Prevalence of Pseudoexfoliation Syndrome and Pseudoexfoliation Glaucoma in Upper Egypt

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ABSTRACT:

Objective: To report the prevalence of pseudoexfoliation (PXF) among Upper Egyptian patients attending the ophthalmology clinic of Assiut University Hospital.

Methodology: A prospective observational, non-interventional study conducted in the period from February 2002 to August 2009. A total of 7738 patients aged 40 years or above attending the general ophthalmic clinics were recruited for this study. A detailed evaluation including ophthalmic and general history, slit lamp biomicroscopy, intraocular pressure measurement, gonioscopy and dilated eye examination were performed on all patients. Patients with pseudoexfoliative material on the anterior lens surface and/or the pupillary margin in either or both eyes were labeled as having PXF.

Results: Of the 7738 patients, three hundred twenty (4.14%) subjects had PXF. Mean age of PXF group was 68.15 years (SD 8.16, range 40-92 years). PXF was bilateral in 82.2% of cases. It was significantly associated with cataract, glaucoma and sensorineural deafness. Of the eyes with PXF, 65% had cataract, 30.3% had glaucoma and 8.1% had sensorineural deafness.

Conclusion: To the best of our knowledge, this is the first study conducted in Egyptian population to determine the prevalence of PXF. PXF appears to be a common disorder in older individuals in Upper Egypt. Population-based studies are recommended to evaluate the prevalence of PXF in the general population and its association with cataract and glaucoma.

KEY WORDS: Aging, Cataract, Pseudo exfoliation, Glaucoma.
INTRODUCTION

Pseudoexfoliation syndrome (PXF) was first described by Lindberg in 1917 in a Finnish population [1]. It is characterized by the deposition of a distinctive fibrillar material in the anterior segment of the eye. Pseudoexfoliation syndrome is frequently associated with open angle glaucoma, known as pseudoexfoliation glaucoma, which is the most common identifiable form of secondary open angle glaucoma worldwide [2]. PXF is a well known risk factor for developing cataracts [3]. Complicating factors such as poor mydriasis, zonular weakness, corneal endothelial dysfunction, higher rate of vitreous loss, capsular phimosis, and opacification have all been reported after cataract surgery [4,5] PXF is considered to be a systemic disorder, pseudoexfoliative material has been reported in lungs, skin, liver, heart, kidney, gallbladder, blood vessels, extra ocular muscles and meninges [6]. An association between PXF and sensorineural deafness has been reported [7-11].

PXF is rarely seen before the age of 40, and its prevalence increases markedly with age [12]. Although it occurs in virtually every area of the world, a considerable racial variation exists. In the Framingham study, prevalence of PXF was found to be 1.8% [13]. In another study of subjects over 60 years in various ethnicities, prevalence rates ranging from 0% in Greenland Eskimos to 21% in Icelanders were noted [14]. In northern/western European countries including England, Germany, and Norway prevalence of 4.0%, 4.7%, and 6.3% have been reported respectively [15].
Epidemiological studies of PXF have been done in some areas in the Middle East, namely in Jordan and Yemen [16, 17], but there is no data available on prevalence of PXF in Egypt.

Egypt is one of the most populous countries in Africa and the Middle East, with a population approaching 80 million. Assiut University Hospital (AUH) is a tertiary medical centre in Assiut – the largest governorate of Upper Egypt –which serves a large number of Egyptians from all over Upper Egypt. The aim of this hospital-based study was to estimate the prevalence of PXF, provide a descriptive analysis and to assess whether PXF is significantly associated with cataract, glaucoma, sensorineural deafness, systemic arterial hypertension and diabetes mellitus.
METHODS

Patients attending the general ophthalmic clinics at Assiut University Hospital in the period of February 2002 to August 2009 were invited to participate in this study.

A total of 7738 patients aged 40 years or above attending the general ophthalmic clinics were included in this study.

The study protocol was approved by the medical ethics committee of Assiut University. Informed consent was obtained from all the participants in compliance with the Helsinki Declaration.

Relevant details in medical and ocular history were obtained from each patient. A complete ocular examination conducted on all patients included intraocular pressure measurement, gonioscopy, slit lamp biomicroscopy, and dilated fundus examination.

PXF was diagnosed clinically by the presence of typical pseudoexfoliation material (PXM) on anterior lens capsule or at the pupil border, with or without Sampaolesi’s line and pigment deposition in angle and/or corneal endothelium.

The statistical analysis was performed using the Statistical Program for the Social Sciences Version 16.0 (SPSS, Inc, Chicago, IL, USA).

Means, standard deviations (SDs) and 95% confidence intervals (CIs) were obtained. A p-value of < 0.05, measured by Pearson’s chi-square test, was considered to indicate statistical significance.
Patients were divided into two groups; PXF and non-PXF. For each group the sex distribution, mean age and SD were calculated. The total number of eyes studied was 7738. The PXF group included 320 eyes and the non-PXF group included 7418 eyes. Frequencies of cataract, glaucoma and sensorineural hearing loss in both groups were estimated.
RESULTS

Of 7738 patients enrolled, 320 were diagnosed with PXF. Thus the prevalence of PXF in the whole study group was 4.14%. Of these, 132 (41.25%) were female and 188 (58.75%) were male.

Mean age in the PXF group was 68.15 years (SD 8.16, range 40-92 years). Prevalence of PXF increased with age and was highest among subjects aged > 80 years. Approximately 90% of all participants were over 60 years old (table 1).

Unilateral PXF was noted in 17.8% of the PXF group and bilateral PXF was noted in 82.2% (figure 1).

Cataract was found in 65% of eyes with PXF (figure 2), but in only 42.5% of non-PXF eyes ($p < 0.001$), indicating a strong association between cataract and PXF (Table 2). During the study period, 3289 patients underwent cataract surgery in one or both eyes, of which 6.32% had PXF.

Glaucoma was found in 30.31% of eyes in the PXF group, but in only 3.3% of eyes in the non-PXF group. The association between PXF and glaucoma was statistically significant ($p < 0.001$), as shown in Table 2.

Out of the 320 patients, 34 (10.6%) were already diagnosed with pseudoexfoliation glaucoma and 63 patients (19.7%) had IOP of more than 21 in one or both eyes and have not been evaluated for glaucoma before.
Sensorineural hearing loss was documented in 8.1% of 320 PXF patients and in only 2.3% of 7418 non-PXF. This association between PXF and sensorineural hearing loss was statistically significant (Table 2).

Significant corneal opacities were present in 7.9% of the PXF patients and 6.1% of non-PXF patients. The difference between the 2 groups was not statistically significant ($p > 0.05$).

We found no statistically significant association between PXF and diabetes mellitus or systemic arterial hypertension ($p > 0.05$).
DISCUSSION

The reported prevalence rate of PXF syndrome in different populations shows extensive variations. Prevalence rates of as low as 0% in Eskimos [18], and as high as 38% in Navajo Indians [19] were reported.

In a hospital based study conducted in Jordan, the prevalence of pseudoexfoliation among patients aged 40–90 years was 9.1% [17]. In another study from Yemen the point prevalence of PXF among patients undergoing cataract surgery was 19.53% [16].

To the best of the authors’ knowledge, there are no previous reports on the prevalence or characteristics of PXF in Egypt. The over all prevalence of pseudoexfoliation in this study was found to be 4.14%.

One of the limitations of this study is being a hospital-based rather than a population-based study. Over or under-estimation of the prevalence of PXF and or co-morbidities associated with PXF may be attributed to the hospital based nature of the study.

In agreement with findings in other reports, our study showed an increase in the prevalence of PXF with advancing age [20-22].

PXF was more common among males (188) than in females (132). A similar finding was reported in the prevalence of PXF among patients undergoing cataract Surgery in Yemen [16]. We found that PXF was bilateral in the majority of cases (82.2%), comparable to what Tiliksew et al. found [22].
A significant association between PXF and cataract was also found in our results and is comparable with findings in other studies [21, 22]. Small pupils, weak zonules and IOP spikes increase the difficulty of achieving successful cataract surgery results in pseudoexfoliation cases.

A strong relationship between glaucoma and PXF is well known. Subjects with PXF had a two- to threefold increased risk for glaucoma according to the Blue Mountains Eye Study [20]. Other studies have demonstrated that eyes with PXF had higher mean IOP than eyes without PXF [12, 23]. Moreover, Topouzis F et al. reported increased likelihood of glaucoma at the same IOP in subjects with PXF [24]. Our study is consistent with the above as we found an increased risk for glaucoma in patients with PXF. Our finding that 30.31% of eyes with PXF had glaucoma reflects a comparable proportion to that reported by Al-Bdour et al. in Jordan [17], yet higher that that found by the Blue Mountains Eye Study, which found incidences of 14.2% [20]. This finding may reflect an overestimation, which is one of the limitations of hospital-based studies.

In our study sensorineural hearing loss was found in 8.1% of PXF patients. This association between PXF and sensorineural hearing loss was statistically significant (Table 2). Cahill et al. reported that a large proportion of patients with PXF have sensorineural hearing loss in comparison to age-matched controls, regardless of whether or not there is associated glaucoma [7]. This was confirmed by other studies from different Saudi Arabia, Canada and Turkey [8-11]. Furthermore, in a recent study Turgut et al. reported high
prevalence of asymptomatic vestibular dysfunction among patients with PXF [25].

Although the material reported here has many limitations, it adds some new information on the prevalence and characteristics of PXF in a region where data on PXF are scarce.
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Figure 1: An eye with pseudoexfoliation showing the dandruff like pseudoexfoliation material on the surface of the cataractous lens capsule.

Figure 2: An eye with pseudoexfoliation showing the dandruff like pseudoexfoliation material on the papillary edge. The combination of hard cataract, poor mydriasis and superficial cornea opacity contributes to the challenge of cataract extraction in this patient.
Additional files provided with this submission:

Additional file 1: Table 1.doc, 28K
http://www.biomedcentral.com/imedia/7080532225039012/supp1.doc
Additional file 2: Table 2.t.doc, 36K
http://www.biomedcentral.com/imedia/1730807655039012/supp2.doc