Correlation of Different Types of Refractive Errors with Cataract

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ABSTRACT

Purpose: To determine correlation between cataract and refractive errors..

Methodology: This Descriptive cross-sectional study was conducted in outpatient department (OPD) in the department of ophthalmology at Hayatabad Medical Complex (HMC) Peshawar, from June 2021 to December 2021.This study was conducted on a total of 50 participants, age group 40 and above, comprising both male and female with cataract. Preliminary examination was done under strict Standard Operating Procedures (SOPs), which include visual acuity assessment with Snellen visual acuity (VA) chart, refraction and anterior segment examination by direct ophthalmoscope. VA was recorded with and without correction for individuals who already used glasses. After recording VA with and without pinhole, objective refraction/dry retinoscopy was performed.

Results: The results showed prevalence of myopia, hypermetropia and astigmatism as 12%, 28% and 60% respectively. Gender wise distribution of refractive errors including myopia, hypermetropia and astigmatism were 6%, 8% and 32% in male while myopia, hypermetropia and astigmatism in female were 6%, 20% and 32%.

Conclusion: In cataract patients, the most prevalent refractive error was astigmatism, followed by hypermetropia. Myopia was the least prevalent finding.

Key Words: Cataract, Myopia, Hypermetropia and astigmatism.

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INTRODUCTION

The clear, biconvex, elliptical shaped human ocular lens is situated between the anterior aqueous fluid and posterior vitreous humor in the optical axis of the eye. One of the main causes of vision impairment worldwide are cataracts, which are caused by the opacification of lens fibers in any part of the lens. There are three primary forms of cataracts based on the area of opacification: nuclear, cortical, and posterior subcapsular cataracts.[1]

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Cataracts can be divided into some categories based on their causes: age-related cataracts, pediatric cataracts, and cataracts from some other sources. In adults, age-related cataracts most commonly occur between 45 and 50 years of age; in children, the most common causes are genetic and metabolic.2 Additionally, long-term systemic corticosteroid medication may cause cataracts. The majority of these cases have involved rheumatoid arthritis patients, who even in the absence of steroids are susceptible to posterior subcapsular cataracts.[3]

According to population-based studies and earlier meta-analyses conducted in various parts of the world, cataracts account for 47.8% to 51% of all blindness globally.[4] According to many large-scale population-based studies, the prevalence of cataract increases with age, from 3.9 % in the age group of 55–64 to 92.6 % in the age group of 80–84.[5] Furthermore, because of the potential association between cataracts and systemic disorders such as diabetes, having cataracts is associated with an increased risk of death.[6] The prevalence of cataracts has been dropping for the past two decades as rates of cataract surgery, as measured by as a result of intensive surgical programs and improved techniques, there are now more surgeries performed annually per million individuals.[7]

It is expected that more than 30 million people would get cataract surgery each year throughout the world.[8] With an incidence ranging from one to six per 10,000 live births, pediatric cataracts are one of the most prevalent causes of curable juvenile blindness.[9]

Congenital cataracts account for the majority of pediatric cases and 5–20 percent of childhood blindness globally, but 22–30 percent in underdeveloped nations.[10-12] Congenital cataracts are also linked to maternal illnesses such as cytomegalo-inclusion, toxoplasmosis, and rubella. Pregnancy-related radiation exposure, endocrine disruption,[8] drug or alcohol misuse (thalidomide, corticosteroids, etc.), and other factors raise the baby's risk of cataract development. Infantile causes that induce cataract in babies include myotonia dystrophica, Lowe's disease, congenital icthyosis, and intrauterine hypoxia in the final trimester of pregnancy. The majority of cataract types are more common in women than in males, most likely as a result of a loss of estrogen in the postmenopausal years.[13]

The following are the most typical complaints that are indicative of a deteriorating cataract: diminished visual acuity, contrast sensitivity, or color appreciation, increasing nearsightedness and/or glare, especially when driving at night Multi-image perception of a single object is known as monocular double vision or ghosting.[14] Preventing glaucoma, treating lens-induced inflammation, and allowing proper retinal visibility are all unusual indications for cataract surgery.[15] Preoperative visual acuity has no bearing on the outcome of cataract surgery. Even with the past ten years of advancements in technology and surgical methods, a thorough preoperative examination, accurate intraocular lens power estimation, and the right intraoperative and postoperative care are still necessary for effective surgical outcomes.[16]

Refractive errors are a type of optical defect where, while the accommodation is at rest, the optical system is unable to focus parallel rays of light sharply on the retina. The three most prevalent kinds of refractive defects are astigmatism, hyperopia, and myopia.[17]

METHODOLOGY

The descriptive cross-sectional study design was used for this study. This study was conducted in OPD in the ophthalmology department HMC Peshawar, from June 2021 to December 2021.This study was conducted on a total of 50 participants, age group 40 and above comprising both males and females with cataract. The study's patients were chosen using a non-probability convenient sampling technique. The inclusion criteria were as follows, all male and female, diagnosed cataract patients aged above 40 years attending eye OPD. The exclusion criteria were as follows, mentally retarded. Uncooperative patients. Pseudo phakic;

who previously had eye surgery. Patients who already had refractive error before developing cataract. The procedures of this investigation were fully explained to each and every participant. Before the preliminary assessment, subjects were asked to fill the Performa. After filling the Performa, preliminary examination was done under strict Standard Operating Procedures (SOPs), which include visual acuity assessment with Snellen visual acuity chart, refraction and anterior segment examination by direct ophthalmoscope. The participants sat on an examining chair six meters away from thechart. After that, an occluder was used to cover one eye and a monocular VA was obtained. VA was recorded with and without correction for individuals who already used glasses, and then VA was recorded. After recording VA with and without pinhole, objective refraction/dry retinoscopy was performed. Auto refraction was done through an auto refractometer (TOPCON RK 8800). A commercially available computer application Statistical Package for Social Science (SPSS) was used to examine the data. Percentages and frequencies were calculated for categorical variables. Cross tabs were calculated for mean percentage for variables. Descriptive statistics (frequency, means and percentage) were used to analyze the data. Probability (p-value) was calculated using the person's correlation test for categorical values comparisons and p value of 0.05 was considered statistically significant.

RESULTS

The results showed that out of 50 total participants 29 (58%) were of the age group 40 – 55 years, 14 (28%) were of the age group 55 – 70 years while 7 (14%) were of the age group 70 and above years. Mean age was found to be 55.86 ± 12.226. Out of total 50 (100%) participants 21 (42%) were male while 29 (58%) were female. Among total of 50 (100%) participants, 6 (12%) had myopic refractive error, 14 (28%) had hyperopic refractive error while 30 (60%) had astigmatism. Among the total participants 50 (100%), the age group of 40 – 55 years 4 (8%) were myopes, 8 (16%) were hyperopes while 9 (18%) had astigmatism. Among the age group of 55 – 70 years 1 (2%) had myopia, 4(8%) were hyperope while 9 (18%) were astigmatism. Among those who were age 70 and above years 5 (10%) had myopia, 14 (28%) had hyperopia and 36 (72%) had astigmatism. Among total of 50 (100%) participants of our study the male participants, 3 (6%) were myopes, 4 (8%) were hyperope while 16 (32%) had astigmatism. Among the female participants 3 (6%) were myopes, 10 (20%) were hyperope while 16 (32%) had astigmatism.

Table - 1: Demographic Profile of the Participants.

Demographics				
Gender				
Age (years)		Male n (%)	Female n (%)	Total n (%)
	40 -55	12 (24)	17 (34)	29 (58)
	55-70	6 (12)	8 (16)	14 (28)
	70 above	3 (6)	4 (8)	7 (14)
Total		21 (42)	29 (58)	50 (100)
Mean ± SD age = 55.86 ± 12.226				

n = number of patients , % = percentage ,SD = standard deviation

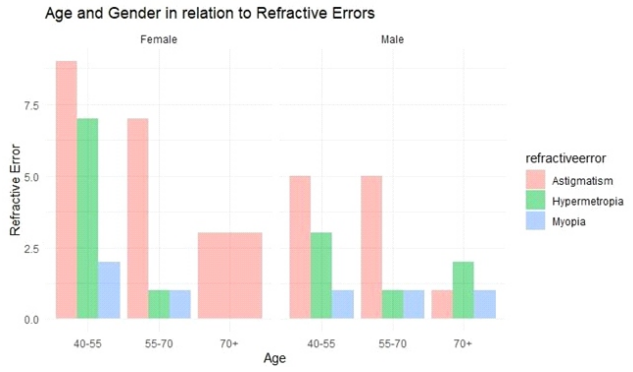
Table - 2: Age Wise Distribution of Myopia, Hyperopia and Astigmatism

Refractive Error				
Age range (Years)	Myopia n (%)	Hypermetropia n (%)	Astigmatism n (%)	Total n (%)
40 -55	4 (8)	8 (16)	17 (34)	29 (58)
55-70	1 (2)	4 (8)	9 (8)	14 (28)
70 above	1 (2)	2 (4)	4 (8)	7 (14)
Total	6 (12)	14 (28)	30 (60)	50 (100)
P-value	.978			

Table - 3: Gender Wise Distribution of Myopia, Hyperopia and Astigmatism

Refractive Error				
Gender	Myopia n (%)	Hypermetropia n (%)	Astigmatism n (%)	Total n (%)
Male	3 (6)	4 (8)	14 (28)	21 (42)
Female	3 (6)	10 (20)	16 (32)	29 (58)
Total	6 (12)	14 (28)	30 (60)	50 (100)
P-value	.841			

Figure -1: Age and Gender Relation to Refractive Errors



DISCUSSION

During cataract surgery greater access of astigmatism correction improves visual outcome and improves overall lifetime cost savings. A total of 50 total participants 58% were of the age group 40 – 55 years, 28% were of the age group 55 – 70 years while 14% were of the age group 70 and above years. Mean age was found to be 55.86 ± 12.226. 42% were male while 58% were female**.** A study conducted in the Vientiane Province of the Lao People's Democratic Republic, to ascertain the incidence of adult refractive error and related risk variables the myopia was recorded in 53.2% of participants showed a correlation between myopia and both age cataract was ($p < .001$). In 26.4% of the subjects, hyperopia was noted; this finding was correlated with advancing age ($p < .001$). A correlation of statistical significance ($p < .001$) was found between astigmatism and increased cataract risk in 55.8% of the population. This study showed that astigmatism was the major anomaly among the cataract patients.[18] However we found the prevalence of astigmatism the most, 60% among the cataract patients.

A study was conducted in Tehran Iran investigated how cataracts and refractive errors are related. The cross-sectional study used a stratified cluster sampling technique, and cycloplegia was used to examine the refractive errors. It was determined whether refractive errors and cataracts are related. The result of this study showed that there is a correlation between cataract and refractive errors. The participants participated in this study showed that the prevalence of hypermetropia was high whereas individuals with cataracts had a decreased rate of myopia.The prevalence of hypermetropia was 57.30% while myopia was 19.43%. Additionally, this investigation revealed that there was an association between age and hypermetropia (P=0.001), but not between age and myopia (P=0.276).[19]

A study conducted to correlate the relationship between age-related cataract and refractive errors in a primarily white US population. Among the participants included in prevalent cataract analyses the myopia frequency was 25.5% and hyperopia was 45.8% . However, our study found that the prevalence of astigmatism was greater followed by hyperopia and least prevalence of myopia. Our study showed that the prevalence of refractive errors among total of 50 (100%) participants, 30 (60%) had astigmatism, 14 (28%) had hyperopic refractive error while 6 (12%)had myopic refractive error. These results were similar to the studies mentioned above.[20] According to the study conducted in Iran the prevalence of myopia among all of the participants were 19.7%, hyperopia was 39.5% while astigmatism prevalence was 23.6%. Myopia was also significantly correlated with male gender and cataract. Age and female gender had a correlation with hyperopia. A strong correlation was found between astigmatism and cataract as well as a decline in age.[21]

Greater access of astigmatism correction during cataract surgery improves visual outcome and improves overall lifetime cost savings.

CONCLUSION

According to the study's findings, the majority of the patients had astigmatism, hypermetropia, and then myopia. Astigmatism was also the most prevalent refractive error in the population in different age groups and genders, followed by hypermetropia. Myopia was the least prevalent finding.

Conflict of Interest: None to declare

Ethical Approval: The study was approved by the

Institutional Review Board / Ethical Review Board Vide No.387C/UGS/PICO/2021.

Author Contributions: Sumreen Bano: Concept, Design, Data Collection, Article Draft.

Nudrat Ihsan: Data Collection, Literature Review.

Anbar Zulfiqar: Data Analysis, Critical Review.

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