Original Article

Frequency, Etiology and Leading Causes of Pre-Senile Cataract: A Descriptive Study

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Abstract

Introduction: Cataract is generally caused due to physical aging, but, in some cases, there are chances that it may develop at an early age (Pre-senile cataract). A pre-senile cataract is believed not to be primary in nature and some underlying ocular/systemic/environmental factor is causing the lens opacification at an early age. This study aimed to determine the frequency and risk factors of pre-senile cataracts in our population.

Materials and Methods: This was an observational study at Outdoor Patient - Eye in Benazir Bhutto Hospital, Rawalpindi (BBH), for the period from December 2017 to June 2018. Cataract was diagnosed on slit-lamp examination. Detailed history, Ocular and systemic examination was done for all pre-senile cataract cases. Laboratory/radiological investigations were performed when and where required. Using the Excel spreadsheet, statistical analysis of descriptive data was carried out.

Results: During the time span of the study 11,448 patients visited the eye OPD. However, cataract was found in only 849 patients. Out of these 849 patients, 165 cases were pre-senile cataracts. Pre-senile cataract was most seen in the age group 30-49 (52.13%) and among women 56.36%. The identified causes were idiopathic 33.3%, diabetes 27.3%, and Steroids and other drugs related 20.0%. Posterior subcapsular cataract in 36.36% was the most identified type in the study among pre-senile cataracts.

Keywords: Cataract, Pre-senile Cataract, Diabetes Mellitus, Corticosteroids.

Introduction

A cataract is one of the primary reasons for visual deficiency in the world. It causes around 47.8% of the total blindness worldwide. Furthermore, in the Southeast Asian region, which includes Pakistan, around 51% of the blindness could be attributed to the cataract.[1]

The light entering the eye is focused onto the retina by an intraocular crystalline lens. A cataract is the opacification of this natural intraocular crystalline lens.[2] The clouding of the lens can cause a decrease in vision, as it develops gradually and is painless. This can result in the degradation of vision and affect one's life and even one is not able to realize it leading to blindness, if not treated in time.[3]

Generally, cataract is caused by the process of physical ageing; still, some circumstances may cause its early formation.[4] This occurrence of cataract from earlier adult age to 60-year life span is termed as Pre-senile cataract.[5] Pre-senile cataract is believed not to be primary in nature and some underlying ocular/systemic/environmental factor is causing the lens opacification at an early age.[6]

Various risk factors, linked to early development, of cataract, are: systemic diseases (Diabetes Mellitus, Atopic Dermatitis, Myotonic Dystrophy, Neurofibromatosis type II, Wilsons disease, Down syndrome, and hypothyroidism); Ocular diseases (Chronic Uveitis, Angle Closure Glaucoma, Hereditary Fundus Dystrophies like Retinitis Pigmentosa & Gyrate Atrophy); Drugs (Steroids, Amiodarone, Chlorpromazine, Busulfan, Allopurinol, and Gold); Refractive error (High myopia); and, Trauma (Including Mechanical, Chemical, Thermal, and Radiations), etc.[7] Active smoking, alcohol use, and severe malnutrition are also linked to the Cataract development.[8,9] However, there are cases where the development of cataracts is not associated with any of the noticeable risk factors in young age patients.

This study's objectives were to determine the frequency of pre-senile cataracts and present major causes that could be identified through this study.

Materials and Methods

This was an observational study conducted at the department of ophthalmology, Benazir Bhutto Hospital. A total of 11,448 adult patients, above 18 years of age, who visited the hospital from December 2017 to June 2018, were examined. However, cataract was found only in 849 patients. Patients who had congenital or developmental cataracts were excluded from the study. Furthermore, from the patients with cataracts, only 165 (19.43%) cases were pre-senile cataracts which formed the final sample for this study.

Demographic history of the patients i.e. age, residence address, occupation, and, risk factors such as diabetes, asthma, skin problems, high myopia, thyroid disorders, steroid intake, history suggestive of uveitis, history of any ocular trauma, intraocular surgeries, history of long-term drug intake, and family history of pre-senile cataracts was noted. Blood sugar (Fasting and random) of all the patients were performed and the patients having, fasting glucose level (>110 mg/dl) or random glucose concentration (>180 mg/dl) were classified as Diabetic.[5]

To check the visual acuity, the test was carried out using Snellen's chart, and for anterior segment examination, a slit lamp was used. Intraocular pressure was measured, after topical instillation of Proxymetacaine hydrochloride drops, by Goldmann Applanation Tonometer. Pupils were dilated with 1% Mydriacyl drops and the presence of cataracts was confirmed. Volk 90 D lenses were used to examine the posterior segment.

The data were entered in an Excel spreadsheet. Bar charts and pie diagrams were prepared to carry on the statistical analysis of data.

Results

During the study period, 11,448 patients visited the BBH eye OPD, out of which 849 patients had cataracts giving an overall frequency of cataracts to be 7.41%. 165 (19.43%) cataracts were found in the pre-senile group with a ratio of 1:5 between pre-senile to senile cataracts (Figure 1). Among 165 patients with pre-senile cataracts, 72 (43.63%) were male and 93 (56.37%) were female. While 136 (82.43%) patients were between 40 -60 years of age and 29 (17.57%) were below 40 years of age. Table 1 summarizes this gender and age-related distribution of a final sample. The study showed that idiopathic, i.e. no definite cause, for pre-senile cataract was identified in the 55 subjects (33.3%). Other important causes were diabetes 45 (27.3%) and a history of long-term corticosteroid usage in 33 patients (20.0%). Table 2 summarizes the etiology of pre-senile cataracts in the study population.

The percentage of patients having a posterior subcapsular cataract is 60 (36.36%), nuclear cataract was found in 44 (26.67%), while mature cataract and

mixed cataract were found in 26 (15.76%) and 35 (21.21 %) respectively (Figure 2).

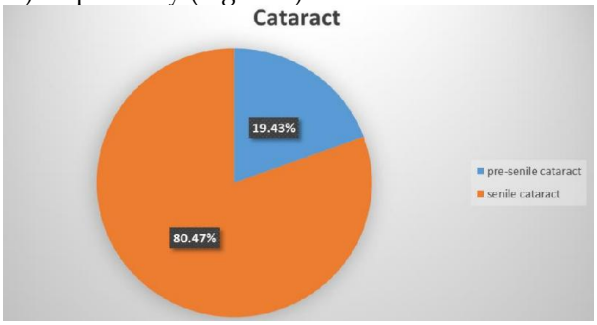

Figure 1: Frequency of Pre-Senile and Senile Cataract in the Study Population

Table 1: Age and Gender Distribution of Pre-Senile Cataract (n =165)

		Frequency	*Percentage*
Age	20-29 years	9	5.45%
	30-39 years	20	12.12%
	40-49 years	86	52.13%
	50-60 years	50	30.30%
Gender	Male	72	43.63%
	Female	93	56.36%

Table 2: Etiology of Pre-Senile Cataract (n= 165)

Etiology	*No. of Patients*	*Percentage*
Idiopathic	55	33.3%
Diabetes	45	27.3%
Steroids and Other Drugs	33	20.0%
Trauma	12	7.3%
Angle Closure Glaucoma (ACG)	01	0.6%
Ocular Diseases Excluding Myopia & ACG	09	5.4%
High Myopia	06	3.6%
Skin Diseases	03	1.8%
Previous Ocular Surgery	01	0.6%

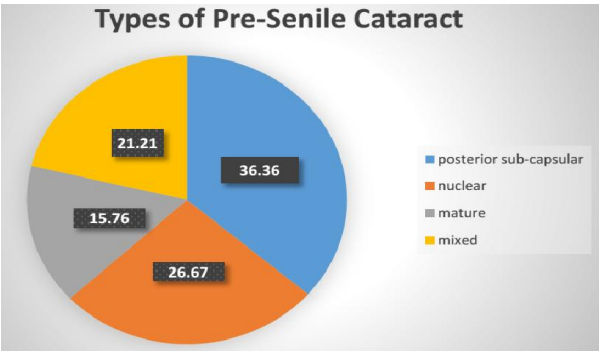

Figure 2: Types of Pre-Senile Cataract

Discussion

Despite the leading cause of blindness, very few studies are reported in the available literature analyzing the risk factors of pre-senile cataracts in Pakistan. In the present study, various etiological factors responsible for the early onset of cataracts were identified.

To the best knowledge of the researchers, the only study conducted in Pakistan on pre-senile cataract was carried in 2011 by Rahman et al.[5] Wherein they concluded that in most of the pre-senile patients no identifiable etiology is found. Among the identifiable risk factors, diabetes leads followed by high myopia. Diabetes was found to be more common in females as compared to males. The presence of atopic dermatitis, occupational heavy metals exposure, and chronic cigarette smoking were also reported in their work.

In one of the recent works carried in India by Jyothi and Sathyan[10], idiopathic was present in 38% of the patients, diabetes mellitus was found to be in 31%, and nearly 12.5% of the study population gave a history of ocular trauma preceding the development of cataract. In 8.5% of the patient's history, atopy was present of which 5% of patients were on regular steroids. 5.5% of the patients were high myopic, 5% were having thyroid disorders while 3% had uveitis. Also, in one of the studies to explore the risk factors for the early onset of cataract in India by Praveen et al., atopy was found in 25.6% of patients.[11] Asthma was also found as a significant risk factor for pre-senile nuclear cataract, which is explained by the usage of systemic steroid treatments.[8] Besides asthma they also highlighted the relation of pre-senile nuclear cataract to current smoking, no-exercise or high amount of physical exercise, tuberculosis, and iron deficiency status.[8]

The study conducted by Nema et al.[12] highlighted the importance of underlying genetic abnormality of galactose metabolism in idiopathic pre-senile cataracts. Various research works show diabetes to be a major risk factor for cataract formation in pre-senile population[5,8], which was also found in our study. The pathogenesis of diabetic cataracts is the intracellular accumulation of sorbitol, which leads to osmotic changes. This, in turn, causes hydropic lens fibres that degenerate and opacify. The use of corticosteroid has well-established adverse effects on cataract formation which is related to the dose and duration of treatment. Steroids administration from any route (systemic, topical, sub-conjunctival, or inhaled form) leads to cataract formation. Furthermore, other drugs like Amiodarone, Chlorpromazine, Busulfan, Allopurinol,

and Gold are also known to have the side effect of lens opacification.[13-15] A traumatic cataract can occur following blunt or penetrating eye injuries. It can also occur after electrocution, chemical, and thermal injuries, or radiation exposure.[16] Ocular diseases like chronic uveitis lead to cataracts due to chronic intraocular inflammation and the use of steroids as a mainstay of treatment, with reporting incidence of around 50%.[17,18] Varied results in terms of regions and races have been reported in many of the studies done to explore the genetic risk factors for the development of pre-senile cataracts. Genetic abnormalities of galactose metabolism causing pre-senile cataract was highlighted in various articles.[12,19-21] Galactosaemia, like diabetes mellitus, is a metabolic disorder that causes improper galactose metabolism and a predisposition to cataract formation. Comparative analysis of the findings from various research articles is given in Table 3.

Table 3: Comparison of Findings of Various Studies with this Study

Etiology	*This Study*	*[5]*	*[9]*	*[10]*	*[11]*
Idiopathic	33.3%	37.8%	65.9 %	37%	19.2%
Diabetes	27.3%	26.0%	7.5%	30%	3.2%
Steroids and Other Drugs	20.0%	-	3.3%	-	7.4%
Trauma	7.3%	-	3.3%	12%	-
Angle Closure Glaucoma (ACG)	0.6%	-	-	-	0.6%
Ocular Diseases Excluding Myopia & ACG	5.4%	-	-	3%	1.2%
High Myopia	3.6%	16.1%	7.5%	5%	-
Skin Diseases	1.8%	2.0%	1.7%	8%	-
Previous Ocular Surgery	0.6%	-	-	-	-

Conclusion

In this study, we found that diabetes mellitus, corticosteroids, and trauma contribute to the occurrence of pre-senile cataracts in the majority of patients. In addition, high myopia, skin diseases, angle-closure glaucoma, and previous ocular surgery were also found to be the factors associated with the pre-senile cataract. Based on the observations, the following measures can prevent the development and progression of Cataracts: Screening and Management of diabetes mellitus; judicious use of steroids, and use of protective eyewear while engaged in the activities that could create a risk for eye injury.

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