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FREQUENCY OF RISK FACTORS OF INFECTIOUS KERATITIS IN TERTIARY CARE HOSPITAL IN HYDERABAD, PAKISTAN

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ABSTRACT

Objective: To determine the frequencies & association of different risk factors of bacterial keratitis followed by healing in patients visiting ophthalmology department of Liaquat University of Medical & Health Sciences (LUMHS) Hyderabad.

Study Design: Prospective case series.

Place and Duration of Study: The study was carried out from May 2013 to October 2013 in the Department of Ophthalmology, Liaquat University of Medical & Health Sciences (LUMHS) Hyderabad.

Material and Methods: During the study period of 6 months 152 patients with bacterial keratitis were purposively sampled keeping in view the eligibility criteria. Variables studied were age, gender, site of eye (right or left), risk factors of keratitis and healing. Frequencies of different variables were analyzed through SPSS version 20 and *p*-value of <0.05 was considered as significant.

Results: The results showed that males were more prone to corneal ulcers than females. Trauma was the most common risk factor followed by contact lenses, topical steroids, ocular surface diseases and previous corneal surgeries. Complete healing of the corneal ulcer was recorded in 84% cases. There was statistically significant association of risk factors with trauma (*p*-value=0.04), contact lens (*p*-value=0.00001), ocular surface disease (*p*-value=0.031), topical steroids (*p*-value=0.05) and previous corneal surgery (*p*-value=0.01).

Conclusion: The study concluded that trauma is the leading cause for the bacterial corneal infections. Males are more prone to have bacterial keratitis in the age group of 31-40 years mostly affected. There is statistically significant association of risk factors like trauma, contact lenses, topical steroids, ocular surface diseases and previous corneal surgery with healing.

Keywords: Bacterial keratitis, Corneal Ulcer, Risk factors, Healing.

INTRODUCTION

One of the major public health problems worldwide is corneal blindness and the majority of the cases result from infectious keratitis[1]. Bacterial infections of cornea are relatively infrequent in the developed world, but unfortunately they constitute major proportion of ophthalmic disorders in the developing world[1]. They are considered to be one of the major cause of monocular blindness in the low middle income countries[2]. These infections can cause devastating damage if allowed to progress unchecked[3]. There is significant difference in the epidemiological pattern of corneal ulcer patients from country to country and more so in different regions[3]. The family sufferings are huge if morbidity occurs in the productive age group as evidenced in the study carried out in Nepal[3]. The study also labelled bacterial keratitis as an "Silent Epidemic" of the under developed countries[3].

According to Medicine net, Keratitis is defined as, "Inflammation of cornea that may result from infection, abrasion, trauma or some kind of underlying pathology like Sjogren's Syndrome or lupus ultimately leading to blindness"[4]. Corneal ulcer is a non-specific term, and includes both non infectious and infectious keratitis cases, although more precise term such

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as microbial keratitis is gaining acceptance[5]. Majority of the patients with infectious keratitis have bacterial etiology[5].

The conjunctiva and its adnexa are usually sterile at birth and are rapidly colonized by saprophytic bacteria[6]. Bacterial keratitis rarely occurs in the normal eye because of the human cornea's natural resistance to infection. The presence of these micro organisms in the normal, uninfected conjunctival sac, provides a constant reservoir of potentially pathogenic bacteria capable of causing serious ocular infections once the normal protective mechanisms of the cornea are breached[6]. Some organisms such as Neisseria gonorrhea, Neisseria meningitides, Corny bacterium diphtheria, Listeria, and Shigella can directly penetrate an intact epithelium[7]. However, the predisposing factors, may also alter the defense mechanisms of the ocular surface and permit bacteria to invade the cornea[7].

The most common risk factors associated worldwide with bacterial keratitis are, wearing contact lenses, trauma, changes in ocular surface may be due to blepharitis penetrating keratoplasty or dry eye and any other systematic disease[5]. Eye pain, blurred vision and photophobia are the major complains of the patients and they heavily depend upon the aggression of the etiologic agent[5]. Bacterial Keratitis can occur in any part of cornea but the most lethal one is the infection of central cornea. Scarring of central cornea can lead to complete visual loss; However, some bacteria can also invade the intact epithelium[8].

Bacterial keratitis remains the most common cause of irreversible blindness due to corneal diseases throughout the globe. It is estimated that the incidence of bacterial keratitis in United States is 11 per 100,000 inhabitants[5]. A cross sectional study in Saudi Arabia showed that the most of the study subjects with the bacterial keratitis have the history of using contact lenses frequently followed by the other risk factors such as trauma, ocular surface disease and ocular surgery[9]. Similar results were recorded in research carried out in Nepal which also revealed that males working in vegetables fields were mainly the patients of bacterial keratitis due to vegetative trauma. The study further revealed that there was association between visual outcome with those who cases presenting before or after 7 days of developing the disease[10].

Therefore, the present study aimed to determine the frequencies & association of different risk factors of bacterial keratitis followed by healing in patients visiting ophthalmology department of Liaquat University of Medical & Health Sciences (LUMHS) Hyderabad.

MATERIAL AND METHODS

A prospective case series study was performed from May 2013 to Oct 2013 at Eye Hospital LUMHS Hyderabad. With frequency of 17.2%[11], precision level 6% and confidence interval of 95% the sample size came out to be 152 through OPEN EPI software. The sampling technique used was non-probability convenient sampling. All those patients who were diagnosed with bacterial keratitis were included in the study. Whereas, those patients with Endophthalmitis, Panophthalmitis or having multiple caused of keratitis were not included in the study. Patients underwent from general OPD of LUMHS Eye Hospital after their informed consent. Detailed history was recorded regarding causes including previous ocular surface disease history, trauma, use of topical steroid, contact lens wear and any previous ocular surgery. Patients were undergone comprehensive slit lamp bio microscopy of the anterior segment and the corneal epithelial defect was measured in millimeters with the help of slit lamp. Corneal scrapings were taken from the base of the ulcer under topical anesthesia (alkane) with a bent tip 26-gauge hypodermic needle in the laboratory and the sample was immediately examined under electron microscope and the diagnosis of bacterial keratitis was established. Patients were then admitted and healing was assessed at the end of treatment (within 3 weeks). Outcome was

labeled successful if cornea healed without complications.

Data were entered into SPSS (Statistical Package for Social Sciences; version 20.0) and manually verified for the data entry errors. The same software was used to analyze the data. Frequencies were calculated for age, gender, site of eye (right or left), risk factors of keratitis and healing. A *p*-value was calculated for association by applying Chi-square test.

RESULTS

A total of 152 patients were included in the study according to the set criteria. The patients were divided into 4 age groups. The mean age ± SD (range) of the patients was 41.26 ± 2.63 (20 to 60 years). Majority of the patients 68 (44.7%) belonged to age group of 31-40 years followed by 33 (21.7%) in 41-50 years, 28 (18.4%)% in 21-30 years and 23 (15.1%) category. Males were more prone to corneal ulcers than females. Approximately 87 (57%) of patients were having bacterial keratitis in their right eye while remaining 65 (43%) had their left eye infected (table-I).

Trauma was the most common risk factor and this was encountered in 102 (67.1%) patients.

There was statistically significant association of risk factors such as trauma in 95 (74.2%, n=128)

Table-I: Epidemiological Characteristics and Site of Keratitis of study population (n=152).

Age (In years)	Indicator	No (%)
	20-30	28 (18.4)
	31-40	68 (44.7)
	41-50	33 (21.7)
	51-60	23 (15.1)
Sex	Male	119 (78.2)
	Female	33 (21.8)
Site	Right Eye	87 (57.2)
	Left Eye	65 (42.8)

Table-II: Frequency of predisposing factors & healing in patients of keratitis (n=152).

Predisposing Factors	Particulars	No (%)
	Trauma	102 (67.1)
	Contact lenses	18 (11.8)
	Topical steroids	15 (9.8)
	Ocular surface disease	14 (9.2)
	Previous corneal surgery	03 (1.9)
Healing	Healed	128 (84.2)
	Not healed	24 (15.8)

followed by contact lens 13 (10.1%, n=128), ocular surface disease in 9 (7.0%, n=128), topical steroids in 10 (7.8%, n=128) and previous corneal surgery in 1 (0.8%, n=128) between healed and unhealed cases. (p-value<0.05)

Table-III: Outcome of patients with risk factors and healing.

Risk Factors	Healed (N=128)	Not Healed (N=24)	Total (N=152)	*p*-value
	No (%)	No (%)	No (%)	
Trauma	09 (7.0)	05 (20.8)	14 (9.2)	0.04*
Contact Lenses	95 (74.2)	08 (33.3)	103 (67.8)	0.00001**
Topical Steroids	10 (7.8)	05 (20.8)	15 (9.9)	0.05*
Ocular Surface Disease	13 (10.1)	05 (20.8)	18 (11.8)	0.031*
Previous Corneal Surgery	01 (0.9)	01 (4.2)	02 (1.3)	0.01*

*p-value is statistically significant calculated by Fisher's exact test of chi square, **p-value is statistically highly significant calculated by Fisher's exact test of chi square.

Contact lenses were the second most common risk factor seen in 18 (11.8%). Topical steroids were being used by 15 (9.8%) patients followed by ocular surface diseases in 14 (9.2%) patients and only 03 (1.9%) patients had a history of previous corneal surgery. Complete healing of the corneal ulcer was recorded in 128 (84.2%) eyes out of 152 cases (table-II).

DISCUSSION

Bacterial keratitis is an ophthalmic emergency that needs immediate treatment. In the absence of laboratory diagnosis, the initial therapy is usually broad-spectrum intensive treatment. Specific therapy should be based on

laboratory data which in identify the causative agents and provide antibacterial susceptibility results[11].

In this study, the mean age of the patients was 41.26 ± 2.63 (20 to 60 years). This is in comparison to a local study conducted by Narsani *et al*. who reported mean age 43 years in his study[12]. Jin *et al*. also highlighted the age profile in their study with mean age of 41.8 years, these findings are also almost similar to our study findings[13].

Out of 152 study participants, the prevalence of microbial keratitis was more in males than in females. Relatively identical findings were reported by Chowdhary *et al*, with males affected in majority by corneal ulcers as compared to females[14]. Another study by Song *et al*, revealed that females were slightly more affected than males, which are contrasting to results of our study[15]. The increased risk in males in our country is probably due to their more active involvement in outdoor activities, which subsequently increased their vulnerability to this blinding disease.

In the present study it was found out that trauma is the commonest predisposing factor and contact lens was the second most common risk factor followed by topical steroids and ocular surface disease. Similar findings were reported by Gebremarium *et al* in their study carried out in Ethiopia with ocular trauma and blepharitis being the major contributors of infectious keratitis[16]. Wearing contact lenses was a major risk factor for bacterial keratitis in a study carried out by Ng *et al* in Hong Kong which is contrasting to the results of present study[17]. Similarly, another study carried out by Elhanan *et al* reported that contact lenses have greatly increased the risk of microbial keratitis which is estimated to be 35% with ocular surgery contributing the least[18]. In a study conducted by Idiculla *et al*. in Oman, the highest risk factor noted was steroid usage followed by ocular trauma[19]. A similar study of bacterial keratitis in Melbourne showed chronic steroid usage and ocular trauma as the major predisposing factors of keratitis[20]. Some of the relevant studies have shown that corneal injury associated with outdoor activities with plant or soil material is a major risk factor for bacterial keratitis. In a study of bacterial keratitis in northern Iran, trauma with plant debris and straws was noted in majority of patients with fungal keratitis[21]. Other predisposing factors noted were ocular surface disorders and use of native medications. A study of bacterial keratitis at Wills Eye Hospital, Pennsylvania, USA, reported chronic ocular surface disease as a major predisposing factor for bacterial keratitis among the study subjects[22].

The other major finding of this study was that complete healing of the corneal ulcer was recorded in more than two third of cases. In the study of Oladigbolu *et al*. reported a significant proportion of the patients healed with corneal opacity after treatment in their study[23]. Another study in India conducted by Bharathi *et al*. showed healing rate of more than 90% in bacterial keratitis in his study[24]. The findings of above studies are almost similar to the present study.

CONCLUSION

The study concluded that trauma is the leading cause for the bacterial corneal infections. Males are more prone to have bacterial keratitis in the age group of 31-40 years mostly affected. There is statistically significant association of risk factors like trauma, contact lenses, topical steroids, ocular surface diseases and previous corneal surgery with healing.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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