

To Compare the Epidemiology and Visual Outcomes of Pseudoexfoliation Cases with Climatic Droplet Keratopathy in Immature Senile Cataract

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Abstract

Background: Pseudoexfoliation is a systemic condition there is a deposition of extracellular grey and white material over the various tissues of eye. Clinical observations suggest that eyes with pseudoexfoliation even with glaucoma, have tendency to develop corneal endothelial decompensation. Climatic droplet keratopathy, a common corneal degeneration and is usually bilateral and interpalpebral. Clinically one can observe amber-coloured oily spherule deposits at and around bowmen's membrane of cornea. The above factors in turn, result in a gross decreased quality of life of individual.

Aim: To compare the epidemiology and visual outcomes of pseudoexfoliation cases with climatic droplet keratopathy in immature senile cataract

Material and methods: This prospective comparative observational study was conducted on 120 patients, aged between 40 to 70 years from October 2018 to March 2019. A Structured Data sheet was used to record the findings. They were undergo either into group A or group B. After taking written informed consent, demographic details and detailed history were taken from these patients. Comprehensive ophthalmic examination, which included visual assessment by snellens chart and anterior segment evaluation by slit lamp examination was done. A detailed dilated fundus examination was done with direct and indirect ophthalmoscopic examination.

Results: Out of total patients, (68%) male predominance in group A and (62%) female predominance in group B. Most common affected age group was 61-70 years in group A and 51-60 years in group B. Illiterate (70%) were more in group A. Group B had higher urban (62%) population. Group B had better visual outcomes as compare to group A. Early diagnosis and adequate treatment is mandatory in pseudoexfoliation cases.

Conclusion: Elderly male with rural background were more prone to develop climatic droplet keratopathy along with poor visual outcomes.

Keywords: Pseudoexfoliation syndrome, Climatic droplet keratopathy, immature senile cataract, Pseudoexfoliation glaucoma, Spheroidal degeneration

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I. Introduction

Pseudoexfoliation syndrome (PES) is an age-related systemic microfibrilopathy, caused by progressive accumulation and gradual deposition of extracellular grey and white material over various tissues of eye⁽¹⁾. Georgiana Dvorak- Theobald gave the term pseudoexfoliation syndrome to this disease, due to the observation of deposits of pseudoexfoliation material on the ciliary body, edge of pupil, corneal endothelium, iris, conal endothelium, trabecular meshwork and anterior lens capsule⁽²⁾. The deposit can also be seen in posterior segment structures like pars plana. The epidemiology of PES varies widely and it also depend upon age, sex and ethnic origin. The scientific literature is still unclear on the mono and bilateral involvement of condition. Pseudoexfoliation glaucoma (PEG) has been widely described as the result of the accumulation of pseudoexfoliative material, which obstructs the trabecular meshwork leading to an increase in IOP levels. As the awareness of PES has considerably increased, it has been widely demonstrated that PES can cause chronic open-angle glaucoma, but also angle-closure glaucoma, lens subluxation, blood-aqueous barrier impairment and complications at the time of cataract extraction, such as capsular rupture, zonular dialysis, and vitreous loss.⁽³⁾

Climatic Droplet Keratopathy is amber-coloured oily spherule deposition at bowman's membrane of cornea. It also known as different names like Bietti nodular hyaline band shaped keratopathy, Climatic droplet

keratopathy, Spheroidal droplet degeneration, Fisherman's keratopathy, Labrador keratopathy, Nama keratopathy, Eskimo keratopathy, Fraunfelder and Hanna keratopathy. These patients present with foreign body sensation pain, redness, watering, photophobia, and deterioration of vision. These patients also have poor corneal wettability and irregular ocular surface and they are not suitable for most of the extra and intra-ocular procedures and surgeries. The intra ocular pressure measurement and retinoscopy will be difficult in the presence of irregular corneal surface. The above factors, in turn, result in a gross decreased quality of life of the individual.⁽⁴⁾

To best our knowledge, in previous literature one research work done on "association of spheroidal degeneration in pseudoexfoliation cases" but it is first time to compare the epidemiology and visual outcomes of pseudoexfoliation cases with climatic droplet keratopathy in immature senile cataract.

II. Materials And Methods

This prospective comparative study was carried out on patients of Department of Ophthalmology at Mathura Das Mathur combined Hospital with Dr. S.N. Medical College, Jodhpur, Rajasthan from October 2018 to March 2019. A total of 120 adults subjects (both male & female) of aged between 40 to 70 years were for in this study.

Study Design: Comparative prospective observational study.

Study Location: This was a tertiary care teaching hospital based study done in Department of Ophthalmology at Mathura Das Mathur Hospital with Dr. S.N. Medical College, Jodhpur, Rajasthan.

Study Duration: 6 months (October 2018 to March 2019)

Sample Size: 120 patients.

Subjects and selection method: The study population was drawn from the patients with Climatic Droplet Keratopathy and Pseudoexfoliation syndrome with immature senile cataract who presented to Mathura Das Mathur Hospital. We only selected the patients with grade 1 nuclear sclerosis.

Patients were divided into 2 groups:

Group A (N= 60 patients) – Climatic Droplet Keratopathy (CDK) with immature Senile Cataract (IMSC)

Group B (N= 60 patients) – Pseudoexfoliation Syndrome (PES) with immature Senile Cataract (IMSC)

Inclusion Criteria:

1. Either Sex
2. Aged between 40 to 70 years
3. Patients with all grades of Climatic Droplet Keratopathy and Grade 1 nuclear sclerosis
4. Patients with Pseudoexfoliation Syndrome with grade 1 nuclear sclerosis

Exclusion Criteria:

1. Trauma
2. Chemical injuries of eye
3. Atrophic & phthisis bulbi
4. Congenital malformations of eye
5. Uveitis
6. Total opacified cornea

Based on the clinical appearance of the spheroids under slit lamp examination, they were classified under the following stages.^(4,5,6)

Stage 1: Tiny, microscopic oil droplet like lesions in the interpalpebral area, nasally and temporally near limbus, best seen by retroillumination.^(4,5,6)

Stage 2: Fine granular lesions in the interpalpebral area. Cornea appears ground glass. Lesions extend upto Bowman's membrane.^(4,5,6)

Stage 3: Amber coloured spherical nodules, raised above the surface of the cornea, occupying the peripheral or central cornea. Confluent lesions in the central part causes diminution of vision.^(4,5,6)

Stage 4: Spherules are associated with thinning and opacification of the superficial cornea. Gross visual deterioration occurs in this stage. Such patients are liable to get indolent corneal ulcers.^(4,5,6)

Procedure Methodology:

After written informed consent was obtained, a well designed questionnaire was used to collect the data of the recruited patients. The questionnaire included the socio-demographic profile like age, gender, residence, literacy. All patients were undergo complete ophthalmological examination which includes visual acuity assessment by Snellens chart including best corrected visual acuity. Anterior segment evaluation was done with slit lamp examination including gonioscopic examination whenever possible. Intraocular pressure was

measured whenever possible. A detailed dilated fundus examination was done with direct and indirect ophthalmoscopy. Corneal staining with fluorescein dye was done in all cases.

Statistical analysis:

The results are presented in mean±SD and percentages. The study parameters were tested for normalcy by using Kolmogorov test. The non-normal parameters were tested by using Mann-Whitney U test between the groups. The normally distributed parameters were tested by using Unpaired t-test between the groups. The Chi-square test was used to compare the categorical variables between the groups. A p-value<0.05 was considered significant. All the analysis was carried out on SPSS 16.0 version (Chicago, Inc., USA)

III. Results

Prospective comparative observational study for about 6 months from October 2018 to March 2019 involving a total of 120 patients (64 males and 56 females) with the age group between 40 to 70 years with pseudoexfoliation with IMSC and Climatic droplet keratopathy with IMSC were included.

a) Gender distribution among the groups

Total 120 patients were studied. Out of 120 patients, group A included 68 % male and 32 % female, while group B included 38 % males and 62% females. Group A shows male predominance and group B shows female predominance.

Gender distribution	Group A		Group B		Total		p-value .01*
	No.	%	No.	%	No.	%	
Male	41	68	23	38	64	53	
Female	19	32	37	62	56	47	

Table no 1- shows the comparison of gender distribution among the groups

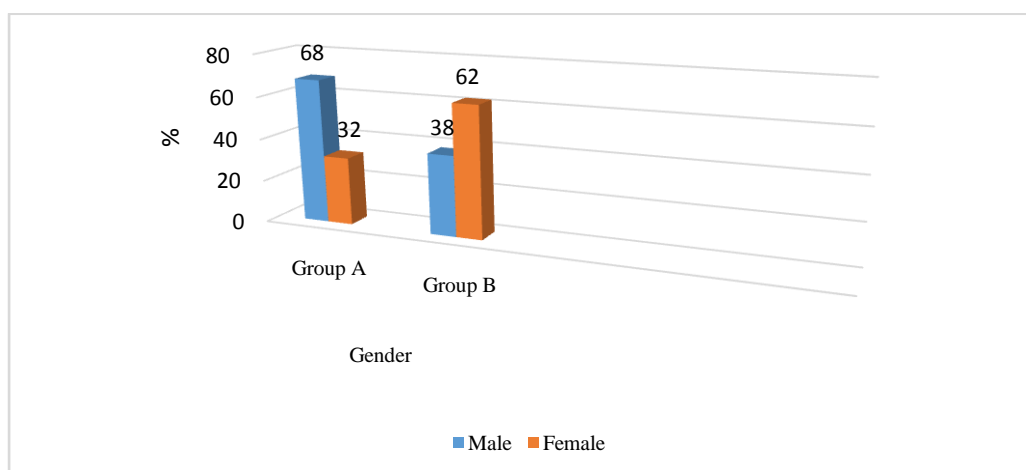


Figure 1- Gender distribution between the groups

b) Distribution of age at diagnosis among the groups

Out of all patients, maximum no (60%) of patients were in the age group of 61-70 years and minimum no (13.3%) were in the age group of 40-50 years in group A. In the group B maximum (40%) patients were in the age group of 51-60 years and minimum (26.3%) were in the age group of 40-50 years.

Age at diagnosis in years	Group A		Group B		p-value .004*
	No.	%	No.	%	
40-50	8	13.33	16	26.33	
51-60	16	26.33	24	40	
61-70	36	60	20	33.33	
Mean±SD	60.86±1.11		56.24±1.10		

Table no 2 – shows comparison of age at diagnosis among the groups

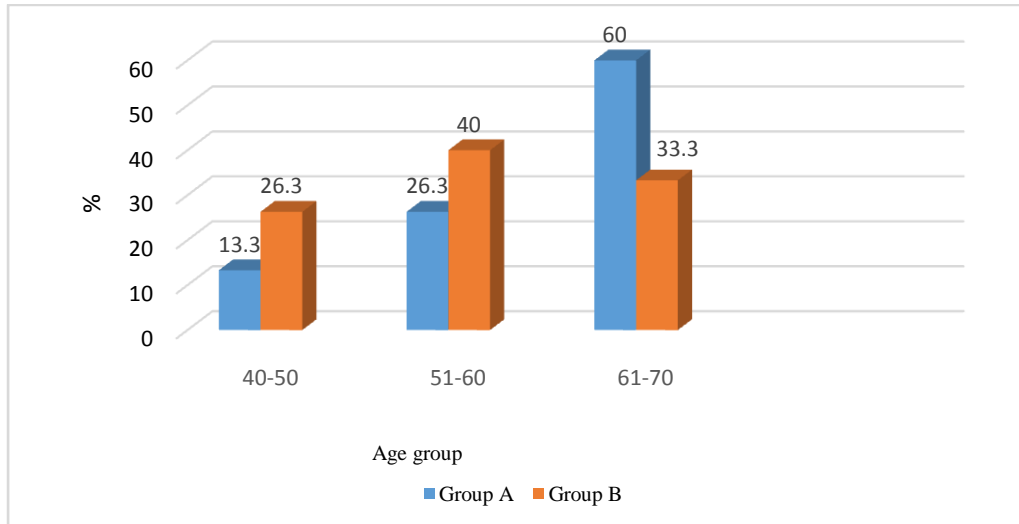


Figure 2- Age at diagnosis between the groups

c) Geographic distribution among the groups

According to residence maximum (62%) were patients belong to rural background in group A and maximum (62%) were patients belong to urban background in group B.

Residence	Group A		Group B		Total		p-value
	No.	%	No.	%	No.	%	
Rural	37	62	23	38	60	50	.08
Urban	23	38	37	62	60	50	

Table no 3- shows comparison of geographic distribution among the groups

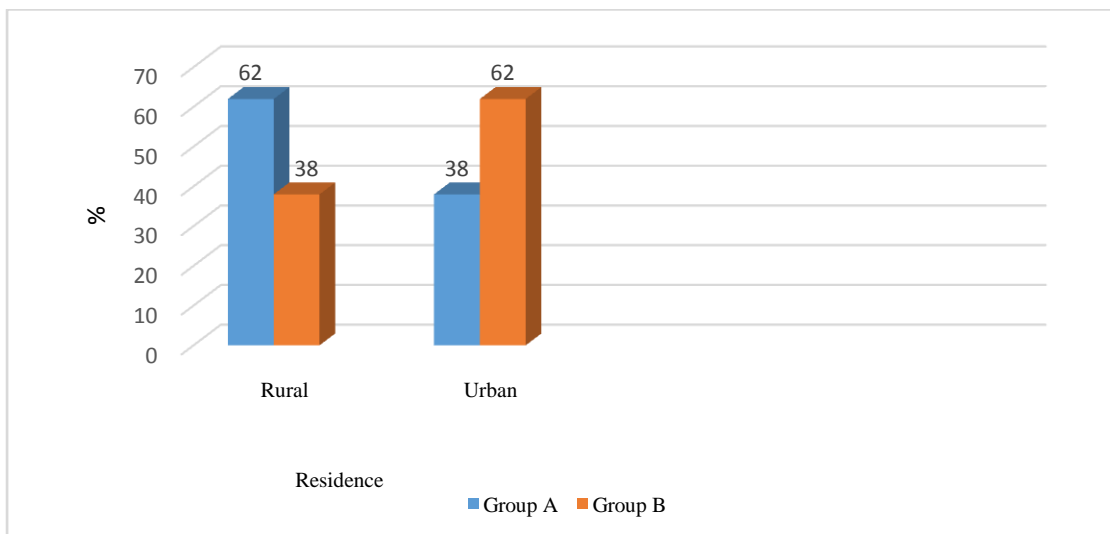


Figure 3- Geographical distribution between the groups

d) Literacy Distribution Among The Groups

Maximum no (70%) were illiterate in group A and maximum no (62%) were literate in group B.

Literacy	Group A		Group B		Total		p-value
	No.	%	No.	%	No.	%	
Literate	18	30	37	62	55	45.83	.004*
Illiterate	42	70	23	38	65	54.16	

Table no 4- shows literacy among the groups

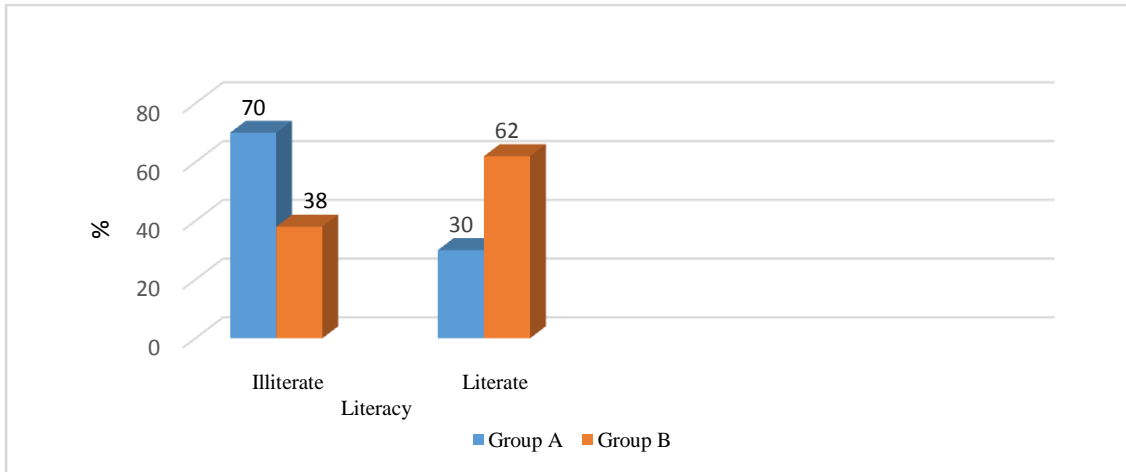


Figure 4- Literacy between the groups

e) Best corrected visual acuity (BCVA) among the groups

In group A maximum no. 52 (43.3%) eyes have the visual acuity range from 6/48 to 6/90 and in group B maximum no. 51 (42.5%) have visual acuity range from 6/15 to 6/38.

BCVA log MAR value (Snellen's value)	Group A		Group B	
	RE	LE	RE	LE
>1.3 (>6/120)	9 (15%)	8 (13.3%)	0 (0%)	0 (0%)
0.9-1.2 (6/48-6/90)	26 (43.3%)	26 (43.3%)	21 (35%)	28 (46.6%)
0.4-0.8 (6/15-6/38)	13 (21.6%)	11(18.3%)	23 (38.3%)	28 (46.6%)
0-0.3 (6/6-6/12)	12 (20%)	15 (25%)	16 (26.6%)	4 (6.6%)
p-value	.001*		.03*	

Table no 5- shows best corrected visual acuity among the groups

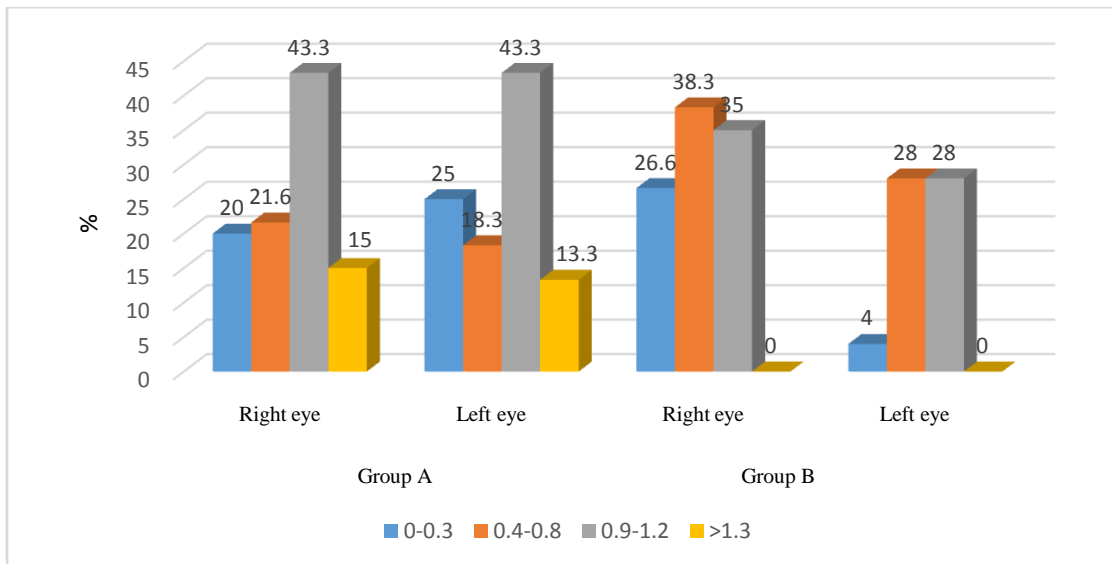


Figure 5- Best corrected visual acuity between the groups

f) Stage of Climatic droplet keratopathy in group A

52 (43.3%)patients were having stage 3, 27 (22.5%) were having stage 1, 24 (20%) were having stage 2, 17 (14.1%) were having stage 4.

Stage of CDK	Group A		Total
	RE	LE	
Stage 1	12 (20%)	15 (25%)	27 (22.5%)
Stage 2	13 (21.6%)	11 (18.3%)	24 (20%)
Stage 3	26 (43.3%)	26 (43.3%)	52 (43.3%)
Stage 4	9 (15%)	8 (13.3%)	17 (14.1%)

Table no 6- shows stages of climatic droplet keratopathy

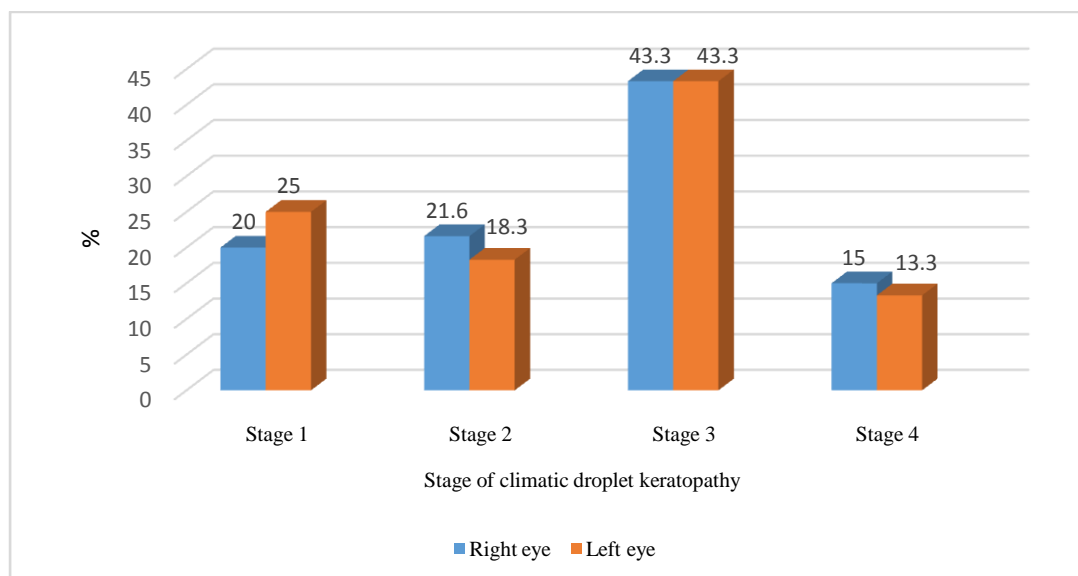


Figure 6- Stages of climatic droplet keratopathy

IV. Discussion

Ours is the largest study and first of its kind from a developing nation to compare the epidemiology and visual outcomes of pseudoexfoliation cases with climatic droplet keratopathy in immature senile cataract.

We had total 120 patients, 60 patients for each group which was larger sample size as compared to previous studies.⁽⁷⁾

In our study we found the male predominance (68%) and most common affected age group was 61-70 years in group A. It was statistically significant ratio between the groups. Mohan A et al⁽⁸⁾ studied the increase prevalence of CDK with age and higher prevalence in men as compare to women because of hot and dry climatic conditions and longer exposure to risk factors in elderly patients and in males who spend most of their time in outdoor activities. Sood et al, it was shown that spheroidal degeneration was very common in people exposed to excessive sunlight where ultra violet radiation is the causative agent.⁽¹⁾

In group B, we found female predominance (62%), this was in the favour of DM Kozart et al.⁽⁹⁾ DM Kozart et al concluded that females were three times more likely than males to develop PES. Most common affected age group was 51-60 years in group B. Previous studies showed that PES was rarely occurred before the age of 50 years.

In group A, 70% illiterate and 62% patients belongs to rural background. In group B 62% literate and 62% patients were urban. Literacy ratio were statistically significant between the groups. Vitamin and protein deficiencies and tuberculosis are common in this population.⁽¹⁰⁾ Poor corneal nutrition may be a factor that increase the severity of degeneration.

Group B had statistically better visual outcomes as compare to group A because group B population were more aware about the disease and reported early to the hospital. Public awareness about the care of eye needs to be conducted and field workers should be advised to wear goggles.

We also studied the stages of climatic droplet keratopathy, stage 3 (43.3%) then stage 1 (22.5%), stage 2 (20%) followed by stage 4 (14.1%). Stage 3 also affected the vision. Extremes of temperature, low humidity, dust and wind⁽¹¹⁾ are the factors for the severity of CDK. South-West Rajasthan has extreme climatic conditions. The area receives very low rainfall and hot wind and dust storms in the summer.

V. Conclusion

Male and elderly were more affected by climatic droplet keratopathy and middle aged and female were more affected by pseudoexfoliation syndrome. Illiteracy and rural background were the major causative factors for climatic droplet keratopathy. Pseudoexfoliation cases had better visual outcomes as compare to climatic droplet keratopathy if diagnosed early and treat accordingly.

Bibliography

- [1]. Ritch R, Schlötzer-Schrehardt U. Exfoliation syndrome. Survey of ophthalmology. 2001 Jan 1;45(4):265-315.
- [2]. Sarowa S, Manohar J, Jain K, Singhal Y, Devathia D. Qualitative and quantitative changes of corneal endothelial cells and central corneal thickness in pseudoexfoliation syndrome and pseudoexfoliation glaucoma. Int J Med Sci Public Heal. 2016;5(12):1.
- [3]. Naumann GO, Schlötzer-Schrehardt U, Kühle M. Pseudoexfoliation syndrome for the comprehensive ophthalmologist: intraocular and systemic manifestations. Ophthalmology. 1998 Jun 1;105(6):951-68.
- [4]. Viswamithra P, Murthy SR. Spheroidal degeneration—An epidemiological study. J Dent Med Sci. 2014;8:48-53.

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- [5]. Sood T, Sharma RL, Mandeep T, Sood S, Sharma A. Climatic Keratopathy in Snow Laden Hilly Areas. *Int J Ophthalmol Eye Res.* 2016 Jun 8;4(5):212-4.
- [6]. Singh D, Singh M, Rudra SI. Climatic keratopathy. *Indian Journal of Ophthalmology.* 1979 Oct 1;27(4):180.
- [7]. Kumar HM, Madhumita M. Association of spheroidal degeneration in pseudoexfoliation cases. *Indian Journal of Clinical and Experimental Ophthalmology.* 2019 Apr;5(2):186-9.
- [8]. Mohan A, Jamil Z, Bhatanagar VC, Gajraj M. Prevalence of spheroidal degeneration of cornea and its association with other eye diseases in tribes of Western Rajasthan. *Indian journal of ophthalmology.* 2017 Oct;65(10):1010.
- [9]. Kozart DM, Yanoff M. Intraocular pressure status in 100 consecutive patients with exfoliation syndrome. *Ophthalmology.* 1982 Mar 1;89(3):214-8.
- [10]. Singh MB, Lakshminarayana J, Fotedar R. Chronic energy deficiency and its association with dietary factors in adults of drought affected desert areas of Western Rajasthan, India. *Asia Pacific journal of clinical nutrition.* 2008 Dec 1;17(4).
- [11]. Rodger FC. Clinical findings, course, and progress of Bietti's corneal degeneration in the Dahlak islands. *The British journal of ophthalmology.* 1973 Sep;57(9):657.

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