ORIGINAL ARTICLE

Age-related cataract and its types in patients with and without type 2 diabetes mellitus: A Hospital-based comparative study

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Abstract

Objective: To determine the frequency and types of age-related cataract in type 2 diabetic patients compared to non-diabetics.

Methods: This comparative, cross-sectional study was carried out at Al-Ibrahim Eye Hospital, Karachi, from July 2014 to June 2015, and comprised both diabetics and non-diabetics. All patients were selected from the out-patient department and had their full ocular examination done, including retinal screening of diabetic patients with non-mydriatic fundus camera. The criterion for diagnosis of cataract was sufficiently advanced lens opacity that caused impaired vision/un-gradable images. Cataract was classified on a morphological basis into cortical, nuclear, posterior sub-capsular and mixed types.

Results: Of the 49,384 patients, 4,556(9.2%) were diabetics and 44,828(90.8%) were non-diabetics. Among the diabetics, cataract was found in 1,956(42.9%) compared to 7,050(15.7%) in non-diabetics. Adjusted odds ratio (95% confidence interval) between the two groups was 4.40 (range: 4.11-4.71) ($p<0.001$). Male-to-female adjusted odds ratio (95% confidence interval) was 2.05 (range: 1.95-2.15) ($p<0.001$). Nuclear sclerosis was the commonest type in 2,123(46.6%) cataract cases in diabetics whereas posterior sub-capsular cataract was the commonest type in 14,480(32.3%) cases among the non-diabetics.

Conclusion: Cataract was four times more common in diabetics and twice more frequent in men. Nuclear sclerosis was the commonest type of cataract in diabetic patients.

Keywords: Cataract, Diabetes, Type of cataract. (JPMA 66: 1272; 2016)

Introduction

Cataract is the commonest cause of blindness worldwide. The proportion of blindness due to cataract among all eye diseases ranges from 5% in developed countries to 50% or more in poor and/or remote regions.[1] A national survey on blindness in 2004 showed that prevalence of the condition in Pakistan was 1%, out of which 53% was due to cataract and 13% due to the post-operative complication of cataract surgery such as aphakia and posterior capsular opacification (PCO).[2] Cataract is known to occur 2-5 times more frequently in patients with diabetes mellitus (DM) which may reach 15-25 times in diabetics below 40 years of age.[3] The most common cause of un-gradable images on mydriatic fundus camera for retinal screening has been central cataract obstructing retinal screening and subsequent laser application.[4] Furthermore, DM patients have higher complication rates from cataract surgery, like PCO, fibrinous uveitis, anterior segment neo-vascularisation and cystoid macular oedema.[5,6] Presence of diabetic retinopathy (DR) further complicates the surgery as it might progress further and worsen maculopathy following phaco-emulsification cataract surgery.[7,8] Cataract in diabetics poses an enormous health and economic burden, particularly in developing countries where DM treatment is insufficient and cataract surgery often inaccessible. Cataract in diabetics should be considered a very important and special issue by the academicians, research workers as well as the policymakers. There exists scanty local literature about the prevalence and risk factors of cataract in diabetics.[9,10] This study was planned to show frequency of cataract, its types in diabetics compared to non-diabetics.

Patients and Methods

This comparative, cross-sectional study was conducted at the outpatient department (OPD) of Isra Postgraduate Institute of Ophthalmology / Al-Ibrahim Eye Hospital (AIEH), Karachi from July 2014 to June 2015. Using non-probability purposive sampling, patients attending the OPD were included irrespective of their gender, age and occupation. Those with a history of ocular trauma, use of local or systemic steroids, chronic eye disease, or any ocular surgery and those who did not give consent were excluded.

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After getting approval from the institutional research ethical committee, the patients were divided into non-DM and DM groups. After written consent was obtained from the subjects, random blood sugar levels were tested followed by fasting blood plasma level and glycated haemoglobin (HbA1c). All subjects underwent a complete ocular examination that included charting of best corrected visual acuity (BCVA) and measurement of intra-ocular pressure (IOP) by Goldman Applanation Tonometer (GAT). All diabetics had their fundus photographs taken by optometrist with non-mydriatic fundus camera. DR was marked present, absent or unidentifiable. The term "cataract" was defined as opacity, partial or complete, of one or both eyes, or in the lens or capsule (excluding congenital, complicated and traumatic cataract) causing impaired vision or blindness. The criterion for diagnosis of a cataract was "sufficiently advanced lens opacity that caused impaired vision/ un-gradable images on non-mydriatic fundus camera for retinal screening. Where cataract and DR were diagnosed, further examination was done using slit lamp and double aspheric 90D lenses (Volk) after dilating pupil with topical 1% tropicamide (Mydriacil - Alcon). Cataract was classified on morphological basis into cortical, nuclear, sub-capsular and mixed types. Retinopathy was classified into macular oedema, proliferative and non-proliferative type. Cataract patients were advised surgery or follow-up. DR patients were advised according to the type of retinopathy.

Data was analysed using SPSS 20. Continuous variables were measured by mean and standard deviation while categorical variables were measured in frequency. Univariate and multivariate logistic regression analyses were applied to see factors associated with the presence of cataract. Adjusted odds ratio (AOR) and 95% confidence interval (CI) was recorded for age, gender and DM with respect to the presence of cataract. P<0.05 was considered statistically significant.

Results

Of the 49,384 patients who visited the OPD, 4,556(9.2%) were diabetics; 20,508(41.5%), were below 39 years of age; and male-to-female ratio was 0.64:1 (Table-1). Cataract was found in 1,956(42.9%) among the diabetics and 7,050(15.7%) among the non-diabetics (p<0.001). Male-to-female was significantly different (p<0.001 (Table-2).

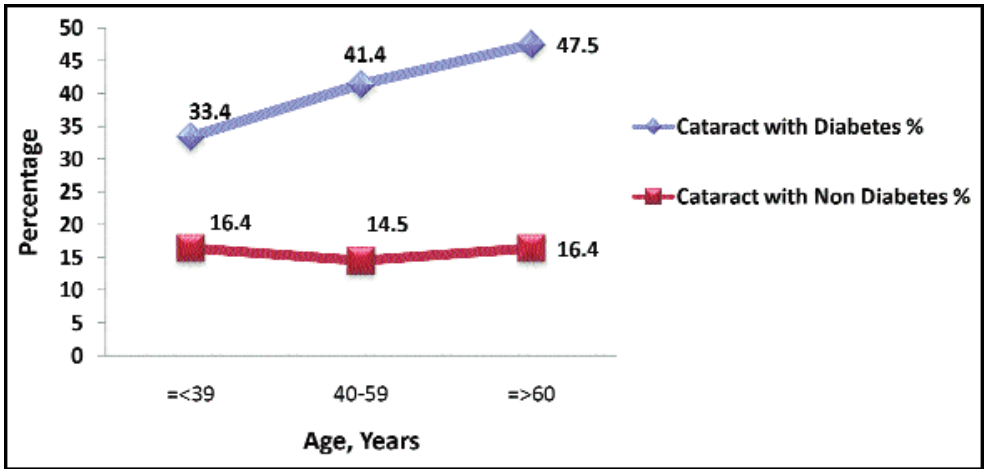

Figure-1: Relationship of cataract with Age in Diabetics and Non-Diabetics.

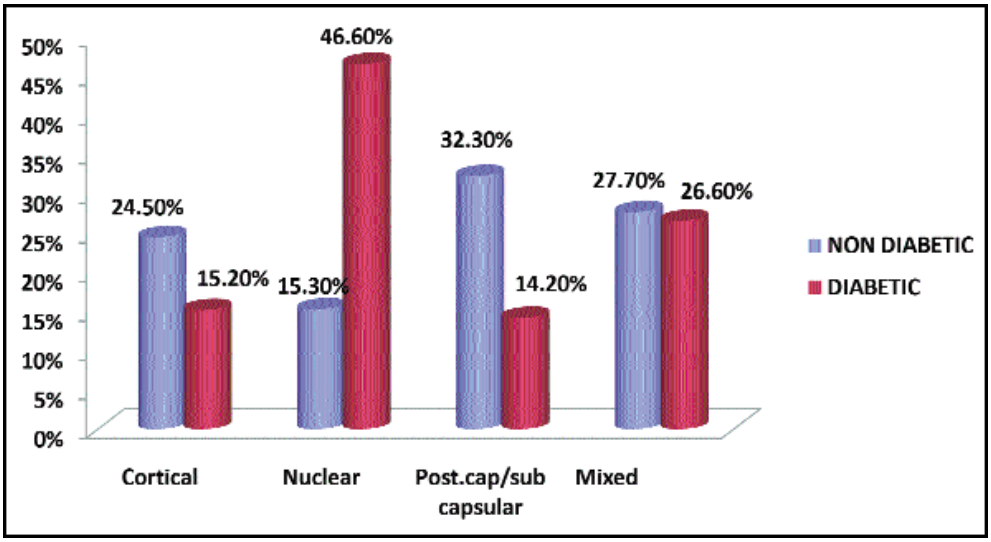

Figure-2: Morphological types of Cataract with Diabetics and Non-Diabetics.

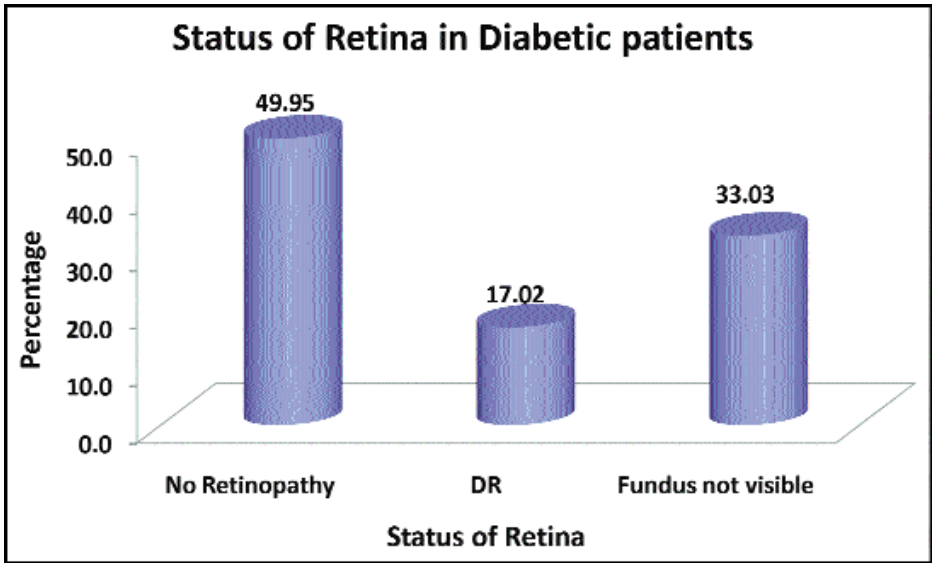

Figure-3: Imaging of the Fundus in Diabetic Cataract.

Table-1: Demography of the respondents.

		Frequency	Percent
Age group	=<39	20508	41.5
	40-59	18430	37.3
	=>60	10446	21.2
	Total	49384	100.0
Gender	Male	19277	39.0
	Female	30107	61.0
Diabetes	No	44828	90.8
	Yes	4556	9.2

Table-2: Relationship of age, gender and Diabetes with Cataract.

		Cataract				
		Not present		Present		P
		Count	Row N %	Count	Row N %	
Age groups	=<39	17094	83.4	3414	16.6	<0.001
	40-59	15037	81.6	3393	18.4	
	=>60	8247	78.9	2199	21.1	
	Total	40378	81.8	9006	18.2	
Gender	Male	14664	76.1	4613	23.9	<0.001
	Female	25714	85.4	4393	14.6	
Diabetes	No	37778	84.3	7050	15.7	<0.001
	Yes	2600	57.1	1956	42.9	

*Data were presented as Frequencies and Percentages n (%)
* P-value < 0.05 considered to be statistically significant.

Frequency of cataract in DM patients increased with age to 1,522(33.4%), 1,886(41.4%), and 2,164(47.5%) in ≤39, 40-59 and ≥60 age groups, respectively. Frequency of cataract in non-diabetic respondents in the corresponding age groups was 7,350(16.4%), 6,500(14.5%), and 7,350(16.4%) (Figure-1). Nuclear sclerosis was the commonest type in 2,123(46.6%) of cataract cases in diabetics whereas posterior sub-capsular cataract was the commonest type in 14,480(32.3%) among the non-diabetics (Figure-2).

Cataract was significantly associated with age, gender, and DM in univariate analysis (by one-to-one variable association). AOR also showed that being old and diabetic increased the risk of cataract in men twice compared to women (Table-3). In diabetic patients, cataract was the reason of un-gradable photos in 1,500(33%) patients, whereas 774(17%) had DR (Figure-3).

Table-3: Univariate and multivariate logistic regression analysis of factors associated with the presence of cataract (n=49384).

Characteristic	Crude Odds Ratio [95% CI]	Adjusted Odds Ratio [95% CI]
Age (years)		
? 39	1.0	1.0
40-59	1.13 [1.07-1.19]	0.95(0.90-1.01)
? 60	1.34 [1.26-1.42]	1.19 (1.12-1.27
P value*	<0.001	<0.001
Gender		
Male	1.84(1.76-1.93)	2.05 (1.95-2.15)
Female	1.0	1.0
P value	<0.001	<0.001
Diabetes		
No	1.0	1.0
Yes	4.03[3.78-4.30]	4.40 (4.11-4.71)
P value	<0.001	<0.001

*Data were presented as Odds Ratio (95% Confidence Interval [CI])
* P-value < 0.05 considered to be statistically significant.

Discussion

This study showed that cataract was nearly four times more common in diabetics than non-diabetics. AOR between the two groups (95% CI) was 4.40(4.11-4.71) (p<0.001). Frequencies of cataract in diabetics quoted in literature are 26% and 43.75% in Pakistan,[11] 32%, in India,[12] 50% in South Korea[13] and 18% in Barbados studies.[14] Harding JJ reported that DM increases the risk

of cataract up to 12-fold in different populations.[15] In spite of these variable results in literature (18% to 65.7%), there is strong evidence that DM is an important risk factor for cataract development in developed as well underdeveloped countries.

Senile cataract is an age-related disease and increases substantially with age; diabetics tend to develop cataract earlier, almost twice as common as non-diabetics.

A population-based survey of eye disease done as part of the health and nutrition examination survey (HANES) in 1971-72 showed that senile cataract or aphakia in the HANES population occurred in 4.9% of those aged 50-64 years and in 25% of those aged 65-74 years[16,17] In Beaver Dam Eye Study it was found that cataract causing a visual acuity (VA) of worse than 6/9 has a prevalence of approximately 5% in the 55-64 age group and over 40% in the over 75s.[18] Data from the Framingham and other eye studies indicate a three to fourfold increased prevalence of cataract in patients with DM under the age of 65 years, and up to a twofold excess prevalence in patients above 65 years.[19,20]

This study has shown that in all age groups diabetics are more prone to cataract development than non-diabetics. Under 40 years, 33.3% diabetics as compared to 16.4% non-diabetics develop cataract; the percentage was 41% and 14.5%, respectively, in 40-59 years age group. The same trend follows in the age group > 60 years where 16.4% non-diabetics develop cataract compared to 47% diabetics (Figure-1). Morphologically, cataract is classified into cortical, nuclear, and posterior sub-capsular on morphological appearance.[21,22] In UK, cortical cataract is the most prevalent (63%) type, followed by nuclear (41%) and posterior sub capsular cataract (24%).[23]

This study has shown that there is preponderance of nuclear sclerosis (46.6%) in diabetics followed by mixed (26.6%), cortical (15.2%), and posterior cortical/sub capsular type (14.2%). In non-diabetics, posterior cortical/sub capsular was more common (32.3%) followed by mixed (27.7%), cortical (24.5%), and nuclear (15.3%) (Figure-2). Nuclear sclerosis poses various problems. It causes early visual disability, mostly in bright light making driving hazardous[24] and enhances chances of corneal complications when Phaco emulsification is carried out. Central cataract obstructs retinal imaging and subsequent laser application.[25] In this study, 33% photos were un-gradable due to cataract whereas 17% of the cataracts had DR (Figure-3).

Conclusion

Diabetes, gender and age are important risk factors for cataract development in Pakistan, just like in the Western world. Diabetics are prone to developing cataract four times more than the non-diabetic in a similar age group. Nuclear sclerosis is the commonest morphological type of cataract in diabetics.

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Conflict of Interest: No.

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