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Assessment of Patient Awareness of Risk Factors and Preventive Measures for Corneal Ulcers and Its Association with Hospital Length of Stay: A Cross-Sectional Study

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ABSTRACT

Corneal ulcers remain a leading cause of preventable visual impairment worldwide, most commonly arising from infection, trauma, or poor contact lens hygiene. This study aimed to assess patients' awareness of corneal ulcer risk factors and preventive measures and to examine its relationship with hospital length of stay. A descriptive cross-sectional analytical study was conducted among 102 inpatients at Jeddah Eye Hospital, Saudi Arabia. Data were collected in 2025 using a validated, researcher-developed 28-item questionnaire assessing awareness of risk factors, preventive measures, and general awareness related to corneal ulcers. Participants demonstrated moderate overall awareness ($M = 1.24$, 62%), with the highest scores in general awareness (66.5%) and the lowest in risk-factor awareness (57.5%). Awareness correlated negatively with hospital length of stay ($r = –0.210$, $p = 0.034$) and number of admissions ($r = –0.436$, $p < 0.001$). Education level positively predicted awareness ($\beta = 0.280$, $p = 0.006$), whereas age showed a negative effect ($\beta = –0.259$, $p = 0.011$). Awareness was significantly higher among urban residents ($p = 0.021$). Strengthening targeted educational interventions, particularly for older adults, rural residents, and individuals with lower educational levels, may significantly enhance preventive behaviors, promote timely medical consultation, and reduce hospital length of stay among patients with corneal ulcers. Integrating structured patient education into routine ophthalmic care and discharge planning could further improve clinical outcomes and support sustained eye-health awareness.

Keywords: Awareness; Preventive measures; Corneal ulcer; Health education; Hospital stay

INTRODUCTION

Corneal ulcers represent a major ophthalmic concern and a leading cause of preventable visual impairment globally [1]. They result from disruption of the corneal epithelium accompanied by tissue necrosis and inflammation, most commonly due to infectious agents such as bacteria, fungi, viruses, or parasites [2]. Other significant

contributors include trauma, contact lens misuse, and ocular surface disorders [2,3]. If not treated promptly, corneal ulcers can lead to scarring, perforation, or permanent vision loss [4]. Contact lens wear, corneal abrasions, and ocular trauma remain common precursors of corneal injury, with contact lenses contributing to surface disruption and increased infection risk [5]. Pretreatment and centrally located ulcers are associated with poorer clinical outcomes, whereas culture-positive ulcers generally show greater improvement [6]. Corneal ulcers impose a considerable burden on both patients and healthcare systems. Akosman et al. [7] found that patients hospitalized for more than four days incurred substantially higher costs than those discharged within four days or less (median $79,504 [mean $86,719] versus median $26,474 [mean $20,743]). Although average hospital stay durations have been reported, they vary widely by individual factors and institutional practices, making length of stay a useful indicator of disease burden. Extended hospitalization is often linked to ulcer severity, systemic comorbidities and social determinants of health. Conditions such as dementia, diabetes and alcohol abuse have been shown to increase the risk of prolonged hospital stays [7]. Ocular conditions also play a critical role. Trauma is a common antecedent, and typical presenting symptoms include ocular pain, redness, photophobia and reduced visual acuity, each of which can affect the intensity and duration of required care [8]. A study from Jimma University Medical Center, Ethiopia, identified ulcer perforation at admission, comorbidities, poor treatment adherence, traditional medicine use and ulcer depth as predictors of poor treatment outcomes which could lead to longer hospital stays [9]. Most corneal ulcers resolve with appropriate medical management, but complications often arise from delayed presentation and the indiscriminate use of traditional eye remedies, which can lead to visual impairment [10]. Effective prevention requires timely medical intervention and active patient participation. Emerging evidence underscores the importance of patient awareness in mitigating risk. For instance, Mack, Fazal and Watson [11] highlighted general practitioners' responsibility to educate patients, especially contact lens users about proper hygiene practices. Hicks et al. [12] identified limited patient awareness as a major barrier to follow-up care, suggesting that insufficient understanding of the condition hinders treatment adherence and worsens outcomes. Kresentia and Surya [13] similarly reported delayed symptom recognition and insufficient medical attention leading to disease progression, and Byanju et al. [14] found a strong correlation between lower education levels and ulcer development. Taken together, the reviewed evidence emphasizes the importance of evaluating patient awareness in promoting early detection, adherence, to preventive measures, and reduced disease burden for both individuals and healthcare systems. However, despite these insights, limited research has examined how patient awareness of corneal ulcer risk factors and preventive behaviors influences hospitalization outcomes. Understanding this relationship is crucial because awareness likely affects consultation timing, treatment adherence and disease progression. Addressing this gap will support the development of targeted educational, clinical, and policy interventions. This study aimed to assess patients' awareness of risk factors and preventive measures for corneal ulcers and to determine how this awareness relates to the duration of hospitalization. Specifically, it sought to (1) evaluate patients' understanding of corneal ulcer risk factors and preventive practices, (2) examine the correlation between patient awareness and hospital stay, and (3) identify demographic and clinical factors linked to variations in awareness and prolonged hospitalization.

SUBJECTS AND METHODS

Study Design

This study utilized a quantitative, descriptive, cross-sectional analytical design to explore patients' awareness of risk factors and preventive measures related to corneal ulcers among patients admitted to Jeddah Eye Hospital.

Study Setting

The study was conducted in Jeddah, located in the Makkah region of Saudi Arabia, from January 1 to September 30, 2025, at Jeddah Eye Hospital, the main governmental specialized healthcare facility providing ophthalmic care in the city.

Study Sample

This study included all patients admitted with a diagnosis of corneal ulcer at Jeddah Eye Hospital during 2024. A total of 150 patients were initially identified; however, after applying the inclusion and exclusion criteria, only 102 met the eligibility requirements. The remaining patients were excluded because they did not meet the inclusion criteria or were unavailable for participation at the time of data collection. Data collection and analysis were conducted in 2025. A census sampling technique was employed, which involves including all individuals within the defined target population rather than selecting a subset. This method ensures complete representation of all eligible patients [15].

Inclusion and Exclusion Criteria

The study included patients who were admitted to Jeddah Eye Hospital between January 1, 2024, and December 30, 2024, with a confirmed diagnosis of corneal ulcer. Eligible participants were adults aged 18 years and above who were available for follow-up and able to participate at the time of data collection in 2025, and who had provided informed consent prior to inclusion in the study.

Individuals were excluded from the study if they did not have a confirmed diagnosis of corneal ulcer, had a diagnosis but were not admitted to the hospital, were no longer accessible for follow-up (including those transferred, discharged to other facilities, or unavailable during data collection), or declined to participate. Patients who were unable to respond due to cognitive or communication impairments were also excluded.

Study Instrument

Instrument Development

A structured questionnaire was developed by the researcher based on an extensive review of the relevant literature, particularly studies [11,14,17]. Item content was informed by prior literature and reviewed by subject-matter experts to ensure content validity. The questionnaire consists of two main parts. The first part collects demographic and clinical information that may influence patients' awareness and hospital stay. This part includes items related to gender, age group, marital status, educational level, occupation, area of residence, primary reason for hospital admission, whether the corneal ulcer was documented as the primary diagnosis, and the length of stay in the inpatient department. The second part was developed to evaluate patients' awareness of risk factors, preventive measures, and general awareness related to corneal ulcers. It comprises 29 close-ended statements divided into three-dimension awareness of risk factors (12 items), awareness of preventive measures (12 items), and general awareness of corneal ulcers (5 items). Participants respond to each item using one of three options: True, Not sure, or False.

Each item in the awareness questionnaire was scored using a three-point scale: 2 points for a correct response, 1 point for a "Not sure" response, and 0 points for an incorrect response. The total score for each item was calculated by applying a weighted frequency formula, as follows:

$$Total\ Score = (0 \times Frequency\ of\ Incorrect\ Answers) + (1 \times Frequency\ of\ Not\ Sure\ Answers) + (2 \times Frequency\ of\ Correct\ Answers)$$

For each dimension (risk factors, preventive measures, and general awareness), the raw score was calculated as the sum of item scores, where the possible maximum score is equal to 204 (102 participants x 2 max score per response). To standardize dimension results, scores were converted into percentage awareness scores using the formula:

$$\text{Awareness Percentage Per Item} = \left(\frac{\text{Item Score}}{204}\right) \times 100$$

While the total percentage determining the level of awareness for each dimension was calculated by:

$$\text{Awareness Percentage Per Dimension} = \left(\frac{\text{Sum of Percentages of All Items}}{\text{Number of Items}}\right)$$

To determine the overall level of awareness across all 3 dimensions, the total awareness percentage was derived by averaging the dimension-specific percentages:

$$\text{Overall Awareness Percentage} = \left(\frac{\text{Sum of Percentages of All dimensions}}{3}\right)$$

The awareness levels were categorized as follows: Low (L) = (0% to less than 50%), Moderate (M) = (50% to less than 75%), and High (H) = (75% to 100%) [16].

Pilot Testing (n = 30)

A pilot study was conducted with 30 patients from the same target population to assess whether all items were understandable, relevant, and appropriate for the intended participants before initiating the main data collection. Data were collected through structured interviews conducted either in person or by telephone. Participant feedback was systematically reviewed to examine item clarity, comprehension, and overall structure. Based on these findings, minor revisions were made to enhance the precision, validity, and usability of the questionnaire for the final study.

Reliability Methods

Preliminary psychometric analyses confirmed satisfactory construct validity and internal consistency for the questionnaire. Supplementary Table S1 shows that the item–total correlations for the three subdimensions risk factors, preventive measures, and general awareness ranged from 0.310 to 0.702. This means that the construct validity is acceptable. All items demonstrated significant and acceptable correlations with their respective subdimensions and total scores, except for preventive item No. 4, which exhibited a weak correlation (r = 0.054)

and was therefore removed from the final version of the instrument. The Cronbach's alpha coefficients, as shown in Supplementary Table S2, were 0.843 for risk factors, 0.803 for preventive measures, 0.706 for general awareness, and 0.915 for the total scale. This means that the internal consistency was good to excellent. The split-half reliability coefficients (Spearman–Brown and Guttman) ranged from 0.627 to 0.925, further supporting the stability of the instrument. The self-validity coefficients (calculated as $\sqrt{\alpha}$) were 0.918, 0.896, 0.840, and 0.956, confirming the adequacy of the tool for measuring the intended constructs. After these analyses, the final version of the questionnaire had 28 questions. These were divided into three groups: 12 questions about risk awareness factors, 11 questions about awareness of preventive measures, and 5 questions about general awareness. These results collectively confirm the validity, reliability, and suitability of the instrument for use in the current study.

Data Collection

Data were collected over a two-month period from June 30 to August 30, 2025, using a cross-sectional design. Participants who had been hospitalized during 2024 were contacted in 2025 and invited to complete the questionnaire. Interviews were conducted face-to-face during hospital visits or by telephone, depending on participant availability. Informed consent was obtained prior to data collection. In addition to questionnaire responses, clinical information—such as reason for admission, length of stay, and readmission history was extracted from patients' medical records. All data were handled confidentially and in accordance with ethical research standards.

Data Analysis

Data were analyzed using IBM SPSS Statistics version 26. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize participants' sociodemographic and clinical characteristics, as well as their awareness levels across the three dimensions of risk factors, preventive measures, and general awareness. Construct validity of the Corneal Ulcer Awareness Questionnaire was assessed using item–total correlations. Internal consistency reliability was evaluated using Cronbach's alpha coefficients, and scale stability was examined through split-half reliability using the Spearman–Brown and Guttman coefficients. Spearman's rank correlation test was conducted to assess the association between total awareness scores and clinical variables, specifically hospital length of stay and number of admissions due to corneal ulcers. Independent-samples t-tests were used to compare overall awareness scores according to gender and area of residence. Multiple linear regression analysis was performed to determine the predictive effects of age and educational level on overall awareness. Additionally, one-way ANOVA was applied to examine differences in awareness across marital status and occupation groups. All analyses were performed at a significance level of $p < .05$, and results were interpreted based on the statistical significance, strength, and direction of the observed relationships.

Ethical Consideration

The study received ethical approval from the Research Ethics Committee at the Branch of the Ministry of Health in Jeddah City (Approval Date: 25/06/2025, IRB Log No: A02237). The study adhered to strict ethical standards to safeguard participants' rights, confidentiality, and anonymity throughout the research process.

RESULTS

Sociodemographic Characteristics

Table 1. Sociodemographic Characteristics of the Participants (N = 102)

Table 1 presents the sociodemographic and clinical characteristics of the participants. Slightly more than half of the participants were male (54.9%). The majority were between 18 and 60 years old, with a mean age category score of 2.95 ± 1.53. More than half were married (55.9%), and 41.2% had completed secondary education, while 24.5% held a bachelor's degree or higher. Regarding occupation, 57.8% were unemployed, and only 30.4% were employed. Most participants (84.3%) lived in urban or suburban areas. Clinically, corneal ulcer was documented as the main reason for hospital admission among 72.5% of patients. The majority (60.8%) had hospital stays of one to seven days (M = 2.21, SD = 0.63), and 67.6% had been admitted only once for corneal ulcer (M = 1.52, SD = 0.90). About 7.8% of the patients had been admitted more than three times for the same condition.

Table 2. Awareness of Risk Factors Associated with Corneal Ulcers (N = 102)

Table (2) presents the awareness levels of patients regarding the risk factors associated with corneal ulcers. The mean scores of the sub-items ranged from 0.77 to 1.64, corresponding to percentages between 38.5% and 82%, respectively; most items reflected moderate awareness, whereas a few showed either high or low awareness levels. The highest awareness was recorded for item (5), "Rubbing eyes with dirty hands can increase the risk of

corneal ulcers," with a percentage of (82 %), classified as high awareness. In contrast, the lowest awareness was found in item (10), "Not removing makeup before sleep has no impact on eye health," with a percentage of (38.5 %), classified as low awareness. The total awareness percentage for this dimension reached (57.5 %) with an arithmetic mean of 1.15 ± 0.71, indicating that patients have a moderate level of awareness regarding risk factors related to corneal ulcers.

Table 3. Awareness of preventive measures for corneal ulcers (N = 102)

Table (3) illustrates the level of awareness among the study participants regarding the steps they could undertake to prevent corneal ulcers. The means of the sub-items ranged from (1.96) to (0.76), which indicates that awareness levels varied between 98% and 38% across the preventive items. These findings demonstrate a noticeable variation in awareness of the sub-items related to preventive measures, ranging from high to low. The highest-rated item was item (1), which states, "Washing your hands before touching your eyes helps prevent infections," with a percentage of 98%, placing it within the high awareness range. In contrast, the lowest-rated item was item (11), which states, "Using sunglasses has no benefit in preventing corneal ulcers," with a percentage of 38%, placing it within the low awareness range. The overall evaluation of the preventive measures dimension is 63%, with an arithmetic mean of 1.26. Therefore, it can be concluded that the patients' awareness level of preventive measures related to corneal ulcers is moderate

Table 4. Awareness of general awareness of corneal ulcers (N = 102)

It is evident from Table (4), which presents the awareness level of the study sample of patients regarding general awareness of corneal ulcers, that the means of the sub-items ranged between (1.71) and (0.89), corresponding to percentages of (85.5%) and (40%), respectively. This indicates a variation in the level of awareness of the sub-items related to general awareness of corneal ulcers, ranging from high to low. The highest-rated item was item (4), which states: "Most corneal ulcers require prompt medical attention," with a percentage of (85.5%), placing it within the high awareness range. In contrast, the lowest-rated item was item (2), which states: "Vision loss from corneal ulcers is usually reversible without treatment," with a percentage of (40%), placing it within the low awareness range. Furthermore, the overall evaluation percentage of the general awareness level in this dimension reached (66.5%) with an arithmetic mean of (1.33). Therefore, it can be concluded that the patients' general awareness level regarding corneal ulcers and related aspects is moderate.

Table 5. Patients' awareness score levels of risk factors and preventive measures for corneal ulcers (N = 102).

It is evident from Table (5), which presents the awareness level of the study sample regarding the risk factors, preventive measures and general awareness of corneal ulcers and their related dimensions, that all dimensions fell within the range of moderate awareness. The highest level of awareness was recorded for general awareness (66.5%), followed by preventive measures (63%), and finally awareness of risk factors (57.5%). Since awareness in all dimensions was at a moderate level, the overall awareness level was also moderate, with a percentage of (62%) and an arithmetic mean of (1.24). Therefore, it can be concluded that the overall awareness level of the sample of patients regarding the risk factors and preventive measures of corneal ulcers and related aspects is moderate.

Table 6. Spearman's correlation between patients' total awareness level and variables of length of hospital stay and number of hospital admissions due to corneal ulcers (N = 102)

Table (6) shows that the relationship between patients' overall awareness of corneal ulcer risk factors and preventive measures, and the variables of length of hospital stay and number of hospital admissions due to corneal ulcers, is statistically significant, with correlation coefficients of (-.210*) and (-.436**), respectively, and probability values of (.034) and (.000), both below the significance levels of (.05) and (.01). These findings indicate a significant negative correlation, showing that patients with higher awareness experience shorter hospital stays and fewer readmissions.

Table 7. t-test results for differences in overall awareness by gender and residence area

Looking at Table (7), we observe that the t-test results indicate that the differences in overall awareness among patients by gender are not statistically significant, as the p-value (.937) is greater than the significance level of .05. However, the differences attributed to the variable of residence area are statistically significant, with a calculated t-value (−2.34) and p-value (.021), which is less than .05, indicating that awareness was higher among urban/suburban residents (M = 35.23) than rural residents (M = 32.15).

Table 8. Multiple regression analysis of the effect of education level and age on overall awareness

The results of Table (8) indicate that the multiple regression model examining the effect of age and education level on overall awareness of the risk factors and preventive measures of corneal ulcer was statistically significant, with ANOVA F = 13.15, Sig. = .000, indicating that the two independent variables significantly contribute to

explaining the variance in awareness levels. The model summary shows a moderate positive correlation (R = .458) between the predictors and the dependent variable, and the R^2 value (.210) indicates that approximately 21% of the variance in overall awareness can be explained by these two variables together. Looking at the regression coefficients, age has a statistically significant negative effect on overall awareness (B = -0.932, Beta = -0.259, t = -2.60, Sig. = .011), meaning that awareness tends to decrease with increasing age, whereas education level has a statistically significant positive effect (B = 1.286, Beta = .280, t = 2.81, Sig. = .006), indicating that higher educational levels are associated with higher awareness among patients.

Table 9. One-way ANOVA results for differences in overall awareness by marital status and occupation

Looking at Table (9), we observe that the value of the ANOVA test parameter (F) indicates that the differences in the overall awareness of patients regarding the risk factors and preventive measures of corneal ulcer and its related aspects, attributed to the variables of marital status and occupation, are not statistically significant. This value is because the p-values (.687 and .083) are greater than the significance level of .05. Accordingly, the result is that there are no statistically significant differences in the overall awareness of patients regarding the risk factors and preventive measures of corneal ulcer and its related aspects that can be attributed to the variables of marital status and occupation.

DISCUSSION

This study assessed patients' awareness of risk factors and preventive measures for corneal ulcers and examined its relationship with hospital length of stay among inpatients at Jeddah Eye Hospital. The findings revealed a moderate overall awareness (62%), consistent with prior research reporting insufficient knowledge of preventive eye care practices [17]. Sub-dimension analysis showed similarly moderate awareness across domains, with scores of 57.5% for risk factors, 63% for preventive measures and 66.5% for general knowledge. Notably, patients demonstrated the highest awareness for general hygiene such as regular handwashing, avoiding eye rubbing with unclean hands and seeking timely medical care. This pattern shows that patients were familiar with basic preventive hygiene concepts but lacked understanding of specific behavioral and etiological risks [18, 19]. However, persistent knowledge gaps were evident, particularly concerning risk related to personal and ocular hygiene and contact lens care. These findings align with previous research reporting similar knowledge gaps among patients with ocular conditions [20]. Several awareness items were answered incorrectly by participants, indicating that understanding of specific risk factors and preventive measures remains limited. In fact, a marked number of patients believed cleaning lenses with tap water or swimming while wearing them was safe and underestimated the dangers of extended wear or sharing eye cosmetics. These misconceptions heighten susceptibility to microbial keratitis and other corneal complications. Arshad et al. [21] found that water exposure during lens wear significantly increases the risk of sight-threatening infections. Stellwagen et al. [22] identified showering in contact lenses as a leading personal-hygiene risk factor for lens-related microbial keratitis. The present study's patients demonstrated a lack of knowledge about personal and eye hygiene regarding the importance of handwashing and removal of eye makeup before touching the eyes. This is in line with Fonn and Jones [23], who cite such behavior as significant risk factor for developing microbial keratitis and other corneal inflammatory events. Medication safety awareness was also suboptimal. Several patients underestimated the risks of using expired or improperly stored eye drops, while many ophthalmic outpatients reported discarding unused or expired eye drops in household waste and demonstrating poor administration techniques, reflecting limited understanding of safe medication use. Although some showed moderate awareness, unsafe behaviors were common, such as neglecting to check expiration dates, storing medications incorrectly and throwing away expired medications [24, 25].

Deficiencies were also evident in systemic and etiological awareness. Some participants were unaware that chronic diseases like diabetes increase susceptibility to corneal ulcers or that nonbacterial pathogens (fungal, viral or parasitic) are common causes. This finding is consistent with reports by Dago et al. [9] and Arinze et al. [10], who observed similarly low awareness of systemic health risks among comparable populations. Of note is the fact that numerous participants undervalued the protective benefits of sunglasses. Chen et al. [26] discovered that, despite a strong awareness of the need for sun protection, actual adherence to wearing sunglasses was inadequate. This suggests that while some populations lack awareness, others face behavioral or attitudinal barriers to translating knowledge into practice. Sociodemographic analysis revealed a negative correlation between awareness and duration of hospitalization, indicating that better-informed patients typically require shorter stays. Education level was a significant positive predictor of awareness, suggesting that higher education supports shorter hospitalizations and fewer readmissions. These results are consistent with prior evidence showing that greater patient health confidence (an indicator of awareness and engagement) correlates with a markedly reduced hospital length of stay (LOS). On average, patients with high health confidence spent 1.5 days less in the hospital, independent of

socioeconomic status and comorbidities [27]. Conversely, low health literacy has been linked to increased emergency department revisits and hospital reutilization [28]. In fact, multiple studies have shown that lower educational attainment is associated with higher hospital readmission and hospitalization rates. For example, patients with only compulsory education (typically up to lower secondary level) had significantly higher 30-day readmission compared to those with tertiary education, likely due to lower health literacy, poorer self-management skills, and less effective communication with healthcare providers [29, 30]. Age also influenced awareness: the regression coefficient for age was negative and statistically significant ($p = .011$), confirming that awareness declines with increasing age. This inverse association echoes earlier findings that older adults often have lower health literacy and face barriers to accessing and processing health information [31, 32]. Additionally, awareness was significantly higher among urban patients than those from rural regions, consistent with Sahu et al. [33], who found that urban communities in Nepal had greater awareness and knowledge of common ocular diseases such as cataract, glaucoma and diabetic retinopathy than their rural counterparts. Overall, this study highlights the broad spectrum of patient awareness regarding corneal ulcer prevention. While patients demonstrated adequate understanding of general hygiene, specific knowledge about contact lens care, medication safety and systemic risk factors was lacking. Educational level, age and residence were key determinants of awareness, emphasizing the need for tailored health education programs. Targeted interventions that address these knowledge gaps could improve patients' preventive behaviors, reduce disease recurrence and shorten hospitalization periods.

STUDY IMPLICATIONS

The results highlight the importance of implementing structured educational strategies as part of hospital discharge planning and subsequent outpatient care. Eye-care professionals must provide clear instructions on hygiene practices, early symptom recognition, and the avoidance of high-risk behaviors, including sharing cosmetics or using non-sterile water. Public-awareness initiatives in community health centers—particularly in rural areas—play a vital role in promoting preventive eye care. Integrating corneal-ulcer prevention education into national eye-health strategies at the policy level has the potential to significantly reduce preventable visual impairment. Enhancing health literacy and fostering patient engagement will further improve clinical outcomes and contribute to the long-term sustainability of eye-health services.

STUDY LIMITATIONS

This study has several limitations that should be considered when interpreting the findings. First, the cross-sectional design prevents the establishment of causal relationships between patients' awareness levels and hospitalization outcomes. Second, the study was conducted in a single governmental eye hospital, which may limit the generalizability of the results to other healthcare settings or populations with different demographic or clinical profiles. Third, the use of interviewer-administered questionnaires may have introduced interviewer bias, as participants could have provided socially desirable responses influenced by the interviewer's presence or manner. Finally, the relatively small sample size ($n = 102$) may have reduced the ability to detect subtle subgroup differences and may limit the external validity of the findings.

RECOMMENDATIONS

- Integrate structured, evidence-based patient education into routine ophthalmic care, emphasizing core areas where awareness was lowest such as behavioral and etiologic risk factors, contact-lens hygiene, and recognition of systemic contributors to corneal ulcers.
- Embed preventive counseling at multiple care points, including admission, hospitalization, and discharge, with brief pre-discharge awareness checks to tailor individualized education and reduce risks of prolonged hospital stay or readmission.
- Prioritize targeted education for high-risk groups, particularly older adults, individuals with low educational attainment, and residents of rural areas—populations that showed significantly lower awareness levels in the present study.
- Use simplified, culturally appropriate educational materials, including visual aids, illustrated leaflets, and clear step-by-step guidance on hand hygiene, safe lens wear, and early symptom recognition.

- Strengthen collaboration between hospitals, primary-care centres, and community health facilities to ensure consistent dissemination of standardized preventive messages and to reduce the observed urban–rural disparity in awareness.
- Leverage digital and visual platforms—such as educational videos, posters, and online resources—to reinforce preventive behaviors and support continuous patient engagement, particularly for younger and more digitally connected populations.
- Institutionalize corneal ulcer prevention within hospital quality and patient-safety frameworks, ensuring that awareness-building activities are sustained, monitored, and integrated into broader eye-health strategies.

CONCLUSIONS

This study found that patients hospitalized with corneal ulcers at Jeddah Eye Hospital demonstrated a moderate level of awareness regarding risk factors, preventive measures and general knowledge of the disease. Although overall awareness was satisfactory, notable deficiencies persisted in areas such as contact lens hygiene, medication safety and recognition of systemic risk factors. Higher levels of education and urban residence were associated with greater awareness, whereas older age was linked to lower awareness levels. A significant negative relationship between awareness and duration of hospitalization underscores the vital role of patient education in improving clinical outcomes. These findings highlight the need to integrate structured, evidence-based educational initiatives into both in- and outpatient ophthalmic care to strengthen preventive behaviors, maximize hospital resource efficiency and promote better visual health outcomes.

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Acknowledgement:
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TABLES

Table 1. Sociodemographic Characteristics of the Participants (N = 102)

Variables	Categories	Frequency	Percent %	Mean	SD
Gender	Male	56	54.9	-	-
	Female	46	45.1		
Age	18-30 years	23	22.5	2.95	1.53
	31-40 years	21	20.6		
	41-50 years	19	18.6		
	51-60 years	17	16.7		
	>60 years	22	21.6		
Marital Status	Single	34	33.3	-	-
	Married	57	55.9		
	Widowed/ Divorced	11	10.8		
Education	Illiterate	19	18.6	2.71	1.03
	Primary Education	16	15.7		
	Secondary Education	42	41.2		
	Bachelor or higher education	25	24.5		
Occupation	Employed	31	30.4	-	-
	Unemployed	59	57.8		
	Retired	12	11.8		
Area of Residence	Rural	16	15.7	-	-
	urban /suburban	86	84.3		
First Reason for Hospital Admission (based on medical records)	Corneal Ulcer	74	72.5	-	-
	other	28	27.5		
Corneal Ulcer Documented as the Primary Diagnosis at Admission?	Yes	74	72.5	-	-
	No	19	18.6		
	Not Specified	9	8.8		
Length of stay in the inpatient department due to Corneal Ulcer	Less than 1 day	10	9.8	2.21	0.63
	1 to 7 days	62	60.8		
	8 to 30 days	28	27.5		
	More than 30 days	2	2.0		
How many times has the patient been admitted to the hospital due to Corneal Ulcer (including the current admission)?	Once	69	67.6	1.52	0.90
	Twice	20	19.6		
	Three times	5	4.9		
	More than three times	8	7.8		

Table 2. Awareness of risk factors associated with corneal ulcers (N = 102)

N	Items risk factors	Frequency / Percent	Incorrect Answered	Not sure	Correct Answered	SD	Mean	Percent	Rank	Estimate
1	**Eye trauma or injury can lead to a corneal ulcer.**	F	9	34	59	0.65	1.49	74.5%	(3)	**M**
		%	(8.8%)	(33.3%)	(57.8%)					
2	**Poor contact lens hygiene is not a risk factor for corneal ulcers.**	F	52	16	34	0.90	0.82	41%	(8)	**L**
		%	(51%)	(15.7%)	(33.3%)					
3	**Corneal ulcers only affect people who have had eye surgeries.**	F	23	46	33	0.73	1.09	54.5%	(6)	**M**
		%	(22.5%)	(45.1%)	(32.4%)					
4	**Sleeping while wearing contact lenses increases the risk of infection.**	F	12	24	66	0.69	1.52	%76	(2)	**H**
		%	(11.8%)	(23.5%)	(64.7%)					
5	**Rubbing eyes with dirty hands can increase the risk of corneal ulcers.**	F	5	26	71	0.57	1.64	82%	(1)	**H**
		%	(4.9%)	(25.5%)	(69.6%)					
6		F	15	62	25	0.62	1.09	54.5%	(6)	**M**

	Diabetes and other chronic illnesses can be risk factors for corneal ulcers.	%	(14.7%)	(60.8%)	(24.5%)					
7	**Only elderly individuals are at risk of developing corneal ulcers.**	F	14	45	43					
		%	(13.7%)	(44.1%)	(42.2%)	0.77	1.28	64%	(4)	**M**
8	**Using tap water to clean contact lenses is safe.**	F	41	30	31					
		%	(40.2%)	(29.4%)	(30.4%)	0.83	0.90	45%	(7)	**L**
9	**Eye infections such as conjunctivitis can lead to corneal ulcers.**	F	14	45	43					
		%	(13.7%)	(44.1%)	(42.2%)	0.69	1.28	64%	(4)	**M**
10	**Not removing makeup before sleep has no impact on eye health.**	F	43	39	20					
		%	(42.2%)	(38.2%)	(19.6%)	0.75	0.77	38.5%	(10)	**L**
11	**Corneal ulcers are caused only by bacteria.**	F	35	51	16					
		%	(34.3%)	(50%)	(15.7%)	0.68	0.81	40.5%	(9)	**L**
12	**Fungal infections can also cause corneal ulcers.**	F	14	58	30					
		%	(13.7%)	(56.9%)	(29.4%)	0.64	1.15	57.5%	(5)	**M**
Total :S d, mean, percentage and overall estimate of dimension (risk factors)						**0.71**	**1.15**	**%57.5**	**-**	**M**
Low (L) = (0%to less than 50%)		Moderate (M) = (50%to less than 75%)				High(H) = (75%to 100%)				

Table 3. Awareness of preventive measures for corneal ulcers (N = 102)

N	Items of preventive procedures	Frequency / Percent	Incorrect Answered	Not sure	Correct Answered	SD	Mean	percent	Rank	Estimate
1	**Washing your hands before touching your eyes helps prevent infections.**	F	0	4	98	0.19	1.96	%98	(1)	**H**
		%	(%0)	(3.9%)	(96.1%)					
2	**Sharing contact lenses or eye makeup is safe practice.**	F	28	33	41	0.81	1.12	%56	(7)	**M**
		%	(27.5%)	(32.4%)	(40.2%)					
3	**Replacing contact lenses as recommended can help prevent corneal ulcers.**	F	13	39	50	0.70	1.36	%68	(5)	**M**
		%	(12.7%)	(38.2%)	(49%)					
4	**Avoiding eye trauma is one way to prevent corneal ulcers.**	F	6	25	71	0.59	1.63	%81.5	(2)	**H**
		%	(5.9%)	(24.5%)	(69.6%)					
5	**Using expired eye drops does not affect eye health.**	F	34	26	42	0.86	1.07	%53.5	(8)	**M**
		%	(33.3%)	(25.5%)	(41.2%)					
6	**Wearing protective glasses during risky activities can prevent injuries.**	F	13	30	59	0.71	1.4	%70	(4)	**M**
		%	(12.7%)	(29.4%)	(57.8%)					
7	**Using preservative-free eye drops may reduce the risk of eye irritation.**	F	11	51	40	0.65	1.28	%64	(6)	**M**
		%	(10.8%)	(50%)	(39.2%)					
8	**It is safe to swim while wearing contact lenses.**	F	35	33	34	0.82	0.99	%49.5	(9)	**L**
		%	(34.3%)	(32.4%)	(33.3%)					
9	**Proper storage of contact lenses can help prevent infections.**	F	7	33	62	0.62	1.53	%76.5	(3)	**H**
		%	(6.9%)	(32.4%)	(60.8%)					
10	**Wearing contact lenses longer than recommended does not cause problems.**	F	39	40	23	0.76	0.84	%42	(10)	**L**
		%	(38.2%)	(39.2%)	(22.5%)					
11	**Using sunglasses has no benefit in preventing corneal ulcers.**	F	39	48	15	0.69	0.76	%38	(11)	**L**
		%	(38.2%)	(47.1%)	(14.7%)					
Total Sd, mean, percentage and overall estimate of dimension (preventative measures)						**0.67**	**1.26**	**%63**	**-**	**M**
Note: Low (L) = (0%to less than 50%)		Moderate (M) = (50%to less than 75%)				High(H) = (75%to 100%)				

Table 4. Awareness of general awareness of corneal ulcers (N = 102)

N	Items (general Awareness)	Frequency / Percent	Incorrect Answered	Not sure	Correct Answered	SD	Mean	Percent	Rank	Estimate
1	Corneal ulcers can be diagnosed only through lab tests.	F	33	47	22					
		%	(32.4%)	(46.1%)	(21.6%)	0.72	0.89	%44.5	(4)	**L**
2	Vision loss from corneal ulcers is usually reversible without treatment.	F	41	40	21					
		%	(40.2%)	(39.2%)	(20.6%)	0.75	0.80	%40	(5)	**L**
3	Redness, pain, and blurry vision can be symptoms of a corneal ulcer.	F	7	22	73					
		%	(6.9%)	(21.6%)	(71.6%)	0.60	1.64	%82	(2)	**H**
4		F	5	19	78	0.55	1.71	%85.5	(1)	**H**

	Most corneal ulcers require prompt medical attention.	%	(4.9%)	(18.6%)	(76.5%)					
5	**Anyone can get a corneal ulcer, regardless of age or health condition.**	F	3	32	67	0.54	1.62	%81	(3)	**H**
		%	(2.9%)	(31.4%)	(65.7%)					
Total: Sd, mean, percentage and overall estimate of dimension (general Awareness)						**0.63**	**1.33**	**%66.5**	**-**	**M**
Note : Low (L) = (0%to less than 50%)		Moderate (M) = (50%to less than 75%)				High (H) = (75%to 100%)				

Table 5. Levels of patients' awareness scores regarding risk factors, preventive measures, and general awareness of corneal ulcers (N = 102)

Dimension	Mean	SD	%	Rank	Estimate
Risk factors	1.15	0.71	%57.5	(3)	M
preventive measures	1.26	0.67	%63	(2)	M
General awareness	1.33	0.63	%66.5	(1)	M
General Estimate	1.24	0.67	%62		M

Table 6. Spearman's correlation between patients' total awareness level and variables of length of hospital stay and number of hospital admissions due to corneal ulcers (N = 102)

Independent variable	Dependent variables	Correlation Coefficient	Sig. (2-tailed)	Conclusion
Total level of awareness	**Hospital stays due to corneal ulcers**	**-.210***	**.034**	**The relationship is negatively significant.**
	hospital admissions due to corneal ulcers	**-.436****	**.000**	**The relationship is negatively significant.**
*. Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).				

Table 7. Multiple linear regression analysis of the effect of age and education level on overall awareness

ANOVA		Model Summary			Coefficients'				
F	Sig.	R	R Square	Model	B	Beta	t	Sig.	
				(Constant)	33.931		16.78	.000	The effect is sig.
				age	-.932	-.259	-2.60	.011	The effect is sig.
13.15	.000[b]	.458[a]	.210	Education level	1.286	.280	2.81	.006	The effect is sig.
b. Dependent Variable: overall awareness - a. Predictors: (Constant), age, Education level									

Table 8. Independent samples t-test results for differences in overall awareness by gender and residence area

variables	Groups	N	Mean	Std. D	df	t	Sig.	Conclusion
Gender	Male	56	34.58	4.81	100	-.07	.937	**The differences are not significant.**
	Female	46	34.67	6.04				
Residence Area	Rural	16	32.15	4.63	100	-2.34	.021	**The differences are significant in favor of urbanites.**
	urban /suburban	86	35.23	5.39				

Table 9. One-way ANOVA results for differences in overall awareness by marital status and occupation

Dep- variables	Source of variance	Sum of Squares	df	Mean Square	F	Sig.	Conclusion
Marital Status	**Between Groups**	**22.030**	**2**	**11.015**	**.376**	**.687**	**The differences are not significant.**
	Within Groups	**2897.813**	**99**	**29.271**			
	Total	**2919.843**	**101**				
Occupation	**Between Groups**	**143.264**	**2**	**71.632**	**2.55**	**.083**	**The differences are not significant.**
	Within Groups	**2776.579**	**99**	**28.046**			
	Total	**2919.843**	**101**				