear layer, against environmental injury such as chemical factors, desiccation, or UV exposure. Abnormalities in tear production or stability can be risk factors for pterygium resulting from UV exposure[5].The tear function instability may cause local drying of the cornea and conjunctiva which in turn leads to these new growths[6]. When Pterygium progress on the cornea it damages the superficial layer of stroma and Bowman's membrane. Pterygium itself could result in a local conjunctival elevation so that there is an uneven distribution of tears on eye resulting in dry eye with tear dynamics abnormality [9]. Pathological or eyelid changes in pterygium lead to disturbed tear film function [3]. Pathogenesis of pterygium is under study. Pathogenesis includes drying of interpalpebral tear film which is an important factor. It exposes the peripheral corneal epithelium, Bowman's membrane and corneal stroma to the damaging effect of UV rays and this tissue damage stimulates the progress of limbal vessels onto the cornea. Interpalpebral tear film dryness occurs mostly at medial third of the interpalpebral fissure, because this part is away from the lacrimal gland and nearest to the puncta. Against the wind, dust or glare when the eyes are partially closed the medial part of conjunctiva is more exposed than the lateral. So that pterygium is more exposed on medial side[2].

The relationship between pterygium and tear film function has proved difficult to define. Pterygium is divided according to its severity, Grade 1 (<2mm) Grade 2 (up to 4mm) and Grade 3 (> 4mm). The tear film is composed of an aqueous layer produced by lacrimal glands. First layer is oily layer, the lipid components of which are secreted by the meibomian gland. In pterygium patients, disturbance of tear quality and quantity is present with decrease in conjunctival goblet cell. Patients with tear film instability have present decreased goblet cell density. The mean goblet cell density significantly increases 1 month after excision, which may result in an increased secretion of mucin in tear film [3].A study was performed in government medical college Jammu, Jammu and Kashmir. The purpose of this study was to find the clinical correlation between dry eye and pterygium and to study the prevalence of dry eye related to pterygium.

Materials and Methods:

This Descriptive cross-sectional study was conducted from October 2017 to May 2018 at Ophthalmology Department, Madina Teaching Hospital, and Faisalabad. Patients with pterygium of all grading with age ranging from 30 to 60 years were included. Subjects were divided into 3 groups in the basis of age. First group had subjects in the age ranging from 30 to 40 years, second group: 41-50 years and third: 51-60 years.
Total study population of 30 subjects of both genders was taken by convenient sampling method. These subjects were included after obtaining informed consent and permission from ethical review committee of the institute. Patients with any

ocular pathology, any ocular and refractive surgery, contact lens user, computer user with working duration of 5-6 hours daily, subjects with drugs, alcohol, antihypertensive agents, diuretics, antidepressants, opioids, that could affect tear film stability were excluded. All systemic and local ocular factors that contribute to cause dry eye except pterygium, Patients with decrease tear production were also excluded. After taking complete history like personal, ocular, systemic and surgical history then tear film stability was assessed with tear breakup time test. Tear film breakup time measurement was performed with instillation of fluorescein and observed on slit lamp. Fluorescein strip was moistened with normal saline then this strip was slightly touched in lower fornix to stain tear film. Patients were asked to blink continuously to allow a homogeneous distribution of the fluorescein. Patients were then asked to stop blinking under cobalt blue filter, the time between last blink and appearance of first black spot, indicating tear break was measured.

All data was recorded on specifically design proforma. The analysis was done with the help of SPSS software version 20. Measurements were compared with cross tabulation and to compare tear film stability in different grades of pterygium the association was determined using chi-square test i.e., $P<0.05$ as significant.

Results:

Out of 30 observations, 11 subjects (36.7%) were in first group that is 30-40 years. 6 subjects (20.0%) were included in second group that is 41-50 years and 13 patients (43.3%) were in third group that is 51-60 years. Out of 30 patients, 66.7% had pterygium in right eye while 33.3% had it in left eye.

Frequencies of right and left eyes with various grades of pterygium and their TBUT is shown in table 1 and 2 respectively. The results showed that with increasing progression of disease (pterygium), TBUT was also decreased.

Mean and Standard deviation of TBUT (N=30) was 5.567± 2.956 seconds. The statistical analysis to assess tear film instability in patients with pterygium with the help of Z-test showed p-value = 0.001 meaning that significant tear film instability present in pterygium patients.

Table 1: Right Eye: Pterygium grading with TBUT

Tear Breakup Time Right Eye						
Pterygium Grading Right Eye		Normal (>10 sec)	Mild	Moderate	Severe	**Total**
	Grade1 (<2mm)	2	5	0	0	**7**
	Grade 2(up to 4mm)	0	1	1	1	**3**
	Grade 3 (>4mm)	0	0	0	10	**10**
	Total	**2**	**6**	**1**	**11**	**20**

Table 2: Left Eye: Pterygium grading with TBUT

		Mild	Moderate	Severe	**Total**
Pterygium Grading Left Eye	Grade1 (<2mm)	1	1	0	**2**
	Grade 2(up to 4mm)	2	5	0	**7**
	Grade 3 (>4mm)	0	0	1	**1**
	Total	**3**	**6**	**1**	**10**

Discussion:

A study was conducted using two tests, i.e., Schirmer's test and tear film breakup time test were used to detect tear film abnormalities in patients having Pterygium. According to this research, tear film breakup time test provides better diagnostic values as compared to Schirmer's test, in order to detect tear film instability in patients with pterygium[4]. However, in the present study used only tear break time test to identify tear film abnormalities in patients with Pterygium. The TBUT test is an excellent diagnostic test for detecting the mucin and a lipid layer deficiency of the tear film. According to different studies pterygium is more common in male subjects (as compared to female). The environmental factors also had a higher risk and major predisposing factors for the development of pterygium[10]. In present study, examined 30 subjects having pterygium, out of which, 10 (33%) were female and 20 (66%) were male patients.

The results of the study demonstrated that out of 30 observations, 11 subjects (36.7%) were in the first group which is 30-40 years. 6 subjects (20.0%) were included in second group that is 41-50 years and 13 patients (43.3%) were in third group having age group 51-60 years. Previous studies [1, 2] agreed (resembled) with our results in such a way that according to them the occurrence of pterygium was more frequently present among the people having age group 40 to 60 years of life.

The Incidence of pterygium was on the high side in age group 51 to 60 years, which is the older age group in this study. Tear film instability is found in pterygium patient, as a shortened tear break-up time test values were seen in these patients. A study that was performed by Atiya Rehman at Karachi [6] in her study, she found that out of total 86 subjects, decrease TBUT test values in patients having pterygium was 65 eyes and 21 eyes did not show any decrease TBUT. A TBUT test value greater than 10 seconds were considered normal.

The results were quite similar to our study, but we had included only those 30 cases of pterygium with right and left eye distribution of subjects which showed that there is tear film instability present in pterygium patients, as shortened tear break-up time test values less than 10 seconds were seen in these patients. The result of our study showed that TBUT test value was 5 seconds. A study was carried out on assessment of tear secretion and tear film abnormality on pterygium and normal Participants. In her study for the examination of cases, pterygium was assessed according to its grading. Out of total study sample of 76 cases, 24 (31%) cases had Grade I (transparent) pterygium, 37(49%) cases had Grade II (intermediate) pterygium and 15 (20%) patients had Grade III (opaque) pterygium[1] Similarly, in present study pterygium was divided according to its severity, Grade 1 (<2mm) Grade 2 (up to 4mm) and Grade 3 (> 4mm) respectively. Out of 30 total participants, 20

cases of the right eye and 10 cases of left eye were observed. In total 20 right eyes, 7 cases had Grade I pterygium, 3 cases had Grade II pterygium and 10 patients had Grade III pterygium. In total, 10 left eyes, 2 cases had Grade I pterygium, 7 cases had Grade II and 1 case had present Grade III.

Conclusion:

Tear break up time statistical values were found less than normal in patients with pterygium meaning instable tear film. Results showed that mostly patients were reported in grade 3 (>4mm), as increasing the progression of disease (pterygium) TBUT was also severe or decreased.

References:

1. Roka N, Shrestha S. Assessment of tear secretion and tear film instability in cases with pterygium and normal subjects. *Nepalese Journal of Ophthalmology*. 2013; 5(1). doi:10.3126/nepjoph.v5i1.7816
2. Saleem M, Muhammad L. Pterygium and Dry Eye - A clinical study. *JPMI*. 2004; 18(4):558-562.http://www.jpmi.org.pk/index.php/jpmi/article/view/930/839. Accessed May 22, 2018.
3. Huang Z, Ye F, Zhou F, Xia Y, Zhu X, Wu Y. Evaluation of meibomian gland and tear film changes in patients with pterygium. *Indian J Ophthalmol*. 2017; 65(3):233. doi:10.4103/ijo.ijo_743_16
4. Rahman A, Yahya K, Fasih U, Waqar-ul-Huda, Shaikh A. Comparison of Schirmer's test and tear film breakup time test to detect tear film abnormalities in patients with pterygium. *J Pak Med Assoc*. 2012;62(11):1214-6.
5. Ishioka M, Shimmura S, Yagi Y, Tsubota K. Ptyerygium and Dry Eye. *Ophthalmologica*. 2001; 215(3):209-211. doi:10.1159/000050860
6. Manhas A, Gupta D, Gupta A, Kumar D, Manhas R, Manhas G. Clinical correlation between dry eye and pterygium: a study done at government medical college Jammu, Jammu and Kashmir, North India. *International Journal of Research in Medical Sciences*. 2017;5(7):3087. doi:10.18203/2320-6012.ijrms20172992
7. Delgado A. Pterygium: Causes, Symptoms and Diagnosis. Healthline. https://www.healthline.com/health/pterygium. Published 2018. Accessed May 25, 2018.
8. Kadayifcilar S, Orhan M, Irkec M. Tear functions in patients with pterygium. *Acta Ophthalmol Scand*. 1998;76(2):176-179. doi:10.1034/j.1600-0420.1998.760210.x
9. Wu H, Lin Z, Yang F et al. Meibomian Gland Dysfunction Correlates to the Tear Film Instability and Ocular Discomfort in Patients with Pterygium. *Sci Rep*. 2017; 7(1). doi:10.1038/srep45115
10. Balogun M, Ashaye A, Ajayi B, Osuntokun O. Tear break-up time in eyes with pterygia and pingueculae in Ibadan. *West Afr J Med*. 2005; 24(2). doi:10.4314/wajm.v24i2.2818.

Authors Contribution

Concept and Design: Ayesha Kiran, Shakila Abbas
Data Collection / Assembly: Ayesha Kiran, Shakila Abbas
Drafting: Ayesha Kiran, Shakila Abbas
Statistical expertise: Nimra Gul, Maryam Jabbar
Critical Revision: Sadaf Qayyum

ORIGINAL ARTICLE

Assessing The Therapeutic Response of Topical Azithromycin 1% in Addition to Oral Form for The Treatment of Meibomian Gland Dysfunction

Adnan Ahmad[1], Mubbashir Rehman[1], Mohammad Farhan[1], Hamid Rehman[2], Javed Rasul[3], Jawad Humayun[4]

Abstract:

Purpose: The efficacy of topical azithromycin supplementation to systemic form has not been studied. This study evaluates the efficacy of topical azithromycin supplementation to systemic azithromycin with hot compresses, artificial tears, and lid scrubs for the treatment of meibomian gland dysfunction (MGD).

Methods: 70 patients with stage 4 meibomian gland dysfunction were enrolled in the study. The patients enrolled into the study were divided into 2 groups. Group A comprised 35 patients who received preservative free topical 1% azithromycin administered as once daily and group B comprised 35 patients who did not receive topical azithromycin. Both groups were prescribed artificial tear eye drops and systemic azithromycin along with lid hygiene measures. Fluorescein break-up time evaluation of tears (T-BUT), staining of cornea, Ocular Surface Disease Index (OSDI) symptom score, and meibum quality were assessed prior to therapy and after 04 and 12 weeks.

Results: The average age of participants in group A was 51.3 ± 14.2 yrs. (15 male and 20 female) and in group B was 52.7 ± 11.3 years (14 male and 21 female). At 4- and 12-weeks post-treatment, group A achieved a level of statistical significance in all given parameters for assessment as compare to baseline ($p < 0.05$). While group B achieved statistically significant improvement only in OSDI score and meibum quality post therapy as compare to baseline ($p < 0.05$).

Conclusions: There was clinical and symptomatic improvement observed in meibomian gland dysfunction with the addition of topical azithromycin to the systemic treatment. *Al-Shifa Journal of Ophthalmology 2021; 17(3):128-135. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

1. *Nowshera Medical College, Nowshera*
2. *Hayatabad Medical Complex, Peshawar.*
3. *Peshawar Institute of Medical Sciences, Peshawar*
4. *Khyber Teaching Hospital, Peshawar*

Originally Received: 11 November 2020
Revised: 20 December 2020
Accepted: 27 December 2020

Correspondence to:
Dr. Adnan Ahmad
dradnanahmad@hotmail.com

Introduction:

Meibomian gland dysfunction (MGD) is a lingering ocular disease resulting in blockage of the end ductules of meibomian gland with associated functional and structural alterations in secretion.[1, 2] Due to deficiency of lipid layer from tears, excessive evaporation of tear film results, leading to bacterial colonization at the eyelid margin, decreased eye wetting, and ocular surface diseases. Sufferers mostly presents with eye irritation/itching, redness, secretions, tearing, light sensitivity, gritty eye sensations, blurring of vision, and feeling of dryness in eyes.[3] Treatment of

MGD involves regular lid cleansing and the use of drug that decreases bacterial count and inflammatory reaction.[4] Standard therapies for MGD involve eyelid cleaning measures including hot compression techniques with cotton clothes, ocular lubricants, topical steroid drops and orally taking tetracyclines (TC) or azithromycin (AM), which can achieve symptomatic and clinical improvement. The usefulness of topical (top.) AM in the management of MGD has been mainly due to its anti-inflammatory and antimicrobial properties by alleviating MGD related posterior blepharitis and bacterial colonization of eyelids.[5] However, latest research shows that AM both in oral and top. form can possibly work by stimulating the meibomian gland cellular restructuring and lipid formation, thus relieving the symptoms after therapy.[6, 7]

As far as our knowledge is concerned, there isn't a single local trial conducted so far that has evaluated the therapeutic effectiveness of topical AM in addition to systemic (oral) form for the management of MGD. This trail has also analyzed the usefulness of eyelid cleansing measures such as, hot compressions, eyelid scrubbings and ocular lubricants for the management of MGD.

Material and Methods:

This prospective, randomized trial was conducted under the guidelines of Good Clinical Practice. and was adherent to tenets of the Declaration of Helsinki, the study was approved by the Institutional ethical Review Board (IERB). 70 patients (41 female and 29 male) were recruited as having grade 4 meibomian gland dysfunction (MGD) based upon clinical evaluation between January 2020 and July 2020 at an Eye OPD of Qazi Hussain Ahmad Medical Complex, Nowshera. Informed consent was acquired from all the patients. Patients having anatomical lid disorders, inflammatory and atopic dermatological disorders and any use of topical/oral antimicrobials within the last 12 weeks and age less than 20 yrs. were screened out. Assessment of MGD was based upon the appearance of eyelid margin congestion, eyelid discharge, clogging up of the meibomian gd. openings and desiccated eyes. All participants recruited in the trial were having grade 4 MGD disease.[5]

The participants were advised with eyelid scrubs every night, 10 min. of hot compresses and massage of the upper eyelids 2 times/day, ocular lubricants 4times a day and oral tab. azithromycin (Tab. Macrobac^{R} 500 mg, Asian Continental, Pak.) for a month as four cycles of 500 mg/day for 03 days separated by 1 wk. interval.[8] Additionally, pts. in group A were also given a topical 1% azithromycin (AM) prepared in local pharmacy under strict sterile conditions by diluting 500mg powdered form vial of azithromycin (Inj. Macrobac^{R} 500 mg, Asian Continental, Pak.) with 10ml of normal saline 0.9% (NS), making a solution of 1ml with 50mg drug, it was further diluted to 5ml with NS making a final concentration of 1ml = 10mg of drug i.e. 1% top. Azithromycin, after reconstituting the sol. it was injected into an empty sterile 5ml eye drop bottle to be dispensed for use, patients were instructed to keep it refrigerated from 2-8ºc, the shelf life was 7 days which was labelled on the bottles, patients were given the availability of these drops free of cost after 7 days from the time of preparation, pts. in group B were deprived of top. AM. The dose was given as 2 times/day for 03 days and then once daily for 04 weeks.[9] Tear film break-up time (T-BUT) was calculated by using sterile Na-fluorescein strips lubricated with preservative free saline sol. under the cobalt blue light. T-BUT was the time interval between the last blink and the appearance of the first random dry spot on the corneal surface. T-BUT was measured 3 times and average value was taken. The eye with more severe signs and symptoms of MGD was taken for the study purpose.

After the T-BUT test, staining of cornea was performed by using 1% Na-fluorescein strips. Corneal fluorescein staining was done by using a slit-lamp cobalt blue light 40 sec. after fluorescein was applied. Oxford scoring system was adopted for grading purpose. This scale divides corneal staining into 6 grades according to stained area on the corneal surface: 0 = none, 1 = slightly stained, 2 = mildly stained, 3 = moderately stained, 4 = markedly stained, and 5 = severely stained.[10]

The Ocular Surface Disease Index (OSDI) was utilized for scoring the symptoms due to ocular surface defects revealing the severity of condition.[11] The OSDI is a 12-item questionnaire, including 5 different grades of symptoms which were given the scores as 0 (not at all), 1 (sometimes), 2 (half of the time), 3 (mostly present), and 4 (throughout present). The total OSDI score was measured by using the formula: OSDI = [(sum of scores of all the questions answered) × 100] / [(total number of questions answered) × 4]

The meibomian gds. / secretions were numbered on a scale of 0 to 4 (0= transparent, 1= turbid fluid, easily expressible, 3= turbid fluid with slight compression, and 4= opaque/ tooth-paste like discharge with forceful compression) by index finger.[1] T-BUT, corneal fluorescein staining, OSDI scoring, and meibum quality were measured at the start, after 04 weeks of therapy and at 12th week visit. Data analysis were done by using SPSS 19.0 version. Categorical variables were expressed as number and percentage and continuous variables as mean ± SD. The chi square test was utilized for comparing the mean OSDI score, mean meibomian gd. score, mean T-BUT and mean corneal staining score at follow-ups within each group. The Mann–Whitney test was used for comparison between the groups. $P < 0.05$ was taken as significant.

Results:

The mean age of pts. in group A was 51.3 ± 14.2 years (including 15 male and 20 female) and in group B was 52.7 ± 11.3 yrs. (14 male and 21 female). Demographic variables and baseline signs and symptoms are shown in Tab. 1. The mean ages of patients in group A and B were almost identical. Female pts. were more in both groups, with no statistically significant difference in male/female distribution between the groups. There were no significant differences between the groups in severity of signs and symptoms at baseline.

The mean baseline T-BUT was similar in group A (4.21 ± 0.82 sec.) and in group B (4.38 ± 0.62 sec.) ($p = 0.351$). At each follow-up, the mean T-BUT in group A significantly increased at 4th and 12th week as compare to baseline and group B ($p = 0.006$) ($p = 0.001$) ($p = 0.001$), respectively (Tab. 2 and Fig. 1). T-BUT in group B didn't achieve statistically significant improvement from baseline as compare to week 4 and 12th.

Corneal fluorescein staining scores were almost identical at baseline in group A (4.58 ± 0.42) and group B (4.28 ± 0.22) ($p =0.911$). This reduced significantly during follow-up as compare to baseline in group A but didn't achieve statistically significant improvement in group B. Group A had a significantly reduced staining score as compare to group B at the 4th week ($p < 0.001$) and 12th week ($p = 0.002$) (Tab. 2 & Fig. 1).

The OSDI score was similar at baseline in group A (39.24 ± 2.38) and group B (40.26 ± 2.44) ($p = 0.452$). This reduced significantly in both treatment groups after therapy at week 04 and 12. Although, group A showed significantly better OSDI scores at the week 4 and 12 as compare to group B ($p = 0.011$) ($p = 0.033$), respectively (Tab. 2 & Fig. 1).

Meibum quality was similar at baseline in group A (3.32 ± 0.24) and group B (3.26 ± 0.30) (p = 0.785) (Tab. 1). At 4th and 12th week post therapy, meibum quality in group A significantly raised from baseline (p < 0.001) (Tab. 2 & Fig. 1). Group B also showed improved expression with treatment. At week 4 and 12, there wasn't any statistically significant difference between the groups as far as the meibum quality was concerned.

Table. 1. Patient's characteristics and baseline values

	Group A (N = 35)	**Group B (N = 35)**	**p value**
Sex			
Male n (%)	15 (42.8)	14 (40)	0.302
Female n (%)	20 (57.1)	21 (60)	0.334
Age (yrs.)	51.3 ± 14.2	52.7 ± 11.3	0.634
TBUT (s)	4.21 ± 0.82	4.38 ± 0.62	0.351
Meibum quality	3.32 ± 0.24	3.26 ± 0.30	0.785
Fluorescein staining	4.58 ± 0.42	4.28 ± 0.22	0.911
OSDI	39.24 ± 2.38	40.26 ± 2.44	0.452

TBUT, tear film breakup time.

Table 2. Outcome measures at baseline and after the 4th & 12th weeks

	Mean at Baseline	Mean at 4th week	Mean at 12th week	p1	p2
TBUT (s)					
Group A	4.21 ± 0.82	7.42 ± 2.24	9.46 ± 1.66	0.006	0.001
Group B	4.38 ± 0.62	4.81 ± 2.15	4.88 ± 0.92	0.814	0.585
p 3	0.351	0.001	0.001		
OSDI					
Group A	39.24 ± 2.38	18.32 ± 4.52	9.10 ± 3.44	0.001	<0.001
Group B	40.26 ± 2.44	26.84 ± 3.22	15.92 ± 2.62	0.014	<0.001
p 3	0.452	0.011	0.033		
Meibum quality		1.31 ± 0.42	0.78 ± 0.48	<0.001	<0.001
Group A	3.32 ± 0.24	1.80 ± 0.33	1.20 ± 0.72	<0.001	<0.001
Group B	3.26 ± 0.30	0.662	0.596		
p 3	0.785				
Corneal fluorescein staining					
Group A	4.58 ± 0.42	2.02 ± 0.74	1.65 ± 0.42	<0.001	<0.001
Group B	4.28 ± 0.22	3.76 ± 0.35	3.22 ± 0.23	0.594	0.414
p 3	0.911	<0.001	0.002		

p1, difference between baseline and first month; p2, difference between baseline and third month; p3, difference between the groups. TBUT, tear film breakup time.

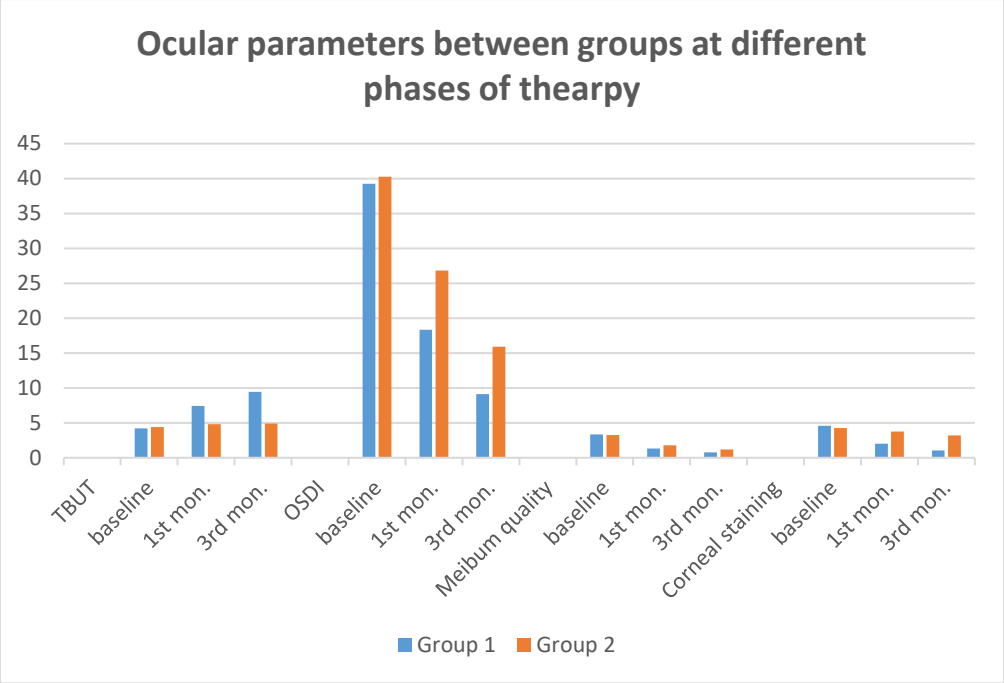

Fig. 1 Showing Tear film break up time (TBUT), Ocular surface disease index (OSDI), Meibum quality and corneal staining score at baseline, 1st month and 3rd post treatment between the 2 groups (topical & oral Azithromycin Vs Oral only).

Discussion:

In the current trial, we evaluated the effectiveness of topical azithromycin (AM) along with oral treatment. We recruited 2 groups with almost identical characteristics at baseline. It was noted that T-BUT in the topical AM group significantly increased as compare to baseline, in addition, T-BUT was significantly longer post therapy in the topical AM group as compare to group B (no topical AM). Corneal fluorescein staining, meibum quality, and mean OSDI scores was also found to be significantly improved from baseline in the topical AM group (Group A). Comparative analysis of groups also suggested that top. AM showed marked improvement clinically.

There are different management strategies for MGD, and there is no universally agreed upon management strategy. Tetracyclines are particularly given for inhibiting bacterial proliferation and reducing inflammation in lid margins, but tolerability of the drug is an issue in the long run which affects the compliance with therapy. We gave oral AM in this study as oral tetracycline (TC) is often poorly tolerated because of its gastro-intestinal side effects and may require 2 to 4 weeks to exert its pharmacologic response. AM has anti-inflammatory, immune-modulatory, and anti-microbial effects.[12] Its prolonged bioavailability requires less frequent dosing with better tolerability and compliance. It is speculated that oral AM penetrates the ocular surface and remained at therapeutic levels days after its cessation.[13]

In the existing research pool, there are numerous studies done that evaluated the significance of topical and oral AM for the management of MGD.[9, 14–21] The efficacy of 1.5% topical AM was revealed by Balci and Gulkilik in the short duration treatment for MGD observing marked clinical improvement.[17] While in a study conducted by Zandian et al topical AM was having same response as oral TC in the management of MGD showing

symptomatic improvement.[16] Another study was conducted by Al-Hity and Lockington evaluating the comparative analysis of oral AM and TC in pts. with MGD. Their study concluded that both groups exerted their therapeutic efficacy as far the clinical improvement was concerned. However, oral AM showed better efficacy (marked improvement of clinical signs of conjunctival hyperemia and corneal staining) with shorter duration of therapy.[17] The biochemical characteristics of meibomian gland secretion and symptoms of pts. with posterior blepharitis was treated with top. AM and oral TC by Foulks et al and they suggested that oral TC was relatively less efficacious in relieving gritty ocular sensations and the signs of clogging of meibomian orifices and meibum quality and observed marked improvement in meibum quality with top AM therapy.[9] AM is efficacious against gm. +ve and gm. -ve bacteria, atypical bacterial species, and chlamydial species. Additionally, its pharmacokinetic reveals that od or bid dosing is adequate, which results in improved compliance to treatment.[18] Liu et al evaluated the role of oral AM and TC on human meibomian gland epithelial cell (HMGEC) differentiation and multiplication. They observed the capability of AM to induce the differentiation of HMGECs, which was not shown by TC. Based on their observations, they reported that AM, but not TC could be effective as a therapy for inducing HMGEC differentiation.[22] The efficacy of oral AM on MGD was revealed in one of the studies conducted by Igami et al. Scoring was done for both signs and symptoms of the disease and were accordingly graded in all the patients. They concluded that oral AM achieved statistically significant improvement in T-BUT and meibomian gland secretions pattern. However, only slight improvement was noted in the Schirmer test, OSDI score and corneal staining score.[8]

In our trail, we observed that the corneal staining score was significantly improved in the top. AM group but the response was unsatisfactory in the oral AM treatment group (group B).

Both top. and systemic AM were effective in the management of MGD, however, top. therapy was efficacious than oral one as far as improvement in lid margin changes were concerned in a trial conducted by Yildiz et al. They also observed improvement in ocular surface staining in the topical group but T-BUT didn't vary much in both groups.[23] They concluded that topical form may be associated with far better ocular tissue penetration and accumulation, hence improved anti-inflammatory and anti-bacterial efficacy as compare to oral therapy. In our observation, it was noted that top. therapy, exerted far better improvement in ocular surface staining and T-BUT after 04 weeks of therapy. Similarly, the efficacy of 4 weeks therapy with 1% top. AM was evaluated by Fadlallah et al and they observed marked improvement with no significant relapse until 12 weeks.[24] In the same way it was demonstrated by Balci and Gulkilik in a study that showed a statistically significant improvement in the clinical signs at the end of 4 weeks, however these improvements didn't persist till week 12th.[14]

Our finding in this study revealed statistically significant improvement in T-BUT, OSDI, corneal staining and meibum quality at week 4 which lasted till week 12. AM may cause structural and functional improvement of meibomian glands better than standard therapy. The supplementation of top. AM to the standard treatment protocol was efficacious and reduced the progression of posterior blepharitis, even in severe disease.

Conclusion:

It is concluded that by administering topical azithromycin in addition to oral form for meibomian gland dysfunction results in improvement of T-BUT, corneal staining and relieving ocular signs and symptoms.

Additional randomized control clinical trials are needed to further delineate the efficacy of topical AM to oral form in patients with meibomian gland dysfunction.

References:

1. Tomlinson A, Bron AJ, Korb DR, et al. The international workshop on meibomian gland dysfunction: report of the diagnosis subcommittee. Invest Ophthalmol Vis Sci. 2011; 52:2006–2049.
2. Nelson JD, Shimazaki J, Benitez-del-Castillo JM, et al. The international workshop on meibomian gland dysfunction: report of the definition and classification subcommittee. Invest Ophthalmol Vis Sci. 2011; 52:1930–1937.
3. Jackson WB. Blepharitis: current strategies for diagnosis and management. Can J Ophthalmol. 2008; 43:170–179.
4. Benitez Del Castillo JM, Kaercher T, Mansour K, et al. Evaluation of the efficacy, safety, and acceptability of an eyelid warming device for the treatment of meibomian gland dysfunction. Clin Ophthalmol. 2014; 8:2019–2027.
5. Geerling G, Tauber J, Baudouin C, et al. The international workshop on meibomian gland dysfunction: report of the subcommittee on management and treatment of meibomian gland dysfunction. Invest Ophthalmol Vis Sci. 2011; 52:2050–2064.
6. Liu Y, Kam WR, Ding J, et al. One man's poison is another man's meat: using azithromycin-induced phospholipidosis to promote ocular surface health. Toxicology. 2014; 320:1–5.
7. Liu Y, Kam WR, Ding J, et al. Impact of azithromycin on lipid accumulation in immortalized human meibomian gland epithelial cells. JAMA Ophthalmol. 2014; 132:226–228.
8. Igami TZ, Holzchuh R, Osaki TH, et al. Oral azithromycin for treatment of posterior blepharitis. Cornea. 2011; 30:1145–1149.
9. Foulks GN, Borchman D, Yappert M, et al. Topical azithromycin and oral doxycycline therapy of meibomian gland dysfunction: a comparative clinical and spectroscopic pilot study. Cornea. 2013; 32:44–53.
10. Sook Chun Y, Park IK. Reliability of 4 clinical grading systems for corneal staining. Am J Ophthalmol. 2014; 157:1097–1102.
11. Schiffman RM, Christianson MD, Jacobsen G, et al. Reliability and validity of the Ocular Surface Disease Index. Arch Ophthalmol. 2000; 118:615–621.
12. Dey S, Majhi A, Mahanti S, et al. In vitro anti-inflammatory and immune-modulatory effects of ciprofloxacin or azithromycin in Staphylococcus aureus-stimulated murine macrophages are beneficial in the presence of cytochalasin D. Inflammation. 2015; 38:1050–1069.
13. Stewart WC, Crean CS, Zink RC, et al. Pharmacokinetics of azithromycin and moxifloxacinin human conjunctiva and aqueous humor during and after the approved dosing regimens. Am J Ophthalmol. 2010; 150:744–751.
14. Balci O, Gulkilik G. Assessment of efficacy of topical azitromycin 1.5% ophthalmic solution for the treatment of meibomian gland dysfunction. Clin Exp Optom. 2018; 101:18–22.
15. Hosseini K, Lindstrom RL, Foulks G, et al. Arandomized, double masked, parallel-group, comparative study to evaluate the clinical efficacy and safety of 1% azithromycin-0.1% dexamethasone combination compared to 1% azithromycin alone, 0.1% dexamethasone alone, and vehicle in the treatment of subjects with blepharitis. Clin Ophthalmol.
2016; 10:1495–1503.
16. Zandian M, Rahimian N, Soheilifar S. Comparison of therapeutic effects of topical azithromycin solution and systemic doxycycline on posterior blepharitis. Int J Ophthalmol. 2016; 9:1016–1019.
17. Al-Hity A, Lockington D. Oral azithromycin as the systemic treatment of choice in the treatment of meibomian gland disease. Clin Exp Ophthalmol. 2016; 44:199–201.

18. Friedlander MH, Protzko E. Clinical development of 1% azithromycin in DuraSite, a topical azalide anti-infective for ocular surface therapy. Clin Ophthalmol. 2007; 1:3–10.
19. Luchs J. Azithromycin in DuraSite for the treatment of blepharitis. Clin Ophthalmol. 2010; 4:681–688.
20. John T, Shah AA. Use of azithromycin ophthalmic solution in the treatment of chronic mixed anterior blepharitis. Ann Ophthalmol (Skokie). 2008; 40:68–74.
21. Luchs J. Efficacy of topical azithromycin ophthalmic solution 1% in the treatment of posterior blepharitis. Adv Ther. 2008; 25:858–870.
22. Liu Y, Kam WR, Ding J, et al. Can tetracycline antibiotics duplicate the ability of azithromycin to stimulate human meibomian gland epithelial cell differentiation? Cornea. 2015; 34:342–346.
23. Yildiz E, Yenerel NM, Yardımcı AT, et al. Comparison of the clinical efficacy of topical and systemic azithromycin treatment for posterior blepharitis. J Ocul Pharmacol Ther. 2018; 34:365-372.
24. Fadlallah A, Rami HE, Fahd D, et al. Azithromycin 1.5 % ophthalmic solution: efficacy and treatment modalities in chronic blepharitis. Arq Bras Oftalmol. 2012; 75:178–182.

Authors Contribution

Concept and Design: Adnan Ahmad, Mubbashir Rehman
Data Collection / Assembly: Mohammad Farhan, Hamid Rehman
Drafting: Javed Rasul, Jawad Humayun
Statistical expertise: Jawad Humayun
Critical Revision: Adnan Ahmad, Mubbashir Rehman

ORIGINAL ARTICLE

Knowledge and Practices Regarding Self-medication of Ophthalmic Products in Rawalpindi

Aiman Fayyaz[1], Khizar Nabeel[1], Sana Azam[1], Fareeha Ambreen[2], Maryam Firdous[1]

Abstract

Purpose: The main aim of this study was to assess the knowledge and practices regarding self-medication of ophthalmicproducts and to determine the factors leading to self-medication in local setting Rawalpindi, Pakistan.

Materials and Methodology: A cross-sectional study was carried out at Outdoor Patient Department (OPD) of tertiary care hospital from November 2019 to December 2019. A total of 300 individuals, who first time visited tertiary care eye hospital, were interviewed using a structured questionnaire.

Results: Out of 300, 65.67% individuals had good knowledge regarding ophthalmic products whileonly 26.67% had good practices. Chi square test of independence was used to find association between independent variables (age, gender, education, marital statusand residence) and dependent variables (knowledge and practices). Statistically significant association was found among knowledge, practices and sociodemographic factors ($p < 0.05$).

Conclusions: Individuals despite having good knowledge were poorly practicing self-medication with ophthalmic products. Knowledge about ophthalmic drugs was significantly associated with sociodemographic factors such as gender, education and residence. Young people had moregood practices. Poor knowledge about side effect of drugs can have serious consequence on visual outcome. *Al-Shifa Journal of Ophthalmology 2021; 17(3):136-143.* © *Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

1. *Pakistan Institute of Ophthalmology, Al-Shifa Trust Eye Hospital, Rawalpindi*
2. *Quaid-e-Azam University Islamabad*

Originally Received: 11 August 2020
Revised: 6 October 2021
Accepted: 27 October 2021

Correspondence to:
Maryam Firdous
Pakistan Institute of Ophthalmology, Al-Shifa Trust Eye Hospital, Rawalpindi
Email: cmaryam01@gmail.com

Introduction:

Eye is an organ of sight considered as most important, helping us in moving around and to see. As it owns an anatomy and physiology, so it can also have a pathology which can be minor such as seasonal allergies, redness, watering, itching, blurring or can be severe such as media opacities and detachments. Disease is a very common experience in human life and can occur at any time. [1, 2] However, the individual's response to such disorder is dependent upon different beliefs of individual and certain other underlying factors. [3, 4]

It is difficult to explain the concept of Health and Disease. The people of different socio- demography have different explanations for the health and disease. The health is considered as the absence of the

illness or disease. World Health Organization defines health as, state of complete physical, mental, and social well-being and not merely the absence of diseases or infirmity. [4, 5]

Most of the people often ignore their ocular complaints referring it as minor illness but many find it very discomforting. Different people go for different treatment options whenthey feel pain or discomfort. Only 10-30% of symptoms felt by an individual are brought to the attention of the physician, but the majority of symptoms are remained either tolerated or self-medicated. [1] They first go for a home remedy such as washing eyes with fresh tap water, holy water, rose water, honey or kajal. Some prefer to use stocked medicines or previous medicines already prescribed with an assumption of recurrent condition. Some seek advice from family or friends prior to consulting an ophthalmologist and some go to pharmacy to get facilitated without wasting much time. [6, 7]

Self-medication is a human behavior in which an individual uses any substance based on personal choice to treat any kind of self-diagnosed illness. [8] The practice of self- medication is widespread but knowledge about desired/side-effect of drugs is minimum among Asians. Self-medication is a broad term which also includes using previous stocked medicines or relying on home remedies. Self-medication includes advice from friends or trends that run in families.

Moreover, extraction of much information from online sources, magazines or periodicals makes people courageous about treating their own illness. However, people are endangering their lives by practicing self-medication as it can lead to habituation, lethal allergic reactions, under dosage of medication which may not alleviate the symptom, and also over dosage can cause collateral damage.[9] It is well known fact that this kind of attitude and practice carries risks, not only related tothe side effects of the topical drug itself, but can also result in inappropriate treatment or failure to seek prompt medical care, thus leading to a postponement in diagnosis and, in turn to unintended consequences even leading to blindness.[10] Self-medication can have serious consequences for patients. Use of ophthalmic medicines without supervision by an ophthalmologist may have adverse effects on the patient's visualoutcome, due to a delayed diagnosis, inappropriate treatment, masking severe pathologies or causing side-effects, intoxication or harmful drug interactions. [11]

Access to hospital (24/7) is a powerful factor in self-medication practices. Only 45% Pakistani population have access to doctors and adequate medical healthcare services. Moreover, less than 21% of population in Pakistan has access to public sector's facilities for primary health care. Provision of appropriate health facilities can significantly reduce self-medication practices. [8]

In Pakistan, about 79% primary care is provided by private sector that can be a cause of self-medication practices. The contributing factors to the high prevalence of self- medication in Pakistan include: ease of access to medicines from pharmacy, many drugs being labeled as Over-the-counter drugs, lack of self-care knowledge, illiteracy rate, excessive marketing, malfunctioning of regulatory policies, poor accessibility to healthcare providers, and lack of public healthcare service centers in peripheries. [8]

Furthermore, in my study population and in Pakistan, there is very limited data about knowledge and practices of ophthalmic self-medication and factors behind it. Therefore, this study is aimed at assessing the knowledge of individuals who practice self-medicationand to evaluate the causes.

This study will provide a baseline to future researches.

Participants and Methods:

This cross-sectional study was carried out at among the individuals visiting the Outdoor Patient Department (OPD) of Al-Shifa Trust Eye Hospital, Rawalpindi and the duration of study was six weeks. All the individuals above the age of 18 years who at least once self-medicated in last 1 year were included in the study. Both genders were taken in the study. The data was collected after approval by Institutional Review Board. Permission was taken from head of OPDs. All the participants were included after taking verbal consent. The data was collected by using an interview based structured questionnaire. Questionnaire was constructed based on previous studies. Reliability was checked using SPSS software and content validity was checked by circulating it to experts in field including supervisor. The questionnaire was interview based and questions were asked in a language and manner easily comprehensible for respondents.

Descriptive statistics was used for quantitative variables i.e., age and gender. Quantitative data was converted into categorical. All the data was presented in form of frequencies and percentages. Graphs and charts were used, where applicable, to represent data. Chi square test for independence was used for finding association between outcome variables and independent variables. The test was applied on all applicable variables. A significance level of 5% was used for all inferential statistics.

Results:

A total of 300 subjects were recruited for this cross-sectional study including 40.3% males and 59.7% females. Mean age of participants was 49.61 ± 15.76 years ranging from minimum 18 to maximum83 years. Age was categorized into seven groups. To find association between independent variables (age, gender, education, marital statusand residence) and dependent variables (knowledge and practices), Chi square test of independence was used. Statistically significant association was found among knowledge, practices and sociodemographic factors. 65.67% respondents had good knowledge about self-medication with ophthalmic products. Only 26.67% of total sample had good practices of ophthalmic self-medication.

Females (70.9%) had comparatively good knowledge of ophthalmic products as compared to males.Higher education level was statistically associated with good knowledge. Urban residents(71.6%) were better in knowledge regarding ophthalmic self-medication. There was a strong association between education, marital status, monthly income,residence, and way of treatment. Age was significantly associated with practice of ophthalmic products. More aged peoplehad more bad practices. No relation was found between age and knowledge of ophthalmicproducts. Good knowledge was significantly associated with good practice of ophthalmic products.

Table 1: Frequency of Age groups

Age groups	Frequency	Percentage
18-28	77	25.7
29-38	49	16.3
39-48	48	16.0
49-58	50	16.7
59-68	63	21.0
69-78	10	3.3
79-88	3	1.0
Total	300	100.0

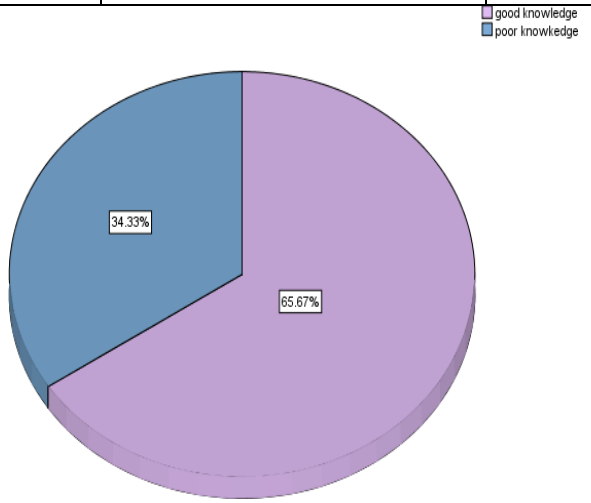

Figure 1: Knowledge regarding self-medication of ophthalmic products

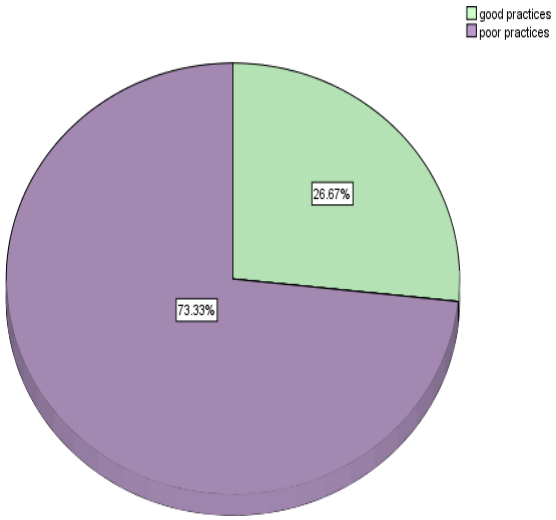

Figure 2: Practices regarding self-medication of ophthalmic products

Table 2: Association of knowledge with sociodemographic of individuals

Variables	Options	Knowledge		df	chi	p-value
		Good knowledge	Poor knowledge			
Gender	Male	70(57.9%)	51(42.1%)	1	5.494	0.019
	Female	127(70.9%)	52(29.1%)			
Education	Illiterate	73(56.6%)	56(43.4%)	3	35.497	0.001
	Primary	44(53.7%)	38(46.3%)			
	Secondary	47(83.9%)	9(16.1%)			
	Higher	33(100%)	0(0.0%)			
Marital status	Unmarried	43(71.7%)	17(28.3%)	1	1.198	0.274
	Married	154(64.2%)	86(35.8%)			
Residence	Rural	71(57.3%)	53(42.7%)	1	6.629	0.010
	Urban	126(71.6%)	50(28.4%)			

Table 3: Association of self-medication practices with sociodemographic features

Variables	Options	Practice		df	Chi	p-value
		Good practices	Poor practices			
Gender	Male	28(23.1%)	93(76.9%)	1	1.289	0.256
	Female	52(29.1%)	127(70.9%)			
Education	Illiterate	13(10.1%)	116(89.9%)	3	37.983	
	Primary	25(30.5%)	57(69.5%)			
	Secondary	26(46.4%)	30(53.6%)			0.001
	Higher	16(48.5%)	17(51.5%)			
Marital status	Unmarried	27(45%)	33(55%)	1	12.891	0.001
	Married	53(22.1%)	187(77.9%)			
Monthly income	Low	51(24.3%)	159(75.7%)	2	8.002	
	Average	29(36.2%)	51(63.8%)			0.018
	High	0(0.0%)	10(100%)			
Residence	Rural	21(16.9%)	103(83.1%)	1	10.235	
	Urban	55(33.5%)	117(66.5%)			0.001
How you came to know about the treatment?	Pharmacy	21(23.4%)	68(76.6%)	4	9.829	
	Friend/family advice	7 (28.0%)	18(72.0%)			
	Previous medicine	16(48.5%)	17(51.5%)			0.043
	4. Self-medicated	36(23.8%)	115(76.2%)			

Table 4: Association between age, knowledge and practices of self-medication

Variable	Options	Knowledge		P value	Practices		p-value
		Good knowledge	Poor knowledge		Good practice	Poor practice	
Age	18-28	50(64.9%)	27(35.1%)	0.268 (6)	31(40.3%)	46(59.7%)	0.022 (6)
	29-38	34(69.4%)	15(30.6%)		10(20.4%)	39(79.6%)	
	39-48	36(75.0%)	12(25%)		11(22.9%)	37(77.1%)	
	49-58	35(70.0%)	15(30.0%)		10(20.0%)	40(80.0%)	
	59-68	33(52.4%)	30(47.6%)		13(20.6%)	50(79.4%)	
	69-78	7(70.0%)	3(30.0%)		5(50.0%)	5(50.0%)	
	79-88	2(66.7%)	1(33.3%)		0(0.0%)	3(100.0%)	

Table 5: Association between knowledge and practice

		Practices		Chi	df	p-value
		Good practices	Bad practices			
Knowledge	Good knowledge	60(30.5%)	137(69.5%)	4.125	1	0.040
	Poor knowledge	20(19.4%)	83(80.6%)			

Discussion:

In current study, all those individuals were included who have had at least once self-medicated using any ophthalmic product or home-based products for eye. It was a KAP study. Questions were asked in an interview manner to inquire about knowledge they hadand practices. All the other international studies were mostly based on prevalence of ophthalmic self-medication. In our study the knowledge about use of ophthalmic products was found good 65.67 %, while only 27.67% had good practices in use of eye products. Young, 18-30 age groups were among the most to self-medicate 25.7%, a study conducted in Islamabad also reported high percentage of young age group 63% who were self-medicating [(11)]. Young generation has more access to internet facilities, they consider themselves

as more educated, moreover they have a busy routine so they are most likely to self-medicate.

In current study, gender was significantly associated with knowledge of self-medication (p=0.01) females had more good knowledge as compared to males 70.9%. Females are more concerned about health issues and they strictly follow the guidelines and recommendations about drug usage. It is in contrast with study conducted in American population where males were more likely to self-medicate. [12]

People of urban population were in majority 58.67% who were self-medicating with good knowledge (71.6%) and more good practices (33.5%). High literacy rate among urban population can also be factor (p=0.00). Rural community preferred a nearby pharmacy (36.3%) or medical store while residents of urban areas were self-medicating with home/traditional remedies (54.7%). Lack of eye care centers in rural areas was a major factor in forcing people to opt for pharmacy in case of any ocular emergency. In this study, Itching (25.33%) was reported as common reason for which most people choose to self-medicate. In a study done by Marquez et al, ocular infection/inflammation was most common reason for self-medication (49.5%) [10]. While a study in Tanzania, Painful eyes (47.7%) were mostly reported. [14]

Half of our study population 50.67% preferred home remedies and traditional methods forcuring their ocular symptoms. These included using holy water, rose water, surma/kajal, homeopathic drugs and some also reported the use of sugar and spices.74.3% of the respondents remembered the name of product they had used. Similar findings were reported by Kadri et al 64.7% in India. 50.3% of the respondents did not know about the type of drug they had used, while rest were those who have used traditional or home remedies. 73.77 % of study population did not even knew about correct dosage of drug and only 8.67 % had the knowledge that ocularmedicines can have side effects too. While 13.3% people knew about usage duration of anophthalmic product after first opening i.e., one month. Similar findings were reported by studies done in India (23.27%); it can be due to regional similarity of subcontinent. [15] This shows poor interest of people in seeking complete information about drug.

Out of all individuals, only 2.3% reported to have side-effects of ophthalmic products thatthey used. While assessing the practices, only 9.3% of study population read the information labels inside drugs. This indicates poor attitude towards self-care. It can have many reasons. Stated as having busy routine, 23.23 % people reported that they never check expiry date of the products. Interestingly, those who were aware of side effect of ophthalmic products, had good practices (p=0.000).
In spite of practicing self-medication, 36% participants preferred to visit an ophthalmologist in case of ocular complain, according to them eye is a delicate organ and one should take care. When participants were inquired about reason for not consulting a health professional, 32.7% stated their problem as minor, 16.67% self-medicated due to lack of time, while 5 % had poor confidence on health professionals. Rest of 14.67% reported the non-availability of health services in their residential area.

Conclusion:

Young generation mostly prefers to self-treat. Females were outnumbered in practicing ocular self-medication. Knowledge was good among literate people, but practices were poor. Urban people preferred to self-medicate with home remedies as they considered theirproblems as minor, while rural population did not have any eye care facility. Financial issues can also lead to such practices. Careless self-

medication can lead to serious side effect on ocular health.

References:

1. Lukovic JA, Miletic V, Pekmezovic T. Self-Medication Practices and Risk Factors for Self-Medication among Medical Students in Belgrade , Serbia. 2014;1–14.
2. Hughes CM, McElnay JC, Fleming GF. Benefits and risks of self-medication. Drug Saf, 2001;24(14):1027-1037.
3. Chohan O, Hassan SMF, Khan KM. General evaluation of self-medication amongst university students in Abbottabad, Pakistan; prevalence, attitude and causes.2013;70(5):919–22.
4. Baig S. Self-medication practices. 1951;513–21.
5. Pawaskar MD, Balkrishnan R. Switching from prescription to over-the counter medications: a consumer and managed care perspective. Managed care interface. 2007 Jan 1;20(1):42-7.
6. Tayanithi P, Aramwit P. Self – medicated over the counter ophthalmic solutions in central Bangkok. J-Med Assoc Thai. 2005;88 (Suppl 4):S330-S334.
7. Carvalho RS, Kara-josé N, Temporini ER, Noma-campos R. Self-medication: initial treatments used by patients seen in an ophthalmologic emergency room. 2009;64(8):735–41.
8. Aziz MM, Masood I, Yousaf M, Saleem H, Ye D, Fang Y. Pattern of medication selling and self-medication practices: A study from Punjab, Pakistan. Plos One [Internet]. 2018;13(3):1–12.
9. Uddin SMN, Karmakar P, Choudhuri MSK. Assessing the Perceptions and Practice of Self-Medication among Bangladeshi Undergraduate Pharmacy Students. 2018;1–12.
10. Issue V, Issn P--J-. Errors of Self Medication By NSAIDS Authors. 2015;3(1):2849–59.
11. Aqeel T, Shabbir A, Basharat H, Bukhari M, Mobin S, Shahid H, et al. Prevalence of self-medication among urban and rural population of Islamabad, Pakistan. TropJ Pharm Res. 2014;13(4):627–33.
12. Marquez GE, Piñeros-heilbron H, Sanchez VM, Torres VE, Gramajo AL, Juarez CP, et al. Eye Drop Self-medication: Comparative Questionnaire-based Study of Two Latin American Cities. 5(2).
13. Marquez GE, Torres VE, Sanchez VM, Gramajo AL, Zelaya N, Peña FY, et al. Self-medication in Ophthalmology: A Questionnaire-based Study in an Argentinean Population. 2012;19(January):236–41.
14. Kagashe GAB, Msela B. Self-medication among patients seen at ophthalmology clinics at four hospitals in Dar es salaam Tanzania. 2012;2(5):21–5.
15. Kadri R, Hegde S, Kudva AA, Achar A, Shenoy SP. Original article Self-medication with over-the-counter ophthalmic preparations: is it safe? 2011;2(2):528–30,

Authors Contribution

Concept and Design: Aiman Fayyaz, Khizar Nabeel
Data Collection / Assembly: Sana Azam
Drafting: Sana Azam
Statistical expertise: Fareeha Ambreen
Critical Revision: Maryam Firdous