

Spheroidal Degeneration –An Epidemiological Study

Dr. Viswamithra P¹ & Dr. Sri Rama Chandra Murthy M²

¹Associate Professor of Ophthalmology, Andhra Medical College, Visakhapatnam

²Assistant Professor of Ophthalmology, Andhra Medical College, Visakhapatnam

Abstract:

Background: Spheroidal degeneration, reported as a rare entity in western literature is a common ocular morbidity in our parts of India. It is commonly seen in persons who are exposed to intense sun light (excess UV radiation) reflected off the surface of the sea, snow and sand. Hence, its prevalence is more in fishermen. Clinically, it is characterised by the presence of amber coloured spherules on the cornea giving rise to intense foreign body sensation, pain, redness, watering, photophobia and decreased visual acuity. Because of the poor ocular surface they are not suitable for certain other ocular procedures like refractive status assessment, cataract surgery etc thus decreasing their quality of life. Superficial keratectomy (manual/laser), Phototherapeutic keratectomy (with adjuvants), Lamellar keratoplasty, Penetrating keratoplasty are the available options for the management of this condition.

Aim: To study the prevalence and the epidemiological profile of spheroidal degeneration in a hospital based population

Methodology: : In a prospective, non interventional, randomised, observational study, 631 randomly selected patients above 20 years of age were examined for the presence of spheroidal degeneration and attributable risk factors were looked for. Corneal lesions were classified using Dr. Daljit Singh's criteria.

Results: Prevalence of spheroidal degeneration was 7.13% in our hospital based population. Primary type was more common (80%). 71.1% of the study population were fishermen. Symptomatology depends on the depth of lesions.

CONCLUSION: Spheroidal degeneration is not so rare a clinical condition in our region. It is associated with significant ocular morbidity and decreased quality of life.

Key Words: Spheroidal degeneration, Fisherman's keratopathy, Climatic Keratopathy.

I. Introduction

Spheroidal degeneration of cornea is characterised by the deposition of amber coloured oily spherules at and around the Bowman's membrane of the cornea^[1]. Spheroidal degeneration is a common ocular morbidity in our country. First described in 1955 by Bietti as Bietti nodular hyaline band shaped keratopathy. Basing on the clinical appearance or the geographical location or population groups in which the cases were identified, different authors have given different names to this condition i.e Climatic droplet keratopathy, Spheroidal droplet degeneration (Fraunfelder and associates), Fisherman's keratopathy (Dr.R.Suryaprasada rao 1961), Labrador keratopathy (Freedmann and Rodger-1965), Nama keratopathy from South Africa (Freedman), Eskimo's keratopathy etc but Spheroidal degeneration (Fraunfelder and Hanna) is the most commonly used term to describe all the related lesions mentioned by the earlier authors under various names.

Intense sunshine, excess UV radiation, microtrauma due to wind borne particles, extremes of high or low temperature, aridity, malnutrition and genetic factors were incriminated as the etiological factors for the development of spheroidal degeneration.^[2]

Spheroidal degeneration of cornea may be of 2 types. Primary and Secondary. Primary spheroidal degeneration occurs as an aging process in an otherwise normal eye. Secondary spheroidal degeneration occurs in eyes with other ocular pathology such as phthisis bulbi, absolute glaucoma, corneal scars, chronic uveitis etc.^[1]

Clinically, spherules appear either in the form of smooth, fine gelatinous dew drops or yellowish or amber coloured raised globules with irregular surface^[3]. The globular deposits are amorphous and predominantly acidophilic in nature and vary considerably in size (1 μ - 100 μ).

Depending on the size and depth of the spherules, spheroidal degeneration can be classified into 4 grades.^[4]
Stage 1: Tiny, microscopic oil droplet like lesions in the interpalpebral area, nasally and temporally near limbus, best seen by retro illumination

Stage 2: Fine granular lesions in the interpalpebral area. Cornea appears ground glass. Lesions extend up to Bowman's membrane. Lesions are seen with corneal loupe.

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

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.^[5]

Chemical composition of the spherules is not exactly known. It could be hyaline, colloid, a protein high in tyrosine, lipids, elastin or keratin in its incomplete form. Some authors claim that the spherules stain positive for Ayoub Shklar stain for keratin.^[6]

Spheroidal degeneration causes intense foreign body sensation, pain, redness, watering, photophobia and deterioration of vision . Because of the poor ocular surface these patients are not suitable for any intra ocular procedures. Irregular corneal surface makes measurement of refractive status and Intra ocular pressure difficult. All these in turn result in gross decrease in the Quality of life of the patient .^[7]

The management options include superficial keratectomy (manual or laser), with or without amniotic membrane grafts , lamellar keratoplasty or penetrating keratoplasty may be required for deeper involvement ^[8,9,10]

II. Methodology

From January 2013 to December 2013, 631 patients who attended the ophthalmology outpatient department of our Institute (tertiary eye care centre) were examined for the presence of corneal spheroidal lesions. Slit lamp examination was done in all these patients. Patients who were found to have spheroidal lesions on cornea were referred to ‘ Cornea Services’ of the institute where further examination was carried out. Demographic details of the patients like age, gender, address, occupation etc were noted. Visual acuity was measured using Illiterate E chart. Best corrected visual acuity (BCVA) was noted .Local examination was done under slit lamp to note co morbidity factors like pterygium, dry eye diseases, cataract etc. Fundus examination was done with indirect ophthalmoscopy. Specific examination of the corneal spheroidal lesions was done and graded according to Daljit Singh’s criteria.^[4]

III. Results

In the present prospective ,observational study done for a period of one year, 631 patients were randomly examined for the presence of corneal spheroidal lesions. 45 patients were diagnosed as having corneal spheroidal degeneration,33 males and 12 females. Age of the patients varied from 38 years to 79 years. Majority of the cases were seen in age group 50-59 years. Most of the cases (80%) were primary type and 20% were secondary type. 53.3% were having Grade 2 spheroidal degeneration. BCVA in most of these patients was between 6/60 to CF 3mts. A distinct epidemiological data was found regarding the effect of occupation on spheroidal degeneration. This condition was more in fishermen followed by manual labourers, agricultural workers .Commonest co morbidity factors were pterygium and cataract.

IV. Discussion

In the present study, out of 631 patients examined,45 patients were found to have spheroidal degeneration i.e prevalence of spheroidal degeneration was 7.13% on par with similar other studies , which varies from 6-7% as shown in the studies done by A.Garner, Bartholomew R S.^[11,12]

The study done in Eskimos by NornMS showed the prevalence as 12.3% . Eskimos are exposed to reflected sun rays off the surface of the snow which is a definitive risk factor for the development of spheroidal degeneration.^[13]

71.1% of our patients were fishermen engaged in active fishing with exposure to reflected sunrays off the sea surface for 8-10 hrs per day. Most of the other patients were manual labourers and agricultural labourers who were engaged in prolonged periods outdoor activity to earn their livelihood.

The average age of the patients in our study was 59 years ,the youngest patient was aged 38 years .

40% of the patients in our study were in 50-59 years age group, 24.4% were in 60-69 years age group and 20% were in 40-49 years age group. It can be explained by the excessive intensity of sunlight and more number of years of exposure to reflected UV radiation in our patients.^[14]

But the study by F.T.Fraunfelder et al showed that the mean age of their patients 69 years, youngest patient being 46 years old.^[6]

73.33% of the patients in our study were males and 26.66% were females . Thus ,our study showed that spheroidal degeneration was more prevalent in males ,in concert with all other similar studies .It can be explained by their more exposure to environmental excesses.

All studies agreed that prevalence of spheroidal degeneration increased with age and also in those people who work in an environment with high surface reflectance as seen in our study where highest number of case were seen in fishermen (71.1 %) . People who are at risk of exposure to intense sunlight (UV radiation) should be educated about wearing protective sun goggles that block UV radiation.^[15]

In our study, 53.3% % had Grade 2 spheroidal degeneration, 22.2% had Grade 3, 13.3% Grade 4 and 11.1% had Grade 1.

All the study patients(100%) had complaints of foreign body sensation, redness, watering and photophobia ,of different degree.

Corneal spheroidal degeneration leads to considerable visual disability as shown in our study. Most of the patients in our study (51.1%) had vision less than 6/60 (legal blindness).24.4% had Visual acuity less than CF 3mts (Counting Fingers at 3 mts).

Treatment Options for spheroidal degeneration include Superficial keratectomy (manual/laser),Lamellar keratoplasty,Penetrating keratoplasty, Photo therapeutic keratectomy with adjuvants (Mitomicin C / Amniotic membrane grafting).^[17]

Table No 1: Number of Patients Examined

| | Male | Female |
|-----------|-------|--------|
| | n=784 | n=478 |
| 30-39 Yrs | 188 | 115 |
| 40-49 Yrs | 204 | 125 |
| 50-59 Yrs | 180 | 110 |
| 60-69 Yrs | 165 | 100 |
| >70 Yrs | 47 | 28 |

Figure No 1: Number of Patients Examined

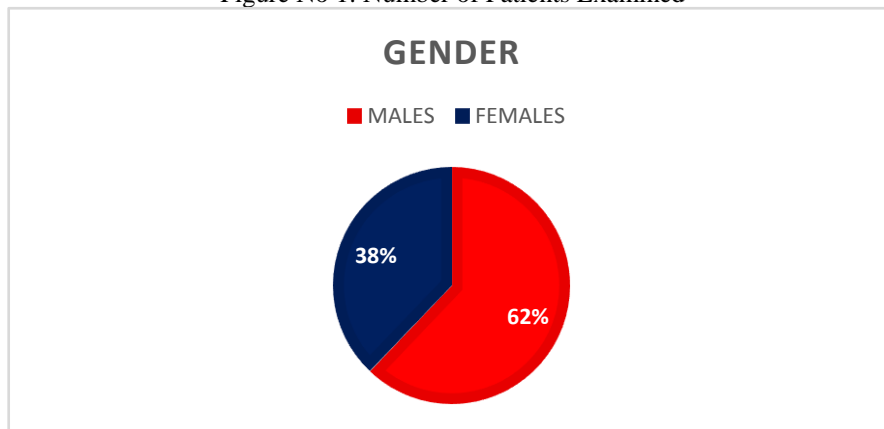


Table No 2 : Prevalence of Spheroidal degeneration

| | Male (n=33) | Female (n=12) | | |
|-----------|-------------|---------------|--|--|
| 30-39 Yrs | 1 | 0 | | |
| 40-49 Yrs | 6 | 3 | | |
| 50-59 Yrs | 13 | 5 | | |
| 60-69 Yrs | 8 | 3 | | |
| >70 Yrs | 5 | 1 | | |

Figure No 2 : Prevalence of Spheroidal degeneration

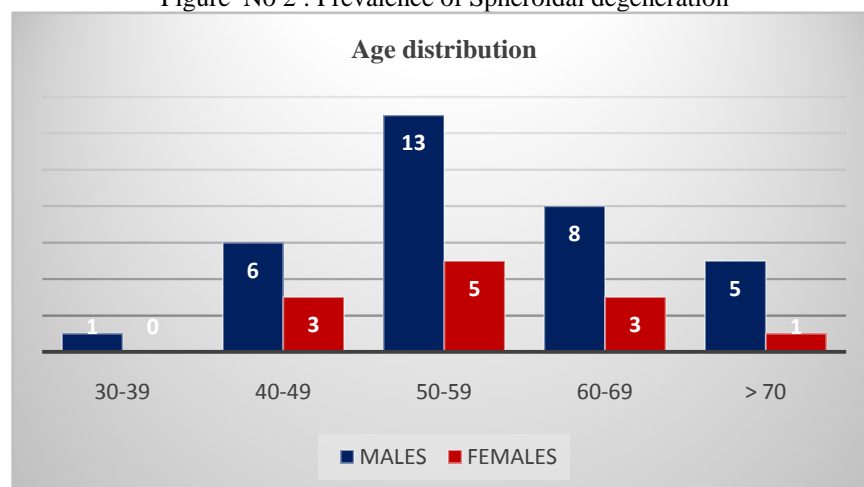


Table No 3 : Types of Spheroidal degeneration

| | Male | Female |
|------------------|------|--------|
| | n=33 | n=12 |
| Primary | 27 | 9 |
| Secondary | 6 | 3 |

Figure No 3 : Types of Spheroidal degeneration

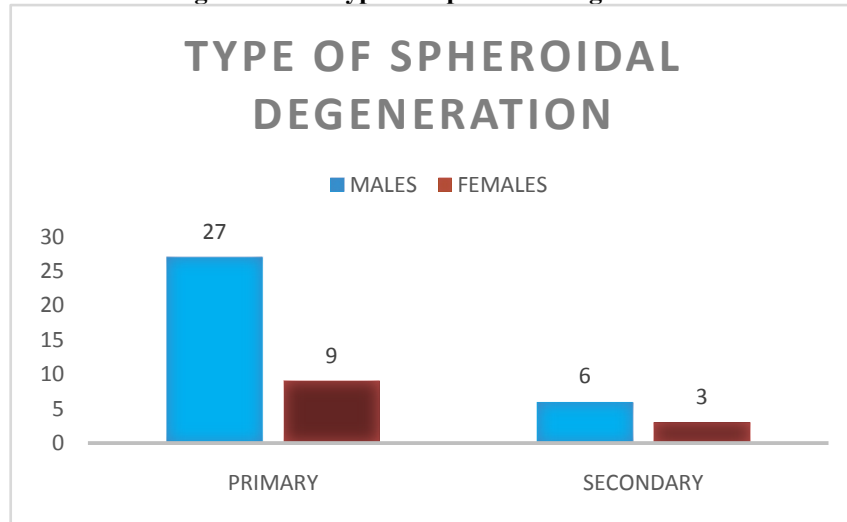


Table No 4 : Grades of spheroidal Degeneration

| Grades | Male | Female |
|-----------|------|--------|
| | n=33 | n=12 |
| Grade I | 4 | 2 |
| Grade II | 19 | 5 |
| Grade III | 7 | 3 |
| Grade IV | 3 | 2 |

Figure No 4 : Grades of Spheroidal Degeneration

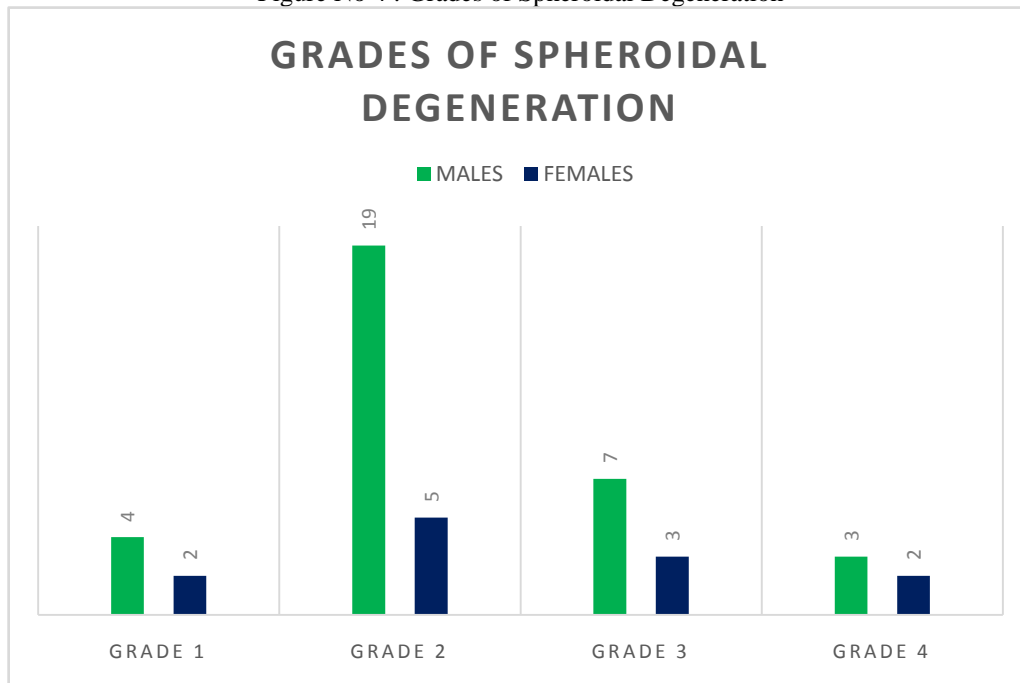


Table No 5: Visual acuity of Patients with Spheroidal degeneration

| Visual Acuity | Male | Female | | | |
|----------------|------|--------|--|--|--|
| | n=33 | n=12 | | | |
| 6/6 - 6/18 | 2 | 1 | | | |
| 6/18 - 6/60 | 5 | 3 | | | |
| 6/60 - cf 3mts | 18 | 5 | | | |
| <cf 3 mts | 8 | 3 | | | |

Figure No 5: Visual acuity of Patients with Spheroidal degeneration

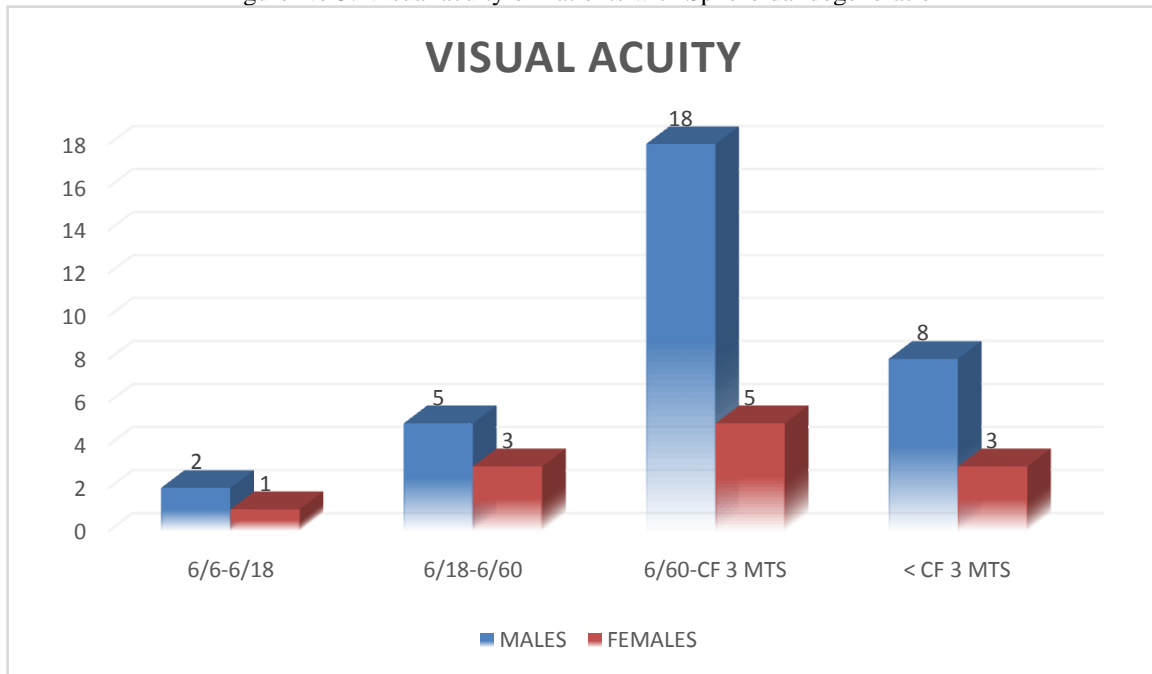
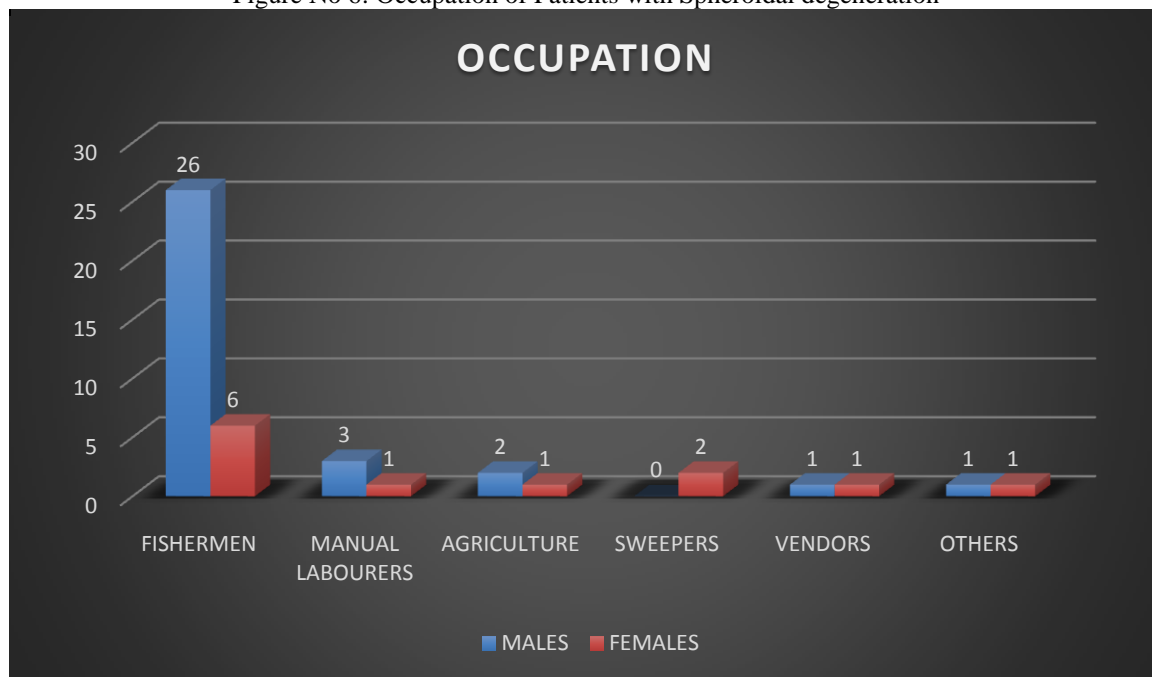


Table No 6: Occupation of Patients with Spheroidal degeneration

| | Male | Female | | | |
|---------------------|------|--------|--|--|--|
| | n=33 | n=12 | | | |
| Fisherman | 26 | 6 | | | |
| Manual Labour | 3 | 1 | | | |
| Agricultural Labour | 2 | 1 | | | |
| Sweepers | 0 | 2 | | | |
| Vendors | 1 | 1 | | | |
| Others | 1 | 1 | | | |

Figure No 6: Occupation of Patients with Spheroidal degeneration



V. Conclusion

Our study showed that Spheroidal degeneration, aptly called Fisherman's keratopathy is a common ocular morbidity, mostly affecting people who are exposed to intense UV radiation and causes considerable visual disability and reduced quality of life. Health education and access to Tertiary eye care services are essential to reduce morbidity in these patients.

References

- [1]. F. T. Fraunfelder, M.D., Calvin Hanna, Ph.D., And J. Parker, M.D.. Spheroid Degeneration Of The Cornea And Conjunctiva 1. Clinical Course And Characteristics. *Am J O* 1973;76:821-828.
- [2]. Alec Garner .Keratinoid Corneal Degeneration. *Bjo*;1970;54:769-780
- [3]. Varsha M Rathi, Sharadini P Vyas, Virender S Sangwan. Phototherapeutic Keratectomy. *Ijo* 2012;60(1):5-14
- [4]. Daljit Singh, Mohindar Singh, Shiv Inder Singh Rudra. Climatic Keratopathy. *Ijo* 1979;27(4):180-184
- [5]. Sridhar Ms, Garg P, Das S, Vemuganti G, Gopinathan U, Rao Gn. Infectious Keratitis In Climatic Droplet Keratopathy. *Cornea*
- [6]. Franufelder, F.T. And Hanna, C., 1973, Amer, J, *Ophthal.*, 76, 41. 2000;19:455-8.
- [7]. Tetsuo Hida, Kajuteru Kigasawa, Etsuo Tanaka, Shinobu Akia, Yukio Tashiro ,Yusuhiro Hosoda. Primary Band Shaped Spheroidal Degeneration Of The Cornea : Three Cases From Two Consanguineous Families Families .*Bjo* 1986 ;70: 347-353.
- [8]. Ayres Bd, Rapuano Cj. Excimer Laser Phototherapeutic Keratectomy. *Ocul Surf* 2006;4:196-206. ↑
- [9]. Amm M, Duncker Gi. Refractive Changes After Phototherapeutic Keratectomy. *J Cataract Refract Surg* 1997;23:839-44.
- [10]. Rao Sk, Fogla R, Seethalakshmi G, Padmanabhan P. Excimer Laser Phototherapeutic Keratectomy: Indications, Results And Its Role In The Indian Scenario. *Indian J Ophthalmol* 1999;47:167-72.
- [11]. A Garner, F T Fraunfelder, T C Barras, And E N Hinzpeter. Spheroidal Degeneration Of Cornea And Conjunctiva Br *J Ophthalmol*. Jun 1976; 60(6): 473-478
- [12]. Bartholomew Rs. Spheroidal Degeneration Of The Cornea. Prevalence And Association With Other Eye Diseases *Doc Ophthalmol*. 1977 Jun 30;43(2):325-40.
- [13]. Norn Ms. Spheroid Degeneration Of Cornea And Conjunctiva. Prevalence Among Eskimos In Greenland And Caucasians In Copenhagen. *Acta Ophthalmol (Copenh)*. 1978;56(4):551-62.
- [14]. Gray Rh, Johnson Gj, Freedman A. Climatic Droplet Keratopathy .*Surv Ophthalmol*. 1992 Jan-Feb;36(4):241-53.
- [15]. S Jain, Jagat Ram, Sandeep Jain study Of Elastotic Degeneration Of The Cornea. *Ijo* .1984;32(5):378-381
- [16]. Rao Sk Fogla R, Seethalakshmi G, Padmanabhan P. Excimer Laser Phototherapeutic Keratectomy: Indications, Results And Its Role In The Indian Scenario. *Indian J Ophthalmol* 1999 :47:167-72.