

Risk factors associated with Pre-senile Cataract

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ABSTRACT

Objective: To determine frequency of various risk factors associated with presenile cataract among patients scheduled for cataract surgery.

Methodology: Study was conducted at Abbasi Shaheed Hospital and Karachi Medical Dental College between October 2007 and September 2009. Patients of cataract of age 30-55 years were selected. Presence of risk factors like diabetes mellitus, high myopia, occupational exposure to metal work, atopic dermatitis and smoking were noted. Visual acuity, anterior and posterior segments were examined and axial length was measured.

Result: Two hundred fifty four patients satisfying inclusion criteria were selected. These included 181 male (mean age 44.7 years) and 73 females (mean age 43.8 years). Unilateral eye involvement was present in 108 patients while bilateral involvement was present in 146 patients. Risk factors frequency was diabetes (26%), high myopia (16.1%), smoking (15%), metallic exposure (3.1%), atopic dermatitis (2%) while 37.8% were idiopathic. Significant differences were found in frequency of risk factors ($p=0.004$) and mean age according to presence of risk factors ($p=0.001$). While no significant association was found of age with risk factors ($p=0.7$) and gender ($p=0.24$).

Conclusion: Our study shows that idiopathy contributed to most of the cases of presenile cataract followed by diabetes mellitus, high myopia and smoking.

KEY WORDS: Presenile cataract, Diabetes mellitus, High myopia.

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INTRODUCTION

Cataract is the major cause of blindness globally, particularly in Asia. The criteria for cataract surgery has become more patient centered rather than clinical and the patient comes for an early surgery when due to cataract they find it difficult to perform their daily tasks.¹

Presenile cataract refers to an onset that occurs at any time from early adult life to age 60 years.² Risk factors for presenile cataract include family history; refractive error such as high myopia, metabolic disease such as diabetes mellitus, in which glycosylation of lens crystallins occurs resulting in accumulation of glycation derived crosslinks, thereby causing aggregation of high molecular weight material responsible for lens opacification.³⁻⁶ Other possible causes for presenile cataract include atopic dermatitis, long term use of corticosteroids that is related to

dose and duration of treatment, and mode of administration whether systemic, topical, sub-conjunctival and in inhaled form leads to cataract formation.⁷ Active smoking, alcohol use, severe malnutrition, ultra violet β -radiations (290 nm to 320 nm), severe diarrhea causing dehydration is among other risk factors for cataract formation. In young patients the ionizing radiations such as X-rays (0.001 to 10 nm) wave length can cause cataract development.⁸⁻¹⁰ Other etiological factors include trauma, intra-ocular inflammation, electrical current injury, outdoor occupation and occupational exposure to heavy metals.^{7,11,12}

The present study was conducted to analyze various risk factors that are associated with presenile cataract as until now there is no such study conducted in Pakistani population. Identification and knowledge about the frequency of these risk factors will allow for better planning and management of these patients in future and thus could help in decreasing the incidence of presenile cataract.

METHODOLOGY

This study was conducted at the Department of Ophthalmology, Abbasi Shaheed Hospital and Karachi Medical and Dental College between October 2007 to September 2009. Patients of either gender presenting with cataract aged between 30-55 years were included. Patient with history of ocular trauma, intra-ocular surgery, raised intra-ocular pressure and congenital cataract were excluded. Risk factors such as diabetes mellitus, high myopia, occupational metallic exposure, dermatological disease (atopic dermatitis) and smoking were evaluated.

Informed consent was taken followed by visual acuity testing using Snellen's chart, anterior segment was examined using slit lamp (Nidek SL-450), intraocular pressure was measured by Goldmann Applanation Tonometer (Haag Streit) after topical instillation of local anesthetic drops proparacaine

hydrochloride 0.5% (Alcaine - Alcone Couvreur Belgium) and using fluorescein strips (Fluorets strips by Chauvin Pharmaceuticals Ltd) for corneal staining. After dilating the pupil with topical 1% tropicamide (Mydriacyl - Alcone Couvreur Belgium) slit lamp examination was again performed to confirm the presence of cataract and posterior segment examination was done by double aspheric 90 D lens (Volk). The criteria for selection of high myopic patients in this study were axial length of 26 mm or more and axial length was determined by using A-scan (PAC Scan 300 A - Snonomed).

All patients were tested for fasting and random blood sugars. Individuals were classified as having diabetes mellitus if they had fasting glucose level (>110mg/dl) or random glucose concentration (>180mg/dl).

Mean age of both genders was compared using Student's 't' test. Frequency of risk factors was calculated and compared with gender and eye involvement using Chi-square test. Association of age with risk factors frequency was studied by goodness of fit model by ordinal regression. Comparison of age with risk factors was done by ANNOVA. Significance level was set at <0.05. PASW version 18 was used for statistical analysis.

RESULTS

The study included 400 eyes of 254 patients who fulfilled the inclusion criteria, among these patients 181 patients were male (mean age \pm SD 44.7 \pm 5.8 years) and 73 patients were female (mean age \pm SD 43.8 \pm 5.1 years). The difference in age among gender was not statistically significant ($p=0.24$; 95% CI -0.6 to 2.4). Out of these, 79 male and 29 females patients presented with unilateral cataract and 102 male and 44 female patients presented with bilateral cataract. Most common risk factor identified in our study was idiopathic with frequency in males of 31.5% and in females of 53.4%. This was followed by diabetes with

Table-I: Frequency & statistical comparison of risk factors according to gender.

	Male		Female		Total	
	N=181	%	N=73	%	N=254	%
Idiopathic	57	31.5%	39	53.4%	96	37.8%
Diabetes Mellitus	46	25.4%	20	27.4%	66	26.0%
High Myopia	32	17.7%	9	12.3%	41	16.1%
Tobacco Smoking	34	18.8%	4	5.5%	38	15.0%
Occupational Metallic Exposure	8	4.4%	0	.0%	8	3.1%
Atopic Dermatitis	4	2.2%	1	1.4%	5	2.0%

Pearson Chi-Square Tests: Chi-square=17.191; df=5; P=0.004*

* The Chi-square statistic is significant at the 0.05 level.

frequency of 25.4% and 27.4% respectfully. In high myopia (mean axial length was 27.5 ± 1.5 mm) with frequency in males was 17.7% and in females 12.3%. Details of risk factors present in studied patients according to the gender are given in Table-I. Statistically significant differences were found in frequency of risk factors according to gender ($p=0.004$; Table-I).

Comparison of risk factor frequency according unilateral or bilateral involvement of eye did show higher frequency of risk factors in bilateral involvement but it was not statistically significant ($p=0.348$; Table-II).

Association of age with risk factors of presenile cataract was studied by ordinal regression test, which showed no significant association of risk factors with age with goodness of fit value of $P=0.7$ and pseudo R-square value of 0.075.

Mean age according to the presence of risk factors was compared using ANNOVA Test. Highest age was found in patients with diabetes (46.4 ± 5.346 years) and lowest was seen with Atopic Dermatitis (39.8 ± 3.962 years). The difference in age according to the risk factor presence was statistically significant ($P=0.001$). Details are given in Table-III.

DISCUSSION

In this study frequency of various risk factors with presenile cataract was analyzed. Idiopathic remained as the major risk factor for presenile cataract followed by diabetes and high myopia. Diabetes and idiopathic were identified more commonly in females while the rest were common in males. Various etiological factors observed were refractive error (high myopia), diabetes mellitus, atopic dermatitis, occupational exposure to heavy metals work and habit of smoking cigarettes for prolong period of time.

Table-II: Frequency & statistical comparison of risk factors according to Eye Involvement.

	Unilateral		Bilateral	
	N=108	%	N=146	%
Idiopathic	41	42.7%	55	57.3%
Diabetes Mellitus	24	36.4%	42	63.6%
High Myopia	19	46.3%	22	53.7%
Tobacco Smoking	15	39.5%	23	60.5%
Occupational Metallic Exposure	5	62.5%	3	37.5%
Atopic Dermatitis	4	80.0%	1	20.0%

Pearson Chi-Square Tests:

Chi-square=5.595; df=5; $P=0.348^*$

* The Chi-square statistic is significant at the 0.05 level

Tsai et al has reported the age of 45.5 ± 7.6 years for presenile group, this is almost the same among our patients who presented with presenile cataract.³ Male preponderance for presenile cataract was reported by Chien SN et al.¹³ In a study done by Kaluzny et al it has been reported that men are affected in younger age than women from cataract, our study did not show any gender predominance. Age, gender, and certain environmental factors such as smoking and ultraviolet light exposure are also risk factors for presenile cataract.¹⁴

Diabetes mellitus and its complications constitute an important health problem in developing countries.^{15,16} Cataract is a common cause of visual impairment in diabetic patients, at younger age due to accumulation of sorbitol within lens this changes its hydration and alters its metabolism.¹⁶ Among our patients 26% had diabetes had the highest age as compared to other risk factors. Presence of cataract with diabetic retinopathy has been reported in about 20% of patients and significant association between them is also well documented.¹⁷⁻¹⁹

In our study 16.1% patients presenting with presenile cataract had high myopia with mean age of 43.4 ± 5.682 years with slight male preponderance (male 17.7% & females 12.3%). High myopia has been reported to be associated with cataract especially in males in fifth decade of life.²⁰⁻²² But it is also reported in younger than 45 years of age.¹³

Smoking was another significant risk factor for presenile cataract in our study, 15% of our patients were smokers with mean age of 45.4 years. Earlier studies have reported that use of tobacco is harmful to the eye as it contains toxic substance cyanide that leads to early cataract development.⁸

Occupational exposure to heavy metals was present in about 3% of our patients. It is in agreement with studies which reported that prolonged

Table-III: Comparison of Age according to the Presence of Risk Factors by ANNOVA.

	N=254	Mean Age (years)	$\pm SD$
Idiopathic	96	43.7	5.484
Diabetes Mellitus	66	46.4	5.346
High Myopia	41	43.4	5.682
Tobacco Smoking	38	45.4	5.568
Occupational Metallic Exposure	8	40.1	3.314
Atopic Dermatitis	5	39.8	3.962

ANNOVA; df=5; $F=4.434$; $P=0.001$

exposure to heavy metals for more than seven years can cause lenticular changes in up to 70% of patients.²³

In our study idiopathy contributed to most of the cases of presenile cataract 37.8% which could be due to outdoor ultraviolet light exposure as most of our patients belong to labour class. Idiopathy remains the most common risk factor for presenile cataract with reported frequency of 54.4%.³

CONCLUSION

Our study shows that among the significant risk factor for presenile cataract idiopathy contributed to most of the patients followed by diabetes mellitus, high myopia and smoking.

REFERENCES

1. Foster A, Gilbert C, Johnson G. Changing patterns in global blindness: 1988-2008. *Community Eye Health* 2008;21(67):37-39.
2. Stevens RE, Datiles MB, Srivastava SK, Ansari NH, Maumenee AE, Stark WJ. Idiopathic presenile cataract formation and galactosaemia. *Br J Ophthalmol* 1989;73:48-51.
3. Tsai CK, Teng MC, Wu PC, Kuo HK. Clinical features of patients featuring cataracts in a myopia-endemic area of Taiwan. *Chang Gung Med J* 2006;29:406-411.
4. Al Samarrai AR, Noor Sunba MS, UI Hassan M. The incidence of unknown diabetes mellitus and impaired glucose tolerance in idiopathic presenile cataract. *Dev Ophthalmol* 1989;17:79-81.
5. Gopalakrishna K, Rao PN, Nayak BR, Pattabiraman TN. Nonenzymatic glucosylation of lens proteins in different types of cataracts. *Indian J Med Res* 1983;78:426-30.
6. Pande A, Garner WH, Spector A. Glucosylation of human lens protein and cataractogenesis. *Biochem Biophys Res Commun* 1979;89:1260-1266.
7. Mitry D, Singh J, Kiire CA, Hegde V. Atopic dermatitis, facial trauma, and cataract surgery. *Can J Ophthalmol* 2009;44:716.
8. Wu R, Wang JJ, Mitchell P, Lamoureux EL, Zheng Y, Rochtchina E, et al. Smoking, socioeconomic factors, and age-related cataract: The Singapore Malay Eye study. *Arch Ophthalmol* 2010;128:1029-1035.
9. Kanthan GL, Mitchell P, Burlutsky G, Wang JJ. Alcohol consumption and the long-term incidence of cataract and cataract surgery: the Blue Mountains Eye Study. *Am J Ophthalmol* 2010;150:434-440.
10. Pendergrass W, Zitnik G, Tsai R, Wolf N. X-ray induced cataract is preceded by LEC loss, and coincident with accumulation of cortical DNA, and ROS; similarities with age-related cataracts. *Mol Vis* 2010;16:1496-1513.
11. Kuwabara T, Fukushima T, Makino K, Kondo H. Epileptic seizure, cataract, and tongue atrophy during the 8 years after electrical brain injury. *Intern Med* 2009;48:1179-1182.
12. Singh D, Tangirala R, Bakthisaran R, Chintalagiri MR. Synergistic effects of metal ion and the pre-senile cataract-causing G98R alphaA-crystallin: Self-aggregation propensities and chaperone activity. *Mol Vis* 2009;15:2050-2060.
13. Chen SN, Lin KK, Chao AN, Kuo YH, Ho JD. Nuclear sclerotic cataract in young patients in Taiwan. *J Cataract Refract Surg* 2003;29:983-988.
14. Kaluzny JJ. Mean age of patients with senile and presenile cataract in clinical material from 1987-1992. *Klin Oczna* 1993;95:277-280.
15. Raman R, Pal SS, Adams JS, Rani PK, Vaitheeswaran K, Sharma T. Prevalence and Risk Factors for Cataract in Diabetes. Sankara Nethralaya Diabetic Retinopathy Epidemiology And Molecular Genetics Study Report No 17. *Invest Ophthalmol Vis Sci* 2010 ;51(12):6253-6261
16. Shah AS, Chen SH. Cataract surgery and diabetes. *Curr Opin Ophthalmol* 2010;21:4-9.
17. Esteves JF, Dal Pizzol MM, Scococo CA, Roggia MF, Milano SB, Guarienti JA, et al. Cataract and type 1 diabetes mellitus. *Diabetes Res Clin Pract* 2008;82:324-328.
18. Dal Pizzol MM, Esteves JF, Scococo CA, Roggia MF, Rosa CM, Lambert JH, et al. Cataract and type 1 diabetes mellitus. *Arq Bras Ophthalmol* 2008;71:564-567.
19. Wiemer NG, Dubbelman M, Hermans EA, Ringens PJ, Polak BC. Changes in the internal structure of the human crystalline lens with diabetes mellitus type 1 and type 2. *Ophthalmology* 2008;115:2017-2023.
20. Younan C, Mitchell P, Cumming RG, Rochtchina E, Wang JJ. Myopia and incident cataract and cataract surgery: The blue mountains eye study. *Invest Ophthalmol Vis Sci* 2002;43:3625-3632.
21. Mehdizadeh M, Ashraf H. Prevalence of cataract type in relation to axial length in subjects with high myopia and emmetropia in an Indian population. *Am J Ophthalmol* 2008;146:329-330
22. Praveen MR, Vasavada AR, Jani UD, Trivedi RH, Choudhary PK. Prevalence of cataract type in relation to axial length in subjects with high myopia and emmetropia in an Indian population. *Am J Ophthalmol* 2008;145:176-181.
23. Mulak M, Misiuk-Hojlo M, Markuszewski B, Dembska K. Influence of chronic exposure to heavy metals on eyesight. *Klin Oczna* 2008;110:176-182.

Authors Contribution:

AR data collection and writing of the manuscript.
UF and AS did review and final approval of the manuscript.
KY designed and edited the manuscript.
BFZ did statistical analysis of manuscript.