



## Comparing Ophthalmic and Microscopic Findings in the Patients of Psuedo Exfoliative Syndrome With and Without Glaucoma in a Tertiary Care Referral Hospital of Western Himalayas

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**Abstract:** Pseudoexfoliation is an age-related systemic disorder with primary ocular manifestation having strong genetic component linking to LOXL-1 gene. The findings from Non-Contact Specular Microscope such as Central corneal thickness (CCT) in subjects with PEX and PEXG, are conflicting. The present cross-sectional analytical study was conducted in the Department of Ophthalmology, Indira Gandhi Medical College, Shimla among the selected patients of pseudo exfoliation with glaucoma over a period of one year with an objective of comparing the ocular as well as intra ocular manifestations among the patients suffering from PEX in comparison to PEXG attending an ophthalmic Out Patient Department clinic. There were 46 study participants in each group of which there were 24 males and 22 females in PEX and 32 males and 14 females in PEXG group. The mean age of patients with Pseudoexfoliation without Glaucoma was  $68.43 \pm 9.88$  while that of the patients with glaucoma was  $66.52 \pm 8.38$  years. The mean vertical cup disc ratio of PEX patients was  $0.36 \pm 0.14$  while that of patients of PEXG was  $0.84 \pm 0.32$ . There was no significant difference in the central corneal thickness ( $p=0.492$ ) and the coefficient of variation ( $p=0.310$ ) between both the groups.

**Keywords:** Pseudoexfoliation without glaucoma, Pseudoexfoliation with glaucoma, Central Corneal Thickness, Coefficient of Variation.

## INTRODUCTION

Pseudoexfoliation is an age-related systemic disorder with primary ocular manifestation having strong genetic component linking to LOXL-1 gene (Challa, P. 2009). Due to the deposition of PEX material, various ocular pathologies occur, such as secondary open angle glaucoma, disturbances of the pre-corneal tear film, zonular weakness and dehiscence resulting in phacodonesis, angle closure glaucoma, lens dislocation, capsular rupture and vitreous release during cataract surgery, poor pupillary dilation, blood aqueous barrier dysfunction and corneal endothelial decompensation (Desai, M. A., & Lee, R. K. 2008; & Nagrale, P. *et al.*, 2018). Deposition of PEX fibrils in the trabecular meshwork makes an important contribution to the occurrence of PEX glaucoma (Vazquez, L. E., & Lee, R. K. 2014).

The rate of conversion from PEX to PEXG is 5% in patient with PEX for 5 years, 15% at 10 years and a 15 year risk of upto 60% (Palko, J. R. *et al.*, 2017). Although elevated intraocular pressure (IOP) represents the main risk factor for loss in retinal nerve fibre layer (RNFL), several reports suggest that pressure independent factors may increase the risk of glaucomatous damage in PEX (Jeng, S. M. *et al.*, 2007).

Very little literature is available regarding the ocular findings of the patients with PEX in comparison to those suffering from PEXG in Northern part of India. Apart from IOP measurements, qualitatively determining the amount of pseudoexfoliation material at the trabecular meshwork and measurements of flare in the anterior chamber, no clinical bio markers are currently used to quantify the severity of PEX and PEXG or determine the risk of glaucoma development and progression in these patients (Schlötzer-Schrehardt, U., & Naumann, G. O. 2006; & Kitsos, G. *et al.*, 2009).

The findings from Non-Contact Specular Microscope such as Central corneal thickness (CCT) in subjects with PEX and PEXG, references in literature are conflicting. Recent studies recognize CCT as an intrinsic ocular factor in the pathogenesis and progression of glaucoma (Dueker, D. K. *et al.*, 2007). The objective of the study was to compare the ocular as well as intra ocular manifestations among the patients suffering from PEX in comparison to PEXG attending an ophthalmic Out Patient Department clinic in a tertiary care hospital of North India.

## METHODOLOGY

The present cross-sectional analytical study was conducted in the Department of Ophthalmology, Indira Gandhi Medical College, Shimla among the selected patients of pseudo exfoliation with glaucoma from July 2018 through June 2019 i.e. one year. All consecutive patients presenting to ophthalmology OPD and diagnosed with pseudo exfoliation without or with glaucoma and were willing to participate were included in the study. The rest who did not fulfil our inclusion criteria were excluded from our study. The data was entered and cleaned using Microsoft Excel Spreadsheet 2007. The data was analyzed using SPSS v22. The quantitative variables were expressed as mean and standard deviation whereas the qualitative variables were expressed as frequencies and proportions. After

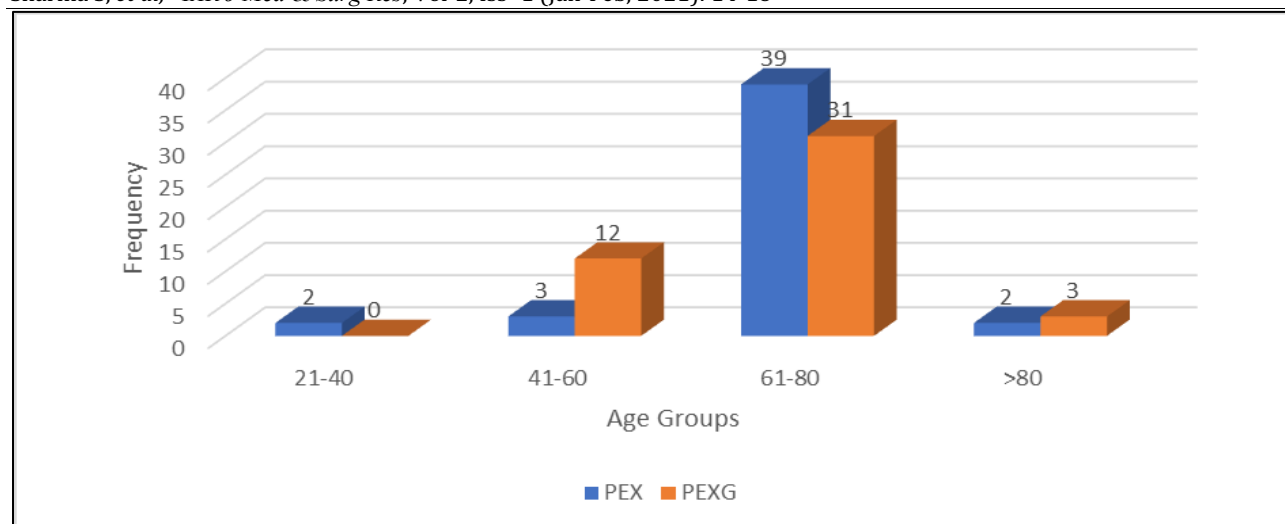
testing for the normalcy of the data, the Independent t-test was used to compare the quantitative variables among the two groups. A p-value of less than 0.5 was considered to be statistically significant. Prior permission was taken from ethical committee of Indira Gandhi Medical College, Shimla to go ahead with the study.

## RESULTS

There were 46 study participants in each group of which there were 24 males and 22 females in PEX and 32 males and 14 females in PEXG group. The mean age of patients with Pseudoexfoliation without Glaucoma was  $68.43 \pm 9.88$  years ranging from 22 – 76 years, while that of the patients with glaucoma was  $66.52 \pm 8.38$  years, ranging from 53-84 years. The age group distribution of the study participants of the two different groups is mentioned in Figure 1. Vertical cup disc between 0.3 -0.4 was found in 39 patients while a cup disc between 0.5 and 0.6 was found to be among the rest of the study participants suffering from PEX whereas Vertical cup disc between 0.6 -0.7 was found in 1 patient while a cup disc between 0.7 and 0.8 was found to be among 3, and rest of the study participants suffering from PEXG had a vertical cup disc ratio between 0.8 and 0.9 (p value<0.001). The mean vertical cup disc ratio of PEX patients was  $0.36 \pm 0.14$  while that of patients of PEXG was  $0.84 \pm 0.32$  (Table 1).

**Table 1: Ophthalmic signs of the study participants with PEX and PEXG (N=92)**

| Variables                    | Pseudo-exfoliation without Glaucoma, n=46 (N, %) |      | Pseudo-exfoliation with Glaucoma, n=46 (N,%) |      | p-value |
|------------------------------|--|------|--|------|---------|
| Age in years (Mean $\pm$ SD) | 68.43 $\pm$ 9.88                                 |      | 66.52 $\pm$ 8.38                             |      | 0.81    |
| Gender                       |  |      |  |      | 0.023   |
| Male                         | 24   | 52.2 | 32   | 69.6 |         |
| Female                       | 22   | 47.8 | 14   | 30.4 |         |
| Vertical Cup Disc Ratio      |  |      |  |      | <0.001  |
| 0.3-0.4                      | 39   | 84.7 | 0  | 0    |         |
| 0.5-0.6                      | 7  | 15.3 | 0  | 0    |         |
| 0.6-0.7                      | 0  | 0    | 1  | 2.2  |         |
| 0.7-0.8                      | 0  | 0    | 3  | 6.5  |         |
| 0.8-0.9                      | 0  | 0    | 42   | 91.3 |         |



**Figure 1:** Age wise distribution of the two groups of study participants

Non-Contact Specular Microscope (Topcon SP-1P Version 1.41) was used to evaluate morphometric parameters such as central corneal thickness and coefficient of variation. It was found that the Mean Central Corneal Thickness (CCT) in our study participants with PEX was  $496.74 \pm 30.873 \mu\text{m}$  in comparison to  $577.89 \pm 59.82 \mu\text{m}$  among patients with

PEXG. There was very weak evidence against our null hypothesis that there is no difference in the central corneal thickness of PEX and PEXG patients ( $p=0.492$ ). The mean Coefficient of variation (CV) of patients suffering from PEX was  $37.37 \pm 4.25\%$  whereas it was  $37.07 \pm 6.07\%$ , thus showing a weak against our null hypothesis that there is no difference in the coefficient of variation in patients with PEX and PEXG ( $p=0.310$ ) (Table 2).

**Table 2:** Non contact specular microscopic findings of the study participants (N=92)

| Variables   | Mean   | Standard Deviation | p-value |
|---|--------|--------------------|---------|
| <b>Central Corneal Thickness (<math>\mu\text{m}</math>)</b> |        |                    |         |
| Pseudo-exfoliation without Glaucoma                         | 496.74 | 30.87              | 0.492   |
| Pseudo-exfoliation with Glaucoma                            | 577.89 | 59.82              |         |
| <b>Coefficient of variation (%)</b>                         |        |                    |         |
| Pseudo-exfoliation without Glaucoma                         | 37.37  | 4.26               | 0.310   |
| Pseudo-exfoliation with Glaucoma                            | 37.07  | 6.07               |         |

## DISCUSSION

A majority of the patients in our study were in the seventh decade of life. Other studies have shown similar results. Naik *et al.*, (2015) also found that the prevalence of PEX increases markedly with age with a majority of cases occurring in the range from 61 and 70 years. Similarly Mohamed, M. M. (2009) observed that the cases of PEX and PEXG increased with increase in age, especially after the age of 60 years. Another study conducted by Mansoori T *et al.*, (2011) reported that

most commonly affected age group was between the age range of 51-60 years for both PFX and PFXG groups. The overall mean age of both the groups was not found to be statistically significant, thus not in concordance with our study.

In patients of Pseudoexfoliation without Glaucoma there were 24 males and 22 females and Pseudoexfoliation with Glaucoma there were 32 males and 14 females, thereby showing male preponderance in both the groups.

The difference of gender distribution between the two groups was found to be statistically significant. In our study PEX shows a male preponderance as shown by other studies done by Ozmen MC *et al.*, (2015), and Junejo SA *et al.*, (2008) In contrary to our finding, there were no significant differences between the groups according to gender in the studies done by Sorkhabi R *et al.*, (2012) and Yu" ksel N *et al.*, (2007).

Vertical enlargement of cup is due to localized loss of nerve

fibers at the superior and inferior poles. Focal loss of NRR results in formation of a polar or a focal notch seen more commonly at inferior than at superior pole. Vertical cup disc ratio between 0.3 -0.4 was found in 39 patients of Pseudoexfoliation without Glaucoma, it was 0.5-0.6 in all 7 patients of Pseudoexfoliation without Glaucoma, 0.6-0.7 in 1 patient of Pseudoexfoliation with Glaucoma, 0.7-0.8 in 3 patients of Pseudoexfoliation with Glaucoma and 0.8-0.9 in 42 patients of Pseudoexfoliation with Glaucoma. Similar findings have been reported by the studies conducted by Mitchell P *et al.*, (1999), and Eltutar K *et al.*, (2016) in which they observed that the majority of the patients of PEX had a vertical cup disc ratio between 0.3 and 0.4, while in the patients of PEXG, the vertical cup disc ratio was in the range of 0.8-0.9 thus revealing that adverse changes in the ratio are more commonly found in patients suffering from PEXG. This finding was statistically significant which is in similar lines with our study.

In our study Mean CCTs were thinner in the PEX group than in the PEXG group but it was not found to be statistically significant. Similar finding was observed in the study done by Yu" ksel N *et al.*, (2007) Similar to our study, Inoue and coworkers (2003) reported thinner corneas in individuals with PEX compared to PEXG. Aghaian *et al.*, (2004) stated that mean CCT in eyes with PEX was significantly lower. Ozcura *et al.*, (2011) found that CCT was less in eyes with PEX than in those with PEXG, although there was no difference in CCT between eyes with PEXG and PEXG. Also, it was found that the coefficient of variance was almost similar in both the groups and there was no statistically significant difference in both the groups. De jaun-Marcos L *et al.*, (2013) evaluated the central corneal thickness in pseudoexfoliative eyes with and without glaucoma. They found that there was no significant difference in mean central corneal thickness between the groups. These findings correlated well with findings in our study.

## CONCLUSION

There is no difference in the mean age of the patients affected with PEX or PEXG. More males were affected than females in both the groups. The vertical cup disc ratio is increased in the patients with PEXG and there is no significant difference in the non-contact specular microscopic findings between both the groups.

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