

# Clinical and demographic review of corneal ulcers in University of Ilorin Teaching Hospital

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## Abstract

**Background:** Corneal ulceration is one of the major causes of avoidable blindness and visual impairment globally. **Objectives:** The aim of this study was to analyze clinical and demographic data of corneal ulcers at the Department of Ophthalmology, University of Ilorin Teaching Hospital (UITH), Ilorin, Kwara state between 2017 and 2021. **Methods:** A retrospective survey of all cases of corneal ulcer under review period was done. Demographic and clinical data were retrieved from hospital records and analyzed using Statistical Package for Social Sciences (SPSS) version 20. **Results:** A total of 92 cases were reviewed, consisting of 66 males, majority (76.1%) are married, and traders and artisan accounted for 54.3%. The age ranges from 6 months to 78 years with 41.2 years as average. The major identified risk factors were trauma (16.3%) and harmful traditional medications (13%). Visual acuity (VA) in 82.6% of the patients at presentation was <3/60 to no perception of light (NPL), while 10.9% presented with VA of 6/6 to 6/18. The most dominant causes of corneal ulcers were microbial keratitis (72.8%) and hypopyon keratitis (12.5%). Time of onset to presentation was within 1 week in 33 patients (35.9%), 29 patients (31.5%) after a week, while others presented over a month. After treatment, VA was 69.5% (<3/60–NPL), 21.7% (6/6–6/18), and 8.7% (6/18–3/60). Five patients had evisceration, two out of which were auto-evisceration. **Conclusion:** Ocular trauma was the most common risk factor with microbial keratitis as the most dominant cause. Poor treatment outcome resulted from late presentation, use of herbal, self and over-the-counter medications. Appropriate health promotion activities need to be conducted to address the identified risk factors at all levels of care.

**Keywords:** Microbial Keratitis, Corneal ulcers, Bacterial keratitis, University of Ilorin

## BACKGROUND

Corneal ulceration is a generic term denoting a full-thickness breach in the corneal epithelium from various causes such as trauma, infection, chemical irritation, contact lens usage, or from endogenous causes in association with a systemic illness.<sup>[1–3]</sup> Corneal ulceration is one of the major causes of avoidable blindness and visual impairment globally.<sup>[3–6]</sup> The number of corneal ulcers occurring annually in the advanced society are easily addressed by early detection and adequate treatment, while in developing nations it is becoming a “silent epidemic” with the numbers approaching 1.5 to 2 million.<sup>[5,7]</sup>

According to the Nigerian National Survey of Blindness and Visual Impairment, corneal scarring from all causes was responsible for 7.9% of blindness in the country, 26.7% of patients with corneal ulcer were of undetermined cause.<sup>[3],[8],[9]</sup>

Common risk factors associated with corneal ulceration in low-income nations include trauma majorly from vegetative matters, dry eyes, ocular surface disorders, use of harmful traditional medicine, delay in seeking health care, and systemic diseases or immunosuppression.<sup>[3],[5],[8]</sup> In advanced nations, contact lens wear is associated with risk of developing corneal ulceration.<sup>[5],[8]</sup> Quite a number of studies have been carried out on corneal ulcer globally; however, there’s paucity of data locally with regard to demographic profile of patients as well as characterizing the associated risk factors in them.

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The aim of this study was to analyze clinical and demographic data of patients with corneal ulcers at the Department of Ophthalmology, University of Ilorin Teaching Hospital (UITH), Ilorin, in order to aid strategies for improved level of care and prevention of complications and associated blinding sequelae of corneal ulcers.

## MATERIALS AND METHODS

A retrospective survey of all cases of corneal ulcer that were seen between 2017 and 2021 at UITH was carried out. Medical records of patients were retrieved and demographic information including age, sex, marital status, and occupation was noted. Clinical information on visual acuity (VA) at presentation, risk factors, diagnosis, management challenges, and treatment outcome were also retrieved and entered into the study pro forma. Patients with incomplete data were excluded. These data were analyzed using the Statistical Package for Social Sciences (SPSS) version Statistics 20.

The routine evaluation in the eye clinic of corneal ulcers included detailed history on presenting complaints, duration of symptoms prior to presentation, evaluation for possible risk factors, medications and other substances in use prior to presentation and systemic illnesses. The affected eye is examined, noting the VA, the size, location, and other parameters of the ulcers with appropriate drawings. Staining is done where necessary, swab or cornea scrapings (as applicable) are obtained for microscopy culture and sensitivity when microbial keratitis is suspected. Medications are commenced as appropriate for the diagnosis. In microbial keratitis response to medications and results of sensitivity tests are used to make further treatment decisions. Patients with corneal ulcers >2 mm in

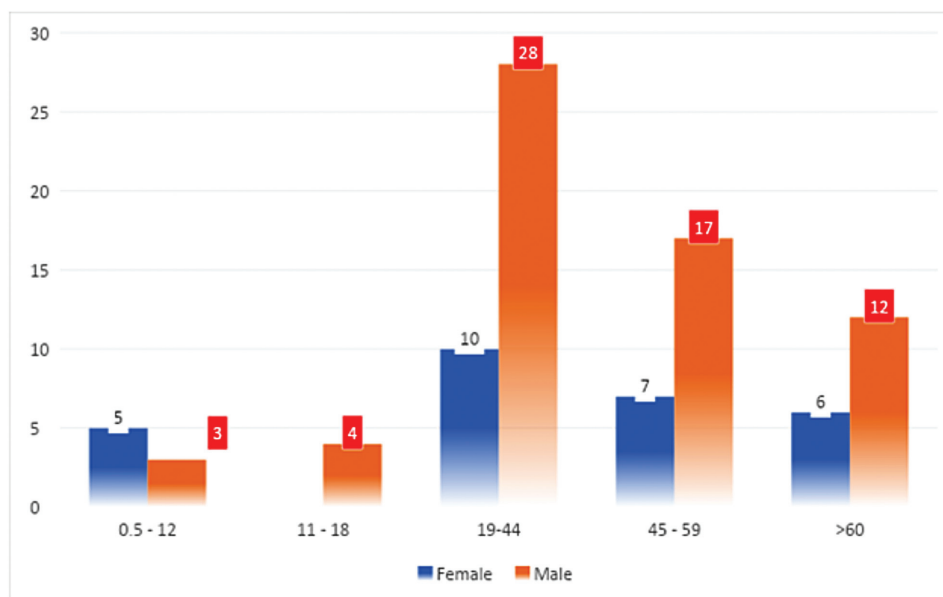
diameter, centrally placed ulcers and bilateral ulcer cases are routinely admitted.

## RESULTS

A total of 98 cases presented within the study period, but only 92 patients had complete records. Their age ranged from 6 months to 78 years, and the mean age was  $41.2 \pm 19.1$  years. The most active and economically viable age categories (19–59 years) constituted 68.9% of the entire patients under study. There were 66 males (71.7%) with a female to male ratio of 1:2.3; however, below the age of 12 years there were more females with a ratio of 1.7:1 [Figures 1 and 2]. The majority (76.1%) of the patients were married. The majority of the affected individuals were traders, artisans, civil servants, students, and farmers. Details of the demographic profile of the patients are shown in Table 1.

The identified risk factors were trauma 15 (16.3%), herbal and home harmful remedies 12 (13%), foreign bodies 10 (10.9%), ocular allergy (5.4%), and others include previous corneal opacity and pterygium surgery (4.3%), recurrent corneal erosion (3.3%), and use of over-the-counter medications (4.3%). Risk factors could not be ascertained in 33 (35.9%) patients. Etiological factors are as shown in Table 2. Time of onset to presentation was within 1 week in 33 patients (35.9%), while 29 patients (31.5%) presented after a week, and the others presented more than a month after onset (29.3%). There was no record of the time of presentation in three patients (3.3%).

At presentation, 82.6% of the patients presented with VA of <3/60, while 6 (6.6%) presented with a vision of no perception of light (NPL) in the affected eye. Following treatment, the number of patients with VA <3/60 reduced to 69.5%. The comparison of the distribution of VA at



**Figure 1:** Gender pattern of distribution of corneal ulcer among different age categories.



**Figure 2:** (a) Patient with left hypopyon ulcer following trauma with history of use harmful traditional medicine. (b) Case of corneal ulcer with auto-visceration at presentation. (c) Peripheral cornea ulcer. (d) Bilateral Mooren ulcer, RE healed with scarring, LE perforation and uveal prolapse at presentation. LE = Left Eye, RE = Right Eye.

**Table 1: Demographic Profile of Patients.**

Item	Categories	Number of Patients	
		Frequency ( <i>n</i> = 92)	%
Age (years)	Mean ( $\pm$ SD)	41.2 $\pm$ 19.1	
	Minimum	0.5	
	Maximum	78	
Age categories (years)	0.5–18 (Children)	12	13.3
	19–44 (Young adults)	38	42.2
	45–59 (Middle-aged adults)	24	26.7
	>60 (Old adults)	16	17.8
Sex	Female	26	28.3
	Male	66	71.7
Marital status	Married	70	76.1
	Single	20	21.7
	Widow	2	2.2
Occupation	Trader	34	36.8
	Artisan	16	17.5
	Civil servant	12	13.1
	Student	8	8.7
	Child (underage)	8	8.7
	Farmer	10	10.9
	Driver	4	4.3

**Table 2: Etiologic Pattern and Risk Factors among Patients with Corneal Ulcers.**

Categories		Frequency (n = 92)	%
Diagnosis	Microbial corneal ulcer	67	72.8
	Hypopyon keratitis	11	12.5
	PUK	2	2.2
	Shield ulcer (vernal)	4	4.3
	Disciform ulcer	2	2.2
	Traumatic corneal ulcer	2	2.2
	Others*	4	4.3
	**Correspondence to Endophthalmitis, panophthalmitis, anterior staphyloma, auto-evisceration		
Risk factors	Trauma	15	16.3
	Harmful traditional medicine	12	13.0
	Foreign body	10	10.9
	Allergy/vernal	5	5.4
	Previous opacity and pterygium surgery	4	4.3
	Recurrent corneal erosions	3	3.3
	Use of over-the-counter medications	4	4.3
	Others*	6	6.6
	Unidentifiable/unknown	33	35.9

PUK = peripheral ulcerative keratitis. \*\*\*Correspondence to Others include poor ocular hygiene (2.2%), recurrent ocular infection (2.2%), and genital infections prior to ocular problem (2.2%).

**Table 3: Comparison Distribution of Visual Acuity at Presentation with Visual Acuity after Treatment among the Corneal Ulcer Patients.**

	At Presentation		Post-treatment	
	Frequency (n = 92)	%	Frequency (n = 92)	%
6/6-<6/12	7	7.6	6	6.5
6/12-<6/18	3	3.3	14	15.2
6/18-<6/60	2	2.2	6	6.5
6/60-<3/60	4	4.3	2	2.2
3/60-LP	70	76.1	50	54.3
NPL	6	6.5	14	15.2

NPL = no perception of light, LP = Light Perception.

presentation with post-treatment VA is represented in Table 3. Changes in VA, represented as either loss or gain in VA lines on the standard clinical Snellen’s chart is depicted in Table 4. Figure 2 showed some pictures at presentations.

Five of the patients with NLP with cogent indications had evisceration, two out of which were autoevisceration. Other significant outcomes include corneal scarring, and phthisis bulbi.

The microbial isolates that were reported among 56 of the cases (47 had corneal swab and 9 cases had corneal scrapping) were *Fusarium solani* in 2 (2.2%), others include *Staphylococcus aureus* and *Pseudomonas aeruginosa* (1.1% each). This gives a culture positivity of about 4.5% in this study.

## DISCUSSION

As earlier noted, corneal ulcer is a silent epidemic in the low- and middle-income countries (LMICs). Evidence abounds that early intervention coupled with appropriate treatment will go a long way to minimize both the visual and economic impact of the sequelae of this important condition.<sup>[5],[10]</sup>

**Table 4: Pattern of Change in Visual Acuity after Treatment among Patients.**

Change in VA Following Intervention		
<i>n</i> = 92		
Loss of more than four but less than 1 Snellen line	6	6.6
Loss of between 1 Snellen line to no change in VA	54	59.3
Gain of one or more but less than three Snellen line	7	7.7
Gain of three or more Snellen line	24	26.4

VA = visual acuity.

All age groups are often affected by corneal ulcer as we have been able to demonstrate but the more active, economically viable age categories are more affected.

The clinicodemographic pattern of corneal ulcer has been shown to have geographical variations. This pattern in LMICs is characterized by a male preponderance with majority of patients being farmers.<sup>[1],[5],[10-13]</sup> The male to female ratio of 2.3:1 obtained in this study is in agreement with quite a number of previous studies which show a higher male percentage.<sup>[5],[11]</sup> However, the ratio in this study is higher

than those obtained in the earlier studies. The average ratio in most studies lies in the range of 1.4/1.5:1.<sup>[1–13]</sup>

Mean age in this study is 41.2 years with a range of 0.5 to 78 years. This finding is within the age brackets reported by other studies from the LMICs. Kampitak *et al.*<sup>[1]</sup> reported mean of 43 years, Adamu<sup>[12]</sup> reported 39 years while in an earlier study carried out at UITH, Saka *et al.*<sup>[13]</sup> reported a range of 0.5 to 80 years with mean age of 36.9 years, where most of the corneal ulcers reported were microbial in nature being related to outdoor or agrarian occupations. The study by Saka was mainly on microbial keratitis.

Furthermore, the age distribution in this study is also similar to findings in other corneal ulcer studies with a preponderance in the active economically viable age brackets, especially in the LMICs.<sup>[1],[5],[10],[11]</sup> The peak age bracket in this study is 19 to 44 years (42.2%). Saka *et al.*,<sup>[13]</sup> also at UITH reported peak age at 21 to 40 years, while 21 to 60 years age bracket of participants were half (50%) of the entire study population. Similarly, Kampitak *et al.*<sup>[1]</sup> reported peak age between 21 and 30 years, while the age category of 21 to 50 years constitute 56% of the total participants. On the other hand, Mourad *et al.*<sup>[14]</sup> in a study on corneal ulcer at the El-Minia University Teaching Hospital in Malaysia reported peak age of incidence those older than 60 years and age category of 50 years and above constitute 70% of the entire study population. The study, however, was limited to only infective corneal ulceration with other causes excluded. Other studies have corroborated higher prevalence of infective corneal ulcers in the older age brackets,<sup>[15]</sup> or bimodal.<sup>[16]</sup>

The most common occupations were traders, civil servants, students, and farmers. Studies have shown that in LMICs, these outdoor occupations and agrarian work have predisposition to developing corneal ulcerations.<sup>[5],[13],[17]</sup>

Common risk factors observed in this study include trauma, (which was the most common) use of herbal preparations, home remedies or over-the-counter medications, foreign bodies, previous corneal opacity due to herpes simplex virus (HSV), previous measles especially in children, ocular allergy, ongoing genital infection, and recurrent corneal erosion. These findings are in consonance with similar studies on corneal ulcers.<sup>[1],[5],[11],[12]</sup> However, Taneja *et al.*<sup>[18]</sup> reported that the most important risk factor in their study was trauma by vegetative matter. This vital finding may be unwittingly present among the risk factors itemized as trauma in this study. In resource-poor countries a substantial number of patients are farmers, another subset whose trauma may not be related to vegetative matter might have applied traditional herbal medicine prior to presentation. These cases are oftentimes underreported in our clinical documentation due to denial or some other reasons.<sup>[2],[8]</sup> Use of traditional herbal medicine, in addition, contributes significantly to delayed presentation which is another risk factor.<sup>[8],[11],[12]</sup>

However, in comparison with other climes,<sup>[2],[10],[13]</sup> cases of contact lens-associated corneal ulcer are common especially in females, with respect to both medical and social indications.<sup>[11],[14]</sup> No case of contact lens-associated corneal ulcer was seen in this present study.

There was a reduction in the number of patients with VA worse than 3/60 in the affected eye preintervention (89.2%) compared to the same category of patients postintervention (69.5%). Other outcomes include phthisis bulbi and perforation, while a majority of the patients ended up with corneal scarring. This appears to be the common pathway for cases of corneal ulcer in the LMICs based on evidence.<sup>[1],[5],[11],[12]</sup>

With respect to etiologic profile of corneal ulcers, microbial keratitis is the most common cause. This might be due to bacteria, mixed bacterial and fungal, and cases of viral with secondary bacterial infections. Diagnosis of fungal and viral keratitis were made mainly on clinical rather than via the laboratory among patients under review (14, 15.2%). This was because corneal scrapping could not be done in some cases due to complication at presentation or because no isolates were obtained from specimens of these patients or both. In this series, 56 had swab or cornea scraping with positive yield in only 4.5%. Above findings were in line with what is obtainable from studies carried out in resource-limited centers like ours.<sup>[5],[10–12],[14]</sup>

As highlighted above, the majority of patients under review presented late with only 37.1% presenting within a week after onset of symptoms. Factors that have been reported to be associated with late presentation in them include use of nonefficacious alternatives such as the over-the-counter medications, herbal concoctions, or even harmful options as in use of steroids, traditional practices such as instillation of urine, breast milk, extracts from herbs, and so on.<sup>[8]</sup>

## CONCLUSION

This study has demonstrated that corneal ulcer is a challenging, prevalent ocular condition causing significant visual loss that is not easily amenable to treatment in the LMICs. However, appropriate health promotion activities such as mass health education via electronic, print, or social media, to address the identified risk factors, discourage harmful activities that either delay early presentation or worsen the condition of patients at all levels of care can reverse this ugly trend. Early presentation, with uncomplicated and uncontaminated lesion will ensure better yield in microscopy culture and sensitivity. These measures will help to curb the trend as well as ensure improved treatment outcomes.

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## Conflict of Interest

There is no financial support was received for this submission and none of the authors has any proprietary interest or conflict of interest with the submission. The authors had unimpeded access to research facilities, and the results obtained are the true reflections of the outcome of this research.

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