ORIGINAL ARTICLE

Pseudoexfoliation Syndrome in Diabetic Patients

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Received: 12 November, 2009 - **Accepted:** 30 November, 2009

ABSTRACT

OBJECTIVE: Pseudoexfoliation syndrome (PEX) leads to some problems in the eye surgery specially cataract surgery. As the prevalence of eye problems is high in diabetic patients, we meant to assess the prevalence of PEX in diabetic patients.

MATERIALS AND METHODS: In this cross-sectional study, 400 type 2 diabetic patients aged 50 or above who referred to Yazd Diabetes Research Center were selected consecutively in a year. Ophthalmologic examinations were performed with slit-lamp, 3-mirror lens, indirect Ophtalmoscopy and Applanation Goldman Tonometer. The criterion used to diagnose PEX was the presence of pseudoexfoliation material on one or more anterior segment structures.

RESULTS: Four hundred diabetic patients aged 50 years or above were recruited for the study. Of whom 24 patients were found to have PEX with an overall prevalence of 6%. The results of this study showed that the prevalence of PEX had a direct relationship with the age of participants until the age of 70.

CONCLUSION: In our study the prevalence of PEX was 6%. Comparing our results with similar studies in the same region in non-diabetic patients at the same age, the prevalence of PEX in diabetic patients was shown to be less than non-diabetic patients.

KEY WORDS: Diabetes, Pseudoexfoliation syndrome (PEX), Secondary glaucoma.

INTRODUCTION

Pseudoexfoliation syndrome (PEX) is characterized by the deposition of a distinctive fibrillar material in the anterior segment of the eye and was first described in 1917 by Lindberg (1). It is frequently associated with open angle glaucoma, known as pseudoexfoliation glaucoma, which is one of the most common identifiable forms of secondary open angle glaucoma worldwide (2). Despite extensive research, the exact chemical nature of the fibrillar material is unknown. It is believed to be secreted multifocally in the iris pigment epithelium, the ciliary epithelium, and the peripheral anterior lens epithelium (3). The material moves into the aqueous humor and is carried to the trabecular meshwork, following the normal flow. Obstruction of the trabecular meshwork by this fibrillar material and pigment causes elevation of the Intraocular Pressure (IOP) leading to glaucoma (4). Also PEX causes some problems in the eye surgery specially cataract surgery including lense changes, exit of vitreous and capsule rapture during cataract surgery (5). PEX is rarely seen before the age of 50, and its prevalence increases markedly with age (6). Although it occurs in virtually every part of the world, a considerable racial variation exists. In Framingham study,

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prevalence of PEX was found to be 1.8% (7). In another study of subjects over 60 years in various ethnicities, prevalence rates ranging from 0% in Greenland Eskimos to 21% in Icelanders were observed (8). In northern/western European countries including England, Germany and Norway, prevalence of 4.0%, 4.7% and 6.3% have been noted, respectively (9). Also in Asian countries like India it was 3.8% (10) and in Pakistan 6.45% (11).

Diabetes mellitus is a common disease worldwide. The prevalence and incidence of diabetes is increasing in most populations, being more prominent in developing countries. The Iranian diabetic patients' population is estimated to be around 1.5 million now (12). Cataract and retinopathy are common diabetic complications. Also some disorders like PEX have been suggested to be prevalent in diabetes (13). The prevalence of PEX in diabetic patients compared with non-diabetic patients varied among different ethnicities. Some studies showed that prevalence of PEX was more in diabetic patients than non-diabetic patients (13), while others showed that the prevalence of PEX decreases in diabetic patients (14). According to disorders that PEX causes in eye surgery especially cataract and high prevalence of eye problems in diabetic patients (15), we meant to assess the prevalence of PEX in diabetic patients.

MATERIALS AND METHODS

In this cross-sectional and descriptive study, 400 type 2 diabetic patients aged 50 or above who referred to Yazd Diabetes Research Center (YDRC) were selected consecutively in a year.

After obtaining informed consent, the patients underwent complete ophthalmic evaluation which included complete ophthalmic and general history, best corrected visual acuity, slit lamp examination, applanation tonometry and gonioscopy. The patients' eyes were dilated, and slit lamp examination of the lens and fundus indirect ophthalmoscopy were carried out. The criterion used to diagnose PEX was the presence of pseudoexfoliation material on one or more anterior segment structures. Since the presence of pseudoexfoliative material on lens is the most consistent and prominent feature of PEX, to prevent underestimation of the prevalence, all subjects who were psuedophakic or aphakic in any eye were excluded from the study. Statistical analysis was performed using SPSS version 13.0 (Chicago IL). Chi-square test and T-student test were used to compare discrete variables. Informed consent was obtained from all subjects and the research proposal was approved by the YDRC Research Council and the Ethics Committee of Shahid Sadoughi University of Medical Sciences and was carried out in accordance with the Declaration of Helsinki.

RESULTS

Four hundred diabetic patients aged 50 years or above were recruited for the study of whom 226 (56.5%) were females and 174 (43.5%) males. Twenty four patients of all were found to have PEX with an overall prevalence of 6%. Twenty one patients (5.2%) were bilateral and three patients (0.8%) were unilateral PEX. The prevalence of PEX was 6.3% in males and 5.7% in females and this difference was not significant ($P = 0.7$).

The present study showed that the prevalence of PEX had a direct relationship with the age of participants until the age of 70. As shown in Figure 1, 1.2% of the patients with PEX were 50-59 years old, the prevalence was 9.6% in patients aged 60-69 and 9.4% of the patients with PEX were 70 years old or above ($P = 0.007$).

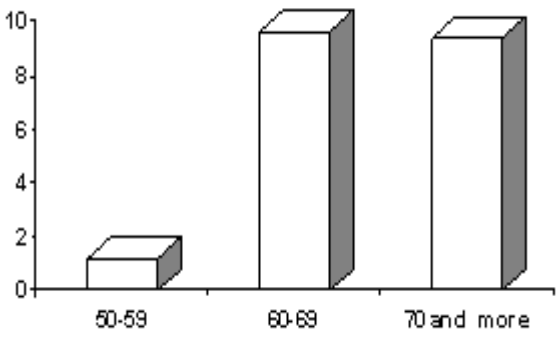

Figure 1- Prevalence of PEX by age

The prevalence of PEX was 3.6% in patients with duration of diabetes less than 5 years, 4.5% in patients with duration of 5-10 years and 6.3% in patients with 10 years or more duration ($P = 0.7$) (Table 1).

Of 400 patients, 300 diabetic patients (75%) had diabetic retinopathy (DR) and among patients with DR, 19 cases (6.3%) had PEX (17 bilateral, 2 unilateral). And in patients without DR 5 cases (5%) had PEX (4 bilateral, 1 unilateral) ($P = 0.7$). Glaucoma was observed in 14.28% patients with PEX (Table1).

DISCUSSION

In this study 24 patients (6%) were found to have PEX. In a case control study in Greece by Psilas et al., 489 non-diabetics older than 50 years were compared with 325 diabetic patients with similar age. The prevalence of PEX was 23.7% in non-diabetic patients and 11 % in diabetic patients (14). Eventhough the prevalence of PEX in that study was lower in diabetic patients, the prevalence of PEX in diabetic patients was higher than ours, this conflict may be due to geographical differences in environmental contributing factors in causing PEX. The reported prevalence in different parts of the world has varied from 0% to 38% in different populations (16,17,18). In a population-based survey performed by Nouri-Mahdavi et al., a random sample of people aged 50 or above from Falavarjan city (near our area), central Iran, was examined for signs of PEX. 806 eyes in 405 cases (210 women and 195 men) were examined. Seventy-seven eyes of 53 cases showed pseudoexfoliative deposits (19). According to our data and Nouri's results using Friedman test ($\alpha = 0.05$), we conclude that prevalence of PEX in diabetic subjects is lower than non-diabetic subjects at the same age. But Solley et al. showed that the incidence of PEX in diabetic subjects was higher than non-diabetic subjects with similar age (13). In this study it was mentioned that cause of high incidence of PEX in diabetic patients is collagen metabolic changes that was observed in diabetic patients more than other metabolic disorders. In this study there was no significant association between duration of diabetes and prevalence of PEX (13) which is similar to our results.

In our study there was a significant increase in prevalence of PEX with age but no sex predilection. In studies by Kozobolis et al. (20) and Miyazaki et al. (21) there was a significant association between age and prevalence of PEX. Arvind et al. examined 2850 subjects aged 40 or above of whom 108 had PEX (3.8%). In this study the relation between age and prevalence of PEX was significant (10). Bedri et al. observed no significant association between sex and prevalence of PEX (22) which supports our findings.

In our study there was no significant relation between DR and prevalence of PEX that was similar to Sainz et al. (23). In our study prevalence of glaucoma in subjects with PEX was 14.28%.

Although PEX is one of the most common

Table 1- The prevalence of PEX by variables

Variables		No PEX		PEX		P value
		number	percent	number	percent	
Sex	female	213	94.2	13	5.7	0.7
	male	163	93.7	11	6.3	
age	50-59	168	98.8	2	1.2	0.007
	60-69	160	90.4	17	9.6	
	70 or above	48	90.6	5	9.4	
Duration of diabetes	<5	79	96.3	4	3.6	0.7
	5-10	88	95.5	5	4.5	
	10 or more	212	93.7	15	6.3	
Diabetic Retinopathy	With DR	95	95	19	6.3	0.7
	Without DR	281	93.7	5	5	
Gluacoma	With gluacoma	23	85.2	4	14.28	0.06
	Without gluacoma	353	94.6	20	5.4	

identifiable causes of open angle glaucoma (24), it has also been reported to be a risk factor for narrow angles and angle closure glaucoma (25,26). In our study the relation between glaucoma and PEX was not significant. This may be due to small number of cases.

Most of the studies have shown a significant association between high prevalence of intraocular pressure and glaucoma and PEX. In Arvind's study prevalence of open angle glaucoma and raised intraocular pressure in subjects with PEX was significantly higher than subjects without PEX (8.33% vs. 1.68%) (9.26% vs. 1.24%) (10). Kozart and Yanoff, in a clinic based study of 100 consecutive patients with PEX, reported 15% prevalence of OHT and 7% prevalence of glaucoma (27). The Blue Mountains Eye Study, a population based study where the diagnosis of PEX glaucoma was based on optic nerve head changes with or without raised IOP, reported 14.2% glaucoma (28), which are similar to our findings.

CONCLUSION

In our study the prevalence of PEX was 6%. Comparing our results with similar studies in the same region in non-diabetic patients at the same age, it was proved that the prevalence of PEX in diabetic patients is less than non diabetic patients.

ACKNOWLEDGMENTS

This study was supported by Yazd Diabetes Research Center of Shahid Sadoughi University of Medical Sciences.

This article was published in Farsi in Journal of Shahid Sadoughi University of Medical Sciences and Health Servises 2006, Volume 15, Number 3, Pages 3-8.

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