Prevalence of ocular pseudo exfoliative syndrome in rural population: A study from South India

Sujani Narendra Bairy[1,*], Pravenya Praveen Kemidi[2]

[1]Assistant Professor, Dept. of Ophthalmology, KAMS & RC, Telangana, [2]Consultant, ESI Hospital, Telangana

***Corresponding Author:**
Email: sujani0825@gmail.com

Abstract

Introduction: Pseudo-exfoliation is a complex age related disorder of production and accumulation of fibrillar material in the anterior segment of eye.It is more common as the age advances. It is also associated with serious ocular problems such as cataract and glaucoma.

Aims: To find out the prevalence and pattern of clinical presentation in pseudo-exfoliative syndrome in patients visiting ophthalmology out- patient department in a rural area.

Materials and Methods: This was a prospective study carried out over a period of one year in the department of Ophthalmology, Mamata Medical College and associated General Hospital, Khammam. In this study 2000 individuals, (1111 male and 889 female) above the age of 40 years, were selected randomly and complete ocular examination was done in these subjects.

Results: Ninety (4.5%) out of 2000 individuals screened showed varying degree of pseudo-exfoliation syndrome in one or both eyes. The prevalence rate increased with advancing age.

It was 4.5%, at 40 years and above, 5.35 %, 6.35 % and 6.89 % at 50, 60, and 70 years and above respectively.

In males the prevalence rate was 5.67% and in females 3.03%. Mean age at which this syndrome was detected is 67.32 SD±8.81 years. In males, it was 68.84 (SD±8.26) years and in females 63.96(SD±9.20) years.

Bilateral involvement of the eyes was more common.

Frequency of signs of pseudo- exfoliation syndrome increased with advancing age and the common signs were pseudo-exfoliation material over pupillary border, over anterior capsule of lens, peripheral band, pupillary ruff defects, pigment deposition over trabecular- meshwork and over endothelial surface of cornea, and on anterior surface of lens capsule.

Conclusion: Pseudo-exfoliation syndrome is common in hospital visiting population especially in the elderly population in rural South India. Thorough ophthalmologic examination helps to pick up this syndrome. Early detection helps to prevent associated complications such as cataract, glaucoma capsulare and phacodonesis.

Keywords: Pseudo exfoliation syndrome, Cataract, Glaucoma capsulare and phacodonesis

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Introduction

Pseudoexfoliation is a complex age related disorder of production and accumulation of fibrillar material in the anterior segment of eye.[1] It is prevalent all over the world. The first description of pseudo exfoliation syndrome was reported in 1917 by Lindberg.[2] Pseudoexfoliation is more common as the age advances. It is also associated with serious ocular problems such as cataract and glaucoma.

To find the prevalence and pattern of clinical presentation in pseudo-exfoliative syndrome in patients visiting ophthalmology out- patient department in a rural area.

Materials and Methods

This was a prospective study carried out over a period of one year in the department of Ophthalmology, Mamata Medical College and associated General Hospital, Khammam. In this study 2000 individuals, (1111 male and 889 female) above the age of 40 years, were selected randomly. The patients having traumatic, infective and inflammatory ocular conditions were excluded.

Preliminary visual acuity of both eyes was recorded unaided, aided and with pinhole. Examination of both eyes was performed with the help of flash torch light and Haagstreit slit lamp bio-microscope and the signs of pseudo-exfoliation syndrome were diligently looked for ---

A. Grayish white dandruff like flaky deposits on
1. Pupillary margin
2. Anterior surface of iris
3. Anterior capsule of lens
4. Zonule (wherever visible)
5. Anterior face of vitreous in aphakic eyes.

B. Pigment dispersion from iris especially the atrophic patches, by transillumination.

C. Pigment deposits over
1. Posterior surface of cornea
2. Anterior capsule of lens and
3. Iris surface

Then gonioscopic examination was done with the help of Goldman three mirror gonioscope. For this cornea was anesthetized by instilling 4% Xylocaine eye drops in the conjunctival sac. Gonioscope filled with 2% methylcellulose, was applied over the cornea and angle of anterior chamber was examined. The following findings were looked for -

1. Pseudo-exfoliation material deposits over angle and ciliary body
2. Sampolesi's line
3. Width of angle of anterior chamber as per grading system described by Shaffer (1962)[3]

Thereafter, pupil was dilated by instilling one to two drops of 10% phenylephrine or 1% tropic amide or both. After 45 minutes when pupil was fully dilated, the patient was examined again for presence of pseudo-exfoliation over the retro-iridial portion on anterior capsule of the lens.

Patient was labeled as a case of pseudo-exfoliation syndrome only when one or more of the above enumerated signs were present, before or after dilation of pupil. Once an individual was found to be a case of pseudo-exfoliation syndrome, he was subjected to thorough ocular examination in the following manner:

Intra-ocular pressure of both eyes was recorded with the help of applanation tonometer after anesthetizing the cornea with 4% Xylocaine drops in conjunctival sac. Fundus oculii were examined in all cases. The optic cup and disc were examined for their size, shape, color and other characteristics. Retinal vessels and background were examined and any other associated findings were recorded. In advanced senile cataract cases, the fundii were examined after cataract surgery.

Observations and Results

A total of 2000 individuals above the age of 40 years comprised the study group. Individuals with traumatic, infective and inflammatory ocular conditions were not included in the study.

Ninety (4.5%) out of 2000 individuals screened showed varying degree of pseudo-exfoliation syndrome in one or both eyes.

Prevalence of pseudo-exfoliation syndrome

Mean age at which this syndrome was seen was 67.32 (SD±8.8) years. These patients were divided into five different age groups. The prevalence rate in group I (40-49 years) was 0.8%, group II (50-59 years) was 2.26%, group III (60-69years), 5.48% group IV(70-79 years) 10.09% and group V (80-89years), 2.95% (Table 1).

Sex wise prevalence of Pseudo-exfoliation syndrome

Out of 2000 subjects studied, 1111(55.55%) were males and 889 (44.45%) females. In 90 cases of pseudo-exfoliation, males were 63 (5.67%) and females, 27 (3.03%). The prevalence was significantly higher in males (2.3:1, P <0.05) than females.

The prevalence varied in males and females in different age groups. In the age group of 40-49 years, the prevalence rate of pseudo-exfoliation in males was 1.56% and in females 0.49%. Similarly in the age group 50-59 years, it was 1.52% and 3.73% and in the age group 60-69 years, 6.02% and 4.88% respectively. The corresponding prevalence rate in age group 70-79 years was 11.38% and 7.14% and in the age group 80 and above 6.6% and 0.49% respectively. (Table 1)

The mean age for occurrence of this syndrome in males was 68.84, (SD±8.26) years and in females 63.96 (SD±9.20) years. Male: Female ratio of PES was 1:0.43. Table 1 shows the relationship of age and sex wise prevalence of pseudo-exfoliation syndrome.

Table 1: Age and Sex wise Prevalence of Pseudo-exfoliation Syndrome

Age(years)	Males examined	No. with PES (%)	Females examined	No. with PES (%)	Total examined	No. with PES (%)
40-49	173	2 (1.56)	202	1 (0.49)	375	3 (0.8)
50-59	263	4 (1.52)	134	5 (3.73)	397	9 (2.26)
60-69	249	15 (6.02)	225	11 (4.88)	474	26 (5.48)
70-79	290	33 11.38)	126	9 (7.14)	416	42 10.09)
80 and >	136	9 (6.6)	202	1 (0.49)	338	10 (2.95)
Total	1111	63 (5.67)	889	27 (3.03)	2000	90 (4.5)

Mean age (years) = 67.32 SD+/-8.81
Mean age, Males = 68.84 SD+/-8.26
Mean age, Females = 63.96 SD+/-9.20
Relationship of age to laterality in pseudo-exfoliation syndrome:

With advancing age, frequency of bilaterality was more. At the age of 40-49 years, ratio between prevalence of unilateral pseudo-exfoliation syndrome to bilateral was 1:2 but in the group 50-59 years, this ratio was 1:0.28, in the age group 60-69 years it was 1:1.16, in 70-79 years age group, 1:2.23 and in 80 years and above it was 1:2.33. The cumulative frequency of unilateral to bilateral pseudo-exfoliation syndrome was 1:1.5.

Unilateral cases were seen at the mean age of 65.31± (SD±9.12) years and bilateral at 68.67± (SD±8.42) years. The prevalence of pseudo-exfoliation syndrome changes with the changes in age parameter.

If the age parameter of screened individuals is changed to 40 years and above, the prevalence rate is 4.5%, at 50 years and above it is 5.35%, at 60 years and above it is 6.35% and at70 years and above, 6.89%. (Table 2)

Table 2: Change in prevalence rate with change in age parameter

Age (years)	No. of patients	No. with PES	%
40 and above	2000	90	4.5
50 and above	1625	87	5.35
60 and above	1228	78	6.35
70 and above	754	52	6.89
80 and above	338	10	2.95

Incidence of signs of pseudo-exfoliation syndrome

A total of 144 eyes of 90 individuals (some only unilateral) showed PES. Each eye was examined for 10 common to rare signs of pseudo-exfoliation syndrome. The most common sign was presence of pseudo-exfoliation material over pupillary margin of iris. Next most common sign was degranulation of pupillary ruff. The pseudo-exfoliation material over pupillary margin was seen in 137 (95.13%) out 144 eyes and degranulation of papillary ruff in 108 (75%) eyes. Pseudo-exfoliation material over anterior capsule of lens was seen in 81 (62.3%) eyes and on retro-iridial portion on dilation of pupil in another 49 (37.69%) eyes. Thus, cumulative incidence of pseudo-exfoliation material over anterior capsule of lens on dilation of pupil was second highest of all signs seen in 130 eyes (90.27%). Pseudo-exfoliation material at angle was seen in 33 (22.91%) eyes whereas on posterior surface of cornea, in 21 (14.58%) eyes, over trabecular meshwork and ciliary body in 89 (61.8%) eyes and over anterior capsule of lens in 46 (31.94%) eyes. Sampaolesi's line was seen only in 86 (59.72%) eyes. The other conditions associated with pseudo-exfoliation like phacodonesis was seen in 5 (3.47%) eyes and Rubeosis irides was not observed in any eye of this series.(Table 3)

Table 3: Incidence of Pseudo-exfoliation syndrome signs in 144 eyes

Sr. No.	Signs	No. of eyes	Percentage
1	Pseudo-exfoliation on pupillary margin	137	95.13
2	Pseudo-exfoliation on anterior surface of lens	130	90.27
3	In pupillary area*	81	62.30
4	In retro-iridial portion**	49	37.69
5	Degranulation of pupillary ruff	108	75
6	Pigment deposition on trabeculum	89	61.8
7	Pseudo-exfoliation at angle	33	22.91
8	Pigment on corneal endothelium	21	14.58
9	Sampaolesi's line	86	59.72
10	Pigment on anterior surface of lens	46	31.94
11	Phacodonesis	5	3.47

***Undilated pupil**
****Dilated pupil**

Relation of frequency of signs of pseudo-exfoliation syndrome to age

In the present study, all ten signs of pseudo-exfoliation syndrome as enumerated in Table 3, were studied for their relation to age. In age group 40-49 years, 1-2 signs of pseudo-exfoliation syndrome were found in majority of cases (40%). In 50-59 years age group, 3-4 signs were found in most eyes (47%). Similarly, in 60-69 years age group7-8 signs (32.55%), in 70-79 years also 7-8 signs (37.28%) and in 80 years and above, again 7-8 signs (45%) were found in majority of eyes examined. Statistically, the frequency of signs is significantly increased with advancing age ($t=3.45$, $p<0.05$).

Discussion

There are various theories regarding the nature and source of pseudo-exfoliation material. Lindberg[2] found pseudo-exfoliation material over pupillary border and described it as old inflammatory exudates.

The origin of pseudo-exfoliation material is now thought to be from pigment epithelium of iris, non-pigmented epithelium of ciliary body, epithelium of lens capsule and focal intra trabecular synthesis. However, exact site of origin is still undetermined[4] Pseudo-exfoliation syndrome is prevalent all over the world. Its prevalence rate world over varies from 0 to 53%.[5] The highest prevalence rate has been reported in Scandinavian countries.[6]

Many authors have observed the variation in prevalence rate of pseudo exfoliation syndrome in different countries - 3% in USA[7]; 10.9% in South Africa[8]; 28% in Greece,[9] 3.4% in Japan.[10]

In India, reported prevalence is highly variable. Besides other recognized factors, the population examined can also be a cause for variation. The present study is based on patients visiting hospital. Our prevalence rate at the age of 40 years and above, compares well with 6% prevalence rate from Tamil Nadu (Krishnadas et al, a Hospital based study),[11] 3.8% prevalence rate from Chennai (Arvind et al)[12],

7.4% prevalence in the hospital visiting patients at the age of 45 years (Lamba et al)[13]. A similar study - Shimla Hills study in North India (Sharma et al)[14] reported 9.3% prevalence in hospital visiting population. This may be a geographic and ethnic variation of populations or higher amount of ultra-violet irradiation from the sun in that region. Thomas et al[15] reported and 0.69% prevalence from Andhra Pradesh in a population based study, so it cannot be compared with the present study.

We observed a higher prevalence rate of pseudo-exfoliation syndrome with advancing age. At the age of 40 years and above, the rate was 4.5%, at the age of 50 years and above it was 5.35%, at 60 years and above, 6.35% and at 70 years and above, 6.89%. This compares well with the study of Sood et al[16] who reported 1.87% prevalence rate at the age of 45 years and 3.63% at the age of 60 years and above. Lamba et al[13] reported 7.4% cases at the age of 45 years and above, 8.38% at the age of 50 years and 11.25% at the age of 60 years and above. North India, Shimla hills study (Sharma et al)[14] reported similar results of increasing incidence with advancing age - 1.09% in 40-49 years age group, 7.63% in 50-59 years, 13.5% in 60-69 years, 18.05% in 70-79 years and 22.2% in >80 years age group. However, Arvind et al[12] from South India reported much lower prevalence rates of 0.89% in > 50 years, 1.82% in > 60 years, 3.8% in > 70 years. But Thomas et al[15] from Andhra Pradesh region of South India reported prevalence rates of 3.01% in above 40 years age group and 6.8% in above 60 years age group, which compares well with the present study.

However, high prevalence rate has been reported from Shimla hills (height 4000 to 9000 feet) area of India of 9.3% which may be due to higher amount of ultra - violet radiation exposure, which over a long period of time can be one of the factors responsible in the etiopathogenesis and higher prevalence of pseudo - exfoliation syndrome (Sharma et al)[14]. Taylor[17] also implicated solar radiation and occupation of the affected individuals as an etiology for this condition. However, this observation has not been confirmed by others (Forsius).[6]

Relationship of age to Pseudoexfoliation

Mean age of occurrence of pseudo-exfoliation syndrome in the present study was 67.32 (SD±8.81) years. Aasved et al[5] reported mean age of 72 years; (SD±8.38) years, Konstas et al[9] 73.8 years; Thomas et al[15] from south India reported 64.9 (SD+/- 9.8) years. These studies show relatively higher mean age for occurrence of Pseudoexfoliation. But studies from India show similar figure as ours, and thus compare well (Sharma et al,[14]Thomas et al[15]).

Sugar et al[18] reported the youngest patient of PES at 22 years of age, Lambaet al[13] at 48 years and Thomas et al[15] reported earliest case of pseudo-exfoliation syndrome at 42 years. The youngest patient affected with pseudo-exfoliation syndrome in the present study was 45 years old. Thus, our findings compare well with the findings of above authors.

Incidence of pseudo-exfoliation syndrome in different age groups

In the present study, the differences in the incidence of pseudo-exfoliation syndrome in various age groups were studied. All the patients studied were divided into five age groups as mentioned below.

Table 4: Comparison of age-group wise incidence of PES in various studies

Study	Incidence of pseudo-exfoliation syndrome age wise (years)				
	40-49	**50–59**	**60-69**	**70-79**	**>80**
1. Aasved et al [5]	-	0.40%	-	-	7.90%
2. Bartholomew[8]	2.20%	4.30%	8.90%	-	-
3. Arvind et al[12]	0.89%	1.03%	1.82%	3.80%	-
4. Lamba et al[13]	-	4.70%	9.70%	-	13.04%
5. Sharma et al[14]	1.09%	7.63%	13.50%	18.05%	22.20%
6. Thomas et al[15]	1.05%	3.01%	-	6.80%	-
7. Sood et al [16]	-	-	-	-	17.39%
8. Taylor et al [17]	1.60%	-	-	-	-
9. Present Study	0.80%	2.27%	5.48%	10.09%	-

The comparative study shows that the present findings are well in accordance with the most authors noted above. Thus, the present study confirms that the prevalence of this disease increases with advancing age.

Sex wise variations

Reports of higher prevalence in both males and females can be found in literature, while others have observed no gender wise predilection.

In our study, the prevalence was more common in males than females. The prevalence rate of pseudo-exfoliation syndrome in males was 5.67% and in females, 3.037%. Similar findings have been reported in literature by Aasvedet al[5] and Tayloret al.[17] Among Indian authors Sood et al,[16] Lamba et al[13] and Sharma et al[14] have also reported higher prevalence of this syndrome in males.

However some authors are of the view that there was no gender variation (Montanes[19]) while still others found higher prevalence in females (Forsius et al,[6] Arvind et al[12]).

In the present study mean age for the development of pseudo-exfoliation syndrome in males was 68.84 (SD±8.26) years and females 63.96(SD±9.20) years. Montanes[19] noted 72.6 (SD±7.1) years in males and 73.4 (SD±7.3) years in females. Sharma et al[14] (North India, Shimla) noted 65.1+/-9.2 years in males and 62.3+/-8.98 years in females. Thus mean age of development of PES compares well with these authors.

Laterality wise prevalence of pseudo-exfoliation syndrome

In the present study, out of 90patients studied, 36 (40%) had unilateral and 54 (60%) had bilateral involvement, thus giving a ratio of 2:3. This is well in accordance with the earlier reports by various authors noted below. However Thomas et al[15] have reported higher prevalence of unilateral PES than bilateral from Andhra Pradesh. As stated elsewhere, their survey is a population based survey, therefore cannot be compared with the present work. Sharma et al[14] have reported higher incidence of bilateral pseudo-exfoliation syndrome. The cause for this variation can be regional, high altitude, and the racial and genetic factors of the population sample studied.

In the present study the mean age for detection of unilateral pseudo—exfoliation syndrome was 65.31 (SD±9.12) years and for bilateral 68.67 (SD±8.42) years.

Common Signs of Pseudo-Exfoliation Syndrome

The commonest sign of pseudo-exfoliation syndrome (PES) in 144 eyes studied was the presence of greyish white dandruff like material over the pupillary margin which was noted in 137 (95.13%) eyes. The next common sign was pseudo-exfoliation material over the anterior capsule (undilated pupils) in 81 (62.3%) eyes showing pseudo-exfoliation. In addition another 49 (37.69%) eyes showed the presence of peripheral ring at the retroiridial portion but no central disc on pupillary dilation. Thus, a total of 130 (90.27%) eyes showed the presence of peripheral ring over the anterior lens surface. Therefore, it was the next common sign. This observation has also been described by Sood et al[16] who found peripheral bands on the retro-iridial portion in all the 40 (100%) eyes and absence of central disc in 9(17.3%) eyes. Layden et al[20] described presence of pseudo-exfoliation material over lens capsule in 92% eyes. With some variations, our observations thus compare well with above authors.

Pseudo-exfoliation flakes on pupillary border were seen in 31 (92.6%) eyes in the present work. Sharma et al[14] noted similar findings in 84.7% cases and Thomas et al[15] observed in 58% at pupillary margin and 63.4% cases on lens. Thus our figure for PES flakes on papillary border compares well with the above authors.

The fourth most common sign observed was pupillary ruff defects in 108 (75%) eyes. In 21 eyes only 1 quadrant, in 28 eyes 2, in 24 eyes 3 and in 35 eyes all four quadrants of the pupillary ruff showed defects. Pupillary ruff defects were observed in 74% cases of this syndrome by Aasved et al[5] Forsius et al[6] also reported these defects but the exact incidence has not been given.

Iris atrophy patches which gives rise to a ‘moth eaten’ appearance were present in 86 (59.72%) eyes. Sharma et al[14] reported incidence of 74.7% in their cases.

Pigment deposition over the trabecular - meshwork was the next common sign seen in 89 (61.8%) eyes. The characteristic appearance was diffuse, spotty distribution of pigment granules throughout the angle. Pigment deposition has also been reported by Sampolesi et al[21] Layden et al[20] and Sharma et al[14,85].

In the present study Sampolesi’s line was seen in 86 (59.72%) eyes. Sampolesi[21] reported 83% patients with pseudo—exfoliation syndrome had this line. Sharma et al[14] reported 47.5% eyes with PES had Sampolesi’s line.

Pseudoexfoliation material over angle was seen in 82 (48.2%) eyes. It was usually seen in inferior quadrant. Earlier reports by Layden[20] and Sharma et al[14] have noted similar findings. However, Thomas et al[15] described pseudo-exfoliation material over trabecular mesh work in 20.5% cases. This is about half the incidence we found in this study. More work is required to probe this incidence further.

Pigment over posterior surface of cornea was seen in 21 (14.58%) eyes. The pigment deposition was diffuse in nature and spread all over the endothelial surface of cornea. Sugar et al[18] and Sharma et al[14] have reported similar findings.

Pigment deposition over anterior capsule of lens was seen in 46 (31.94%) eyes. This was diffuse in nature but in some cases only one or two pigment clumps were visible. Sugar et al[18] and Sharma et al[14] have also reported deposition of pigment over anterior surface of lens capsule.

Pseudo-exfoliation material over the lens zonule was seen in 2 out of 5 eyes in which the zonule could be visualized due to subluxation of lens. Sharma et al[14] have reported deposition of pseudo-exfoliation material over zonules in 8 out of 10 cases where zonules were visible.

We also observed the presence of pseudo-exfoliation material on anterior hyaloid surface in 1 out of 4 aphakic eyes, where the cataract extraction had been done 5 to 8 years earlier. Sharma et al[14] also have reported this observation. In their study, the cataract surgery was done 3.5 to 8 years earlier.

Phacodonesis in Pseudoexfoliation syndrome

Phacodonesis in pseudo-exfoliation syndrome has been reported in literature by Irvine[7], Bartholomew[8], Sood et al[16] and Sharma et al[14]. In the present study, we found 5 (3.47%) eyes having phacodonesis. Bartholomew[8] observed 9(3%) out of 300 cases of pseudoexfoliation syndrome. But Sood et al[16] reported very high incidence of 11 (64.9%) cases of phacodonesis out of 17 having pseudo-exfoliation syndrome. Thus, our figure for phacodonesis is quite comparable to Bartholomew[8], but very low in comparison to Sood et al.[16] However, the latter authors have studied a small number of cases compared to the present work leading to a skewed observation.

Rubeosis Irides in Pseudo-exfoliation syndrome

Association of rubeosis in pseudo-exfoliation syndrome has been reported by many authors. Sood et al[16] reported 5.88% incidence of rubeosis in pseudo-exfoliation syndrome. Sharma et al[14] reported 2.35% of rubeosisirides in PES on slit lamp biomicroscopy. Rubeosisirides was present in none of the cases in our study.

Relation of frequency of signs of Pseudo-exfoliation syndrome to Age

We observed that as the age increased, number of signs of pseudo-exfoliation syndrome also increased. In age group 40-49 years, 1 to 2 signs of pseudo-exfoliation syndrome were found in majority of cases (40%). In 50-59 years group, 3 to 4 signs were found in majority (47.06%). Similarly in 60-69 years age group, 7-8 signs in (32.55%), in 70-79 years, again 7-8 signs in (37.28%) and in 80 years > age group, 7-8 signs were found (45%) cases of PES. From this, we conclude that in younger age group, less number of signs of pseudo-exfoliation are present and as the age advances more number of signs are added. So with advancing age, the disease becomes more manifest and number of signs of pseudo-exfoliation syndrome goes on increasing. This finding has been found statistically significant ($t=3.45$, $P < 0.05$). To the best of our knowledge, this type of evaluation has not been done in any earlier studies in the literature and hence no comparison can be made.

Results

A total of 2000 individuals above the age of 40 years, visiting ophthalmic department of Mamata Medical College and Associated Hospital, Khammam were studied for the prevalence, ophthalmic findings, and associated conditions of pseudo-exfoliation syndrome. Ninety (4.5%) out of 2000 individuals screened showed varying degree of pseudo-exfoliation syndrome in one or both eyes.

1. Prevalence of pseudo-exfoliation syndrome was 4.5% at the age of 40 years and above.
2. The prevalence rate of pseudo-exfoliation syndrome changed with change in age parameter.

At 40 years and above it was 4.5%.
At 50 years and above it was 5.35%.
At 60 years and above it was 6.35%.
At 70 years and above it was 6.89%.

3. In males the prevalence rate of pseudo-exfoliation syndrome was 5.67% and in females 3.03%. Thus, prevalence was higher in males than females (ratio 2.33:1, $P<0.05$).
4. Mean age at which this syndrome was detected was 67.32 SD±8.81 years.
5. In males the mean age for detection was 68.84 (SD±8.26) years and in females 63.96(SD±9.20) years. Thus, in females this syndrome was seen earlier by about five years.
6. The prevalence of pseudo-exfoliation syndrome increased with advancing age.
7. Bilateral involvement of pseudo-exfoliation syndrome was more common.
8. With advancing age, incidence of bilateral pseudo-exfoliation syndrome also increased.
9. Mean age of unilateral pseudo-exfoliation syndrome was 65.31 (SD±9.12) years and mean age of bilateral was 68.67 (SD±8.42) years.
10. Common signs of pseudo-exfoliation syndrome were pseudo-exfoliation material over pupillary border, over anterior capsule of lens, peripheral band, central disc + peripheral band, Pupillary ruff defects, pigment deposition over trabecular meshwork and over endothelial surface of cornea, and on anterior surface of lens capsule.
11. Frequency of signs of pseudo- exfoliation syndrome increased with advancing age.

Conclusions

Pseudo-exfoliation syndrome is common in hospital visiting population especially in the elderly population in rural South India. Thorough ophthalmologic examination helps to pick up this syndrome. Early detection helps to prevent associated complications such as cataract, glaucoma capsulare and phacodonesis.

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