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Proportions and incidence rates of corneal lesions. A comparison between two separate samples in Al-Thawra General Modern Hospital, Sana'a –Yemen

Horia Abdulla Al-Ansi [1,*] ,Amat Allateef Abu Taleb[1] ,Aziz Shaher Hameed [3] ,Abdul Razek Samara'aee[1]

1. Department of ophthalmology- Faculty of Medicine and Health Sciences- , Sana'a University, Sana'a, Yemen.
2. Department of Community Medicine, Faculty of Medicine and Health Sciences, Sana'a University, Sana'a, Yemen.

***Corresponding author:** halansi16@gmail.com*

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ABSTRACT

Many corneal lesions end in corneal blindness by opacity. Eye Bank, which is not yet available in Yemen, is the source of substituted corneal grafts to retain eye vision. This study compared percentages and incidence rates of corneal lesions in two samples of total 2600 patients in 1993 and 1440 patients in 2004 who attended the same clinic. From the total new eye patients, these with corneal lesions either isolated or combined underwent the same determinants to show demography, etiology, and laterality through documenting their basic data, full history, and examinations.

Results: Respectively among the tow samples, a total of (141) 5.42% and (135) 9.38% (belonging to (130) 5.0% and (118) 8.19% patients) had corneal lesions distributed among all age groups, with the age group of 19- 50 years constituted (66) 50.77% and (65) 55.08%. The demography in (number) percentage and incidence rates were as follows: samples were comparable higher among males in (80) 61.54%, 3.08%, and (84) 71.19%, 5.48%, monocular (130) 92.2%, 5.00%, and (118) 87.41%, 8.19%, and AGMH received (79) 66.94%, 5.49%, and (118) 87.0%**,** 8.00% of the total attendance from outside Sana'a city. Right eye was in (48) 34.04%, 1.85%, and (75) 55.5%, 5.21%. Among etiologies, the incidences were: trauma (69) 2.65%, (61) 4.24%, inflammation (36) 1.38%, 3.08%, and (18) 1.25%; both are controllable and constituted 66.7% and 51% of the total corneal lesions. Then degenerative lesions (12) 0.423%, (9) 0.625%, keratoconus (8) 0.307%, (12) 0.833%, edema (5) 0.231%, (12) 0.833%, dryness (5) 0.192%, (7) 0.278%, dystrophy (4) 0.154%, (8) 0.416%, congenital (2) 0.076%, (6) 0.416%, and tumors were only in 2004 as (2) 0.138%. *Conclusion*: The incidence rates of corneal lesions were 5.0 and 8.0%, and the proportions of the controllable trauma and inflammations were 66.67% and 51.1%, reflecting the need for wide distribution of eye health centers among the country.

CONTENTS

1. Introduction

The transparency and refractive properties of the cornea are important for clear vision in the eye. [1] As the cornea lies on the anterior surface of the eye, it protects the eye contents. [1, 2] The high sensitivity of the cornea causes painful red eyes with marked visual defects, making the recent corneal lesion present early to seek advice. [2, 3] Delay in treatment of acute corneal infection might lead to corneal opacity by scaring and even eye perforation. [4]

The epidemiology of corneal blindness is diverse and highly dependent on the ocular diseases that are endemic, works, remedies value, and the geographical area. [3,5 - 9] The predisposing factors for corneal infections are trauma, dryness, chronic inflammation of the conjunctiva, sclera, and exposure keratitis, corneal edema, and opacity from glaucoma or anterior segment surgery. [6,10-13] Neuroparalytic (facial nerve paralysis or proptosis) by dryness or neurotrophic by de-sensitization factors both can threaten the cornea's immunity. [11]

Keratoconus is progressive corneal thinning, in which 10% of cases have family history with an autosomal dominant inheritance pattern. It handicaps young patients and needs corneal grafts. [3] Degenerative disorders such as ptreygium, Salesman nodules, allergic keratoconjunctivitis, vascularization (pannus), band keratopathy, and marginal degenerations. [1, 11] Dystrophies are uncontrollable, bilateral, inherited, and painless groups of biochemical abnormalities, presented by gradually progressing corneal haze with many histopathological patterns. They appear in the first or second decade of life and ultimately lead to blindness at various ages; stromal dystrophies appear at 40 to 50, epithelial in younger ages, and endothelial may be younger if congenital or older ages if acquired. [1, 11, 15-18]

Corneal esions such as tumors (benign limbal dermoid or malignant epithelioma) and congenital as megalo/mmicro-cornea, congenital glaucoma, and metabolic disorders are uncontrollable but infrequent lesions. [1, 11- 16] Diseases affecting the cornea are major causes of blindness worldwide, second to cataracts and glaucoma in overall importance. Trauma and infection are still important preventable causes of corneal blindness worldwide. [4, 6, 8, 17, 18] Traditionally, the diseases responsible for an increase in prevalence of corneal blindness in some populations that got benefit from controlling programs included trachoma, onchocerciasis, leprosy, ophthalmia neonatorum, and xerophthalmia. These were endemic and related to overall, in low- and middle-income countries, together with infectious keratitis and traditional eye medicine, the most common bilateral corneal scarring problem. [5—10, 16-18]

The aim of this study was to determine the incidence of corneal lesions among the total number of these who first attended the eye clinic in the corresponding year and analyze their demography. Special aims were to compare the etiology of corneal lesions in the two samples to see if there was any fluctuation in etiologies or new risks developed for corneal blindness, also guessing the ophthalmic practice of the hospital in that period.

2. Patient and Method

Study design and setting

It was a cross-sectional hospital-based study with no sizing but a purposive yearly sample of patients. The study suggested by the ophthalmic department. At time of sampling, the Al-Thawra General Hospital (ATGH) was the only consultant and referral medical center for justfications across Yemen. It received all eye injuries (24-hour duties) and also issued official reports as qualifying visual efficiency for legal purposes for works or court requests and ultimate abroad reports for consulting a specialized eye center for all medical branches, including ophthalmic cases.

Participants

The selection was for purposive sampling among willingness participation for this study once they met the inclusion criteria of the first attendance patients with corneal involvement lesions. Given that, our primary goal was to determine the incidence rate of corneal lesions among other eye lesions and the proportions of each lesions among all corneal lesions. No other similar studies were reported as hospital-based topics from general eye clinics. The study compared with population-based studies and hospital-based corneal graft trends and indications studies.

The samples of this study were from the same general eye clinic, in a general hospital. This study described and compared the hospital incidence rates of corneal lesions between 2 separate samples in 1993 and 2004, to show the magnitude of corneal blindness among the total new eye attendances.

This study applied the same determinants by one researcher among four duty days per week in 1993 and two duty days per week in 2004. The selection was random, with no referral, among all new eye attendances during 1 January to 31 December of 1993 and 2004 and excluded those who came for follow-up.

All new attendances were put as serial numbers, and these with corneal lesions, either isolated or combined with other eye tissues, underwent documentation of basic data, full history, and address (either from or outside Sana'a). Then subjected to examination of visual acuity by Snellen's E Chart, anterior segment evaluation by slit lamp, and posterior segment evaluation by ultrasound B-scan to determine treatment plan and prognosis. Acute lesions such as trauma, ulcer, post-surgery, and exposure keratitis followed until stability and the potential visual acuity were recorded.

The age grouping depended on activity and independence in attending medical advice, and the four social groups were: children's 1-6 years, young's 7–18 years, adults 19 to 50 years, and senile if more than 50 years.

3. Results

Table 1 and Table 2 showed in the 1993 and 2004 samples, a decade apart, the total corneal lesions incidence among the total new attendance of various eye lesions found to increase from 5.0 to 8.17% with a P-value > 0.05 (0,299).

Table 1: Respectively, in 1993 and 2004, a number of 141 eyes belonged to 130 patients; that means 11 patients had their right and left eye involved or presented with bilateral corneal lesions, from a total of 2600 patients examined during 1993. In 2004, 130 eyes belonging to 118 patients, or 17 patients, had bilateral corneal lesions, from 1440 patients examined. Respectively, in 1993 and 2004, the bilateralism among eyes was 7.80% at an incidence rate of 0.42% and 12.95% at an incidence rate of 1.18%. In terms of patients, bilateralism percentages are, respectively, 8.46% and 14.41%. The demography of the two samples was, respectively, males 80 (61.54%) and 84 (73.73%), the right eye affected in 48 (34.04%) and 75 (55.56%). Among all ages, from Figure 1, the adult's age group occupied (66) 50.77% and (65) 55.08%. The AGMH received respectively a (51) 36.1% and a (79) 66.94% from outside Sana'a city. Table 2 showed etiologies of corneal lesions (corneal opacity risk factors). The monocular corneal lesions predominate in about 92% and 87% of patients; here the affected individuals suffered visual defects and were not visually handicapped.

The rest etiologies were infrequent but seriously, both eyes affected, so handicap the patient by isolated corneal lesions as dystrophies, keratoconus, trachoma, xerophthalmia, and ultimately end in corneal

blindness. Corneal edema increased also from 0.231% to 0.833%. The new and scarred form of trachoma and xerophthalmia, both endemic in some areas, were absent in the 2004 sample, while the post-cataract surgery corneal edema and these related to contact lenses were absent in the 1993 sample. This reflected the increased facilities and standard of ophthalmic services. [3, 8, 12]

The incidence ordered, respectively: trauma, (69) 2.65%, (61) 4.24%, inflammation, (36) 1.38%, and (18) 1.25%; both are preventable and occupied 73.5% and 58.5% of the total corneal lesions, fortunately declining in 2004**.**

Figure 1: Proportions of age groups among corneal lesions

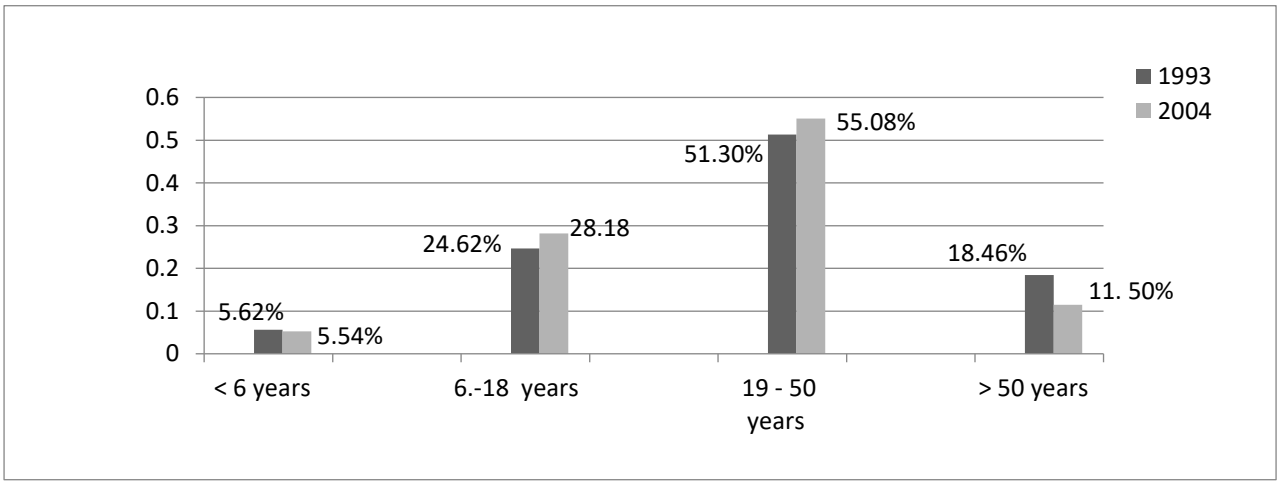

Table 1: Demography of the corneal lesions-in the respective year.

Sample	1993 2600 (No)	Proportion	Incidence	2004 1440 No	Proportion	Incidence	Chi square,	P-value
Eyes /*								
Right	(48)	34.04%	**1.85 %**	(75)	55.5%	**5.21%**	11.2	0.001
Left	(93)	65.96 %	**3.58%**	(60)	44.4%	**4.17%**		
Laterality/*								
Monocular	(130)	92.2%	**5.00%**	(118)	87.41%	**8.19%**	5.3	0.02
Binocular	(11)	7.80%	**0.42%**	(17)	12.95%	**1.18**%		
Gender								
Male	(80)	61.54%	**3.08%**	(84)	73.73%	**5.83%**	2.57	0.1
Female	(50)	38.5%	**1.92%**	(34)	28.80%	**2.36%**		
Residency								
Outside Sana'a	(113)	86.92%	**8.00%**	(79)	66.94%	**5.49%**	6.5	0.01
Inside Sana'a	(18)	13.85%	**2.36%**	(39)	33.05%	**2.71%**		
Total								
***Eyes**	**(141)**	**100%**	**5.42%**	**(135)**	**100%**	**9.38**	1.07	0.299
Patients	130		5.00	118		8.19		

Table 2: Incidence and proportions of corneal lesions attended AMGH per eyes

Total patients	1993 2600			2004 1440			Chi square,	P-value
Etiology	**No**	**Proportion**	**Incidence**	**No**	**Proportion**	**Incidence**		
Trauma	69	48.94	2.654	61	45.18	4.236	0.008,	0.927
Inflammation	36	25.53	1.385	18	13.33	1.250	3.812	0.051
Degenerative	12	8.51	0.462	9	6.66	0.625	0.00	0.995
Keratoconus	8	5.67	0.308	12	8.88	0.833	0.861	0.354
Edema	5	3.55	0.192	12	8.88	0.833	2.065	0.151
Dryness	5	3.55	0.192	7	5.17	0.486	1.121	0.484
Dystrophy	4	2.84	0.154	8	5.92	0.555	1.521	0.312
Congenital	2	1.42	0.077	6	4.44	0.416	1.479	0.224
Tumors	0	0	0	2	1.48	0.138	0.603	0.438
Total Eyes	**141**	**100**	**5.42**	**135**	**100**	**9.38**		
Patients	130		5.00	118		8.19	**1.07**	**0.299**

Table 3: Pattern of the controllable corneal lesions in the respective year of study.

Preventable corneal lesions Totals	**1993 N 94**	**(%) /141**	**Incidence /2600**	**2004 N 69**	**(%) /135**	**Incidence /1440**
Trauma:	**58**	**41.13%**	**2.231%**	**51**	**37.78 %**	**3.54%**
Perforating	28	19.86%	1.077%	32	23.70%	2.22%
With IO- FB	10	7.09%	0.385%	12	8.89 %	0.83%
Bomb explosions	7	4.96%	0.269%	2	1.48 %	0.14%
Corneal Foreign Bodies	13	9.22%	0.5%	3	2.22%	0.21%
Missed	6			2		
Trauma + inflammations	**15**	**10.64%**	**0.577** %	**12**	**8.89%**	**0.83%**
Corneal Ulcer	6	4.26%	0.231%	6	4.44%	0.42%
Cured with antibiotics	3	2.13%	0.115%	4	2.96%	0.28%
Endophthalmitis	6	4.26%	0.231%	2		
Missed	2					
Inflammations-without trauma						
Responded to antiviral	**21**	14.89%	**0.808**%	**6**	**4.44%**	**0.43%**
Old Scars	8	5.67%	**0.308**%	3	2.22%	0.21%
Secondary to Trachoma	10	7.09%	**0.385%**	3	2,22%	0.21%
	2	1.42%	**0.077**%	0	0.00	0.000
Xerophthalmia	1	0,71%	**0.038%**	0	0.00	0.000
Total	**94**	**66.67 %**	**3.62%**	**69**	**51.11%**	**4.79%**

4. Discussion

This cross-sectional study showed younger ages suffered less from corneal lesions (Figure 1), and this was comparable to a study in India that showed low vision among childhood were congenital, lens, or retinal detachment. A systematic study among Asian countries as well as other studies were comparable in their demography to Figure 1 and Table 1, the corneal blindness related more to aging, males, farmer work, low educations, and mostly monocular with significant p values. [10, 3, 17, 18]

Table 1 showed mostly males in the tow samples; the active independent adult age had

more chance for corneal lesions. However, left eye in the first sample, but right eye in the second sample. Bilateralism as indicating visual handicap increased from 7.8% to 12.9% among patients, and Table 2 showed a higher incidence of keratoconus, dystrophy, and congenital risk factors.

From Table 2: The pattern of etiology showed absent trachoma and xerophthalmia in 2004 denoted improved health level standard. Reduction of the trachomous corneal blindness also noted in all global records, due to the implementation of the SAFE Strategy (mass surgery, antibiotic distributions in endemic areas, facial washing, and improved environmental sanitation), which was responsible for blindness of 1.3 million worldwide[18].

Trauma and inflammation as interrelated and important controllable etiologies of corneal lesions worldwide. [2-18] A comment of the incidence from the total of new-coming eye patients of corneal opacities in less developed countries is uncertain, but it is reasonable to assume there were traumas associated with bacterial keratitis and fewer contact lens-related infections. [4-9]

Corneal blindness from controllable causes such as trauma, infection, corneal edema, and advanced keratoconus increases in situations of limited eye care infrastructures and the delay, incorrect, or negative patient compliance to treatments. [13] That was also clear in this study; the new attendances came from outside Sana'a city with corneal lesions in Table 1, were 87.0% in 1993 and 66.9% in 2004.

Ocular trauma is a global problem; the burden of blindness from eye injuries was most heavily felt in developing countries, with 10 to 70 times more incidence from the total of new-coming eye patients than in developed countries, especially those where war and civic unrest have left a legacy of eye trauma from weapons. [4, 5, 12, 17, 18]

Comparatively, the controllable trauma and inflammations from Table 2, in the respective years, occupied (69+ 36) 74.47% and (61+18) 58.51% of the total corneal lesions, both still major causes of corneal lesions, and showed no statistical significance in Chi square and P-values (0.008 and 0.927 for trauma and.812 and 0.051 for inflammation). The quality of eye health and/or less eye facilities among the country being restricted to the main cities. In the other hand, efficient antibiotics, less traditional remedies, and more qualified ophthalmologists were positive factors.

A countrywide population-based survey with a peaceful history reported that trauma was responsible for 7.7% of all monocular blindness. In the developing countries, injuries are usually associated with agricultural work, but a much higher rate of ocular trauma can occur in specialized situations, such as foundries: an 11% eye-injury rate reported in foundry workers in Saudi Arabia. [3,8, 17,18] Corneal ulceration in developing countries has only recently been recognized as a silent epidemic. [2, 7, 9]

Keratoconus is infrequent and affects approximately 1 in 2000 and has a worldwide distribution in all races. Dystrophy has also rare incidences, with no racial predominant. Sjogren's syndrome (salivary and lacrimal xerosis) is 1%–2% of the general population. [11, 12]

Table 2, as this study is hospital-based, shows that keratoconus and other uncontrolled corneal lesions as dystrophies had a less than 0.308 and 0.833 incidences from the total in 1993 and 2004, respectively. Their burden is for bilateral eye presentation and affect young's; let them be visually handicapped and mandate treatment more than unilateral corneal lesions, who can work by the other healthy eye, and many were not involved in this study, as they did not have

medical consultations for the absence of an eye bank in the country.

Table 1 showed tumors newly lesioned (0.1%) in the 2004 sample; in the general population, both epithelioma of the conjunctiva and cornea have a prevalence of 2 in 100.000, although new risks might increase for metaplasia increased by aging and in years thereafter. Pseudo-phakic bolus-keratopathy and corneal edema increased from 0.231% to 0.833%, raising suspicion of new corneal lesions risks by more rates of anterior segment surgeries. [13]

The extra-capsular cataract extractions are a cataract surgery introduced in the hospital after 1991 (a decade later, the phacoemulsification), and corneal edema was seen in 2004 more than in 1993, when extra-capsular cataract extractions were routine procedures. [13]

Table 2 showed in the 2004 sample, there was an increase in the proportion of corneal disorders by 1.72 X. Table 3 showed an increase in trauma proportion by 1,6 X. The tumors & endothelial decompensation show higher by 16%.

Some private eye centers import corneas for grafting from time to time; otherwise, patients have to travel outside the country.

There will be an increased need for Eye Bank to provide donor corneas and treat the increasing corneal blindness in the future because of the increasing population and higher age expectancy, admitting more cataract surgery. [13]Increasing myopia also among population with proportionated corneal blindness from corneal ectasia from refractive surgery and the high proportions of corneal traumas as well as the isolated corneal dystrophies. [14-16] Rehabilitation of corneal lesions among bilateral deep amblyopia in very young age by a special blind school institution and by cosmetic artificial eye, if accompanied by eye atrophy due to severe trauma. [2, 5-8, 10]

Among Asian countries, a population-based systematic study showed the prevalence of moderate to severe visual impairment due to cornea diseases was 0.4%, with 20 folds variation from country to country according to their own level of ophthalmic management infrastructure. [17] This study is hospital-based, and the incidence rate was 8.0%. In Nigeria, corneal blindness was 1.1% in the community and accounted, as in this study (Table 1), for 9.6% bilateral and 20.4% unilateral corneal blindness, and it was greater among males, farmers, and lower educational status. [18]

5. Conclusion

The corneal lesions incidence varied by time, place, and type of the study, as well as by the efficiency and feasibility of the ophthalmic services. In 1993 and 2004, the incidence rates of corneal lesions were 5% and 8.17%, respectively, in the same major referral hospital in Sana'a city. The hospital received 87% and 67% of cases from outside the city. The controllable trauma and inflammations were responsible for 66.67% of corneal lesions and 51.1%. The study showed declined trachoma, acute nutritional etiology, and appearance of corneal edema secondary to anterior segment surgery, which indicate improving general health state. Eye Bank, which is not available in Yemen, provides feasible corneal grafts from local donors that would treat and decrease corneal blindness in the future.

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