

Eye care-seeking behaviors in microbial keratitis patients at tertiary eye units in Dar es Salaam, Tanzania

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ABSTRACT

Objective. To investigate eye care-seeking behavior and associated factors among patients with Microbial Keratitis (MK) at two tertiary eye hospitals in Dar es Salaam, Tanzania.

Methods: This was a hospital-based cross-sectional study conducted over six months at Muhimbili National Hospital and the Comprehensive Community-Based Rehabilitation Tanzania Hospital. Consecutively recruited participants were interviewed using a structured questionnaire covering demographics, symptom duration, time to treatment, prior actions taken before presentation, and awareness of MK complications. Appropriate healthcare-seeking was defined as presenting to a formal health facility within 48 hours of symptom onset without prior self-treatment. Data were analyzed in SPSS v23, and multivariate logistic regression identified predictors of healthcare-seeking behavior.

Results: A total of 351 participants were included, slightly more males (183, 52.1%). Most 221 (63%) were aged 18–40 years (mean 37 ± 16.6). Over one-third (135, 38.5%) were petty traders, and 213 (61%) lacked health insurance. Only 25% demonstrated appropriate healthcare-seeking behavior. Clinically, more than half 196 (55.8%) presented with severe MK, while 278 (79.2%) were unaware of its vision-threatening potential. Initial care locations were health facilities (42.7%), medical shops (32.2%), traditional healers (13.1%), and prayer houses (2.6%). Independent predictors of inappropriate behavior were lack of health insurance (aOR 1.30, 95% CI 1.09–1.53), being a petty trader (aOR 1.37, 95% CI 1.02–1.85), and lack of awareness of disease consequences (aOR 2.79, 95% CI 1.71–4.56).

Conclusion: Only 25% of patients with microbial keratitis sought care appropriately. Inappropriate care-seeking behaviour was associated with occupation, lack of health insurance, and poor awareness of the disease. Interventions focusing on expanding health insurance coverage and targeted education may enhance appropriate health-seeking behaviours in these patients.

Key words: Microbial keratitis, Eye healthcare-seeking behavior, Tertiary hospitals, Tanzania

INTRODUCTION

Healthcare-Seeking Behaviour (HSB) refers to any action undertaken by individuals experiencing a health problem to obtain appropriate management¹. It is a component of the broader concept of health behaviour, which encompasses activities aimed at maintaining health, preventing illness, and addressing deviations from a state of well-being². Appropriate HSB occurs when patients seek care from formal health services promptly, whereas inappropriate HSB refers to delays in seeking care or consulting non-formal healthcare providers³. The proportion of individuals exhibiting appropriate eye healthcare-seeking behaviour varies by region, ranging from 31% in developing countries to 72.5% in developed countries^{4–9}.

Microbial Keratitis (MK) is a leading cause of monocular visual impairment and blindness in developing countries, second only to cataract¹⁰. In Tanzania,

hospital-based evidence indicates that MK is a significant contributor to corneal blindness, with more than half of affected patients presenting with severe visual impairment and many retaining poor vision despite treatment^{5,11–12}. MK commonly affects young, economically productive individuals, and delayed treatment leads to severe visual morbidity and socioeconomic burden^{10,13}. Early access to appropriate care is critical to prevent irreversible complications such as corneal perforation, scarring, and irreversible blindness^{5,6,13}.

Delayed healthcare seeking among patients with MK is a major contributor to complications and poor outcomes. Delayed healthcare-seeking is influenced by patient-related factors, including use of traditional medicine, self-medication, patient literacy, and poor disease awareness, as well as geographical and health system barriers such as distance to health facilities, transportation challenges, and limited insurance coverage^{6,7,10,14}. In Tanzania, specialised eye care services are limited to higher-level facilities, and

health insurance coverage remains low, with only 32% of population covered, leaving the majority relying on out-of-pocket payments¹⁴⁻¹⁶.

In our setting, hospital reports shows that patients with MK often present late, by which time the disease has progressed, leading to unfavorable outcomes, and in some cases, complete resolution of the condition is no longer achievable¹¹⁻¹². In developing countries including Tanzania, management options for MK complications are limited, and many patients who experience adverse outcomes remain blind due to the scarcity and high cost of corneal transplant services¹⁷⁻¹⁸.

There is limited evidence on eye healthcare-seeking behaviour among patients with MK in our setting. This study aims to assess healthcare-seeking behaviour and associated factors among patients with MK attending tertiary hospitals in Dar es Salaam to inform interventions that promote timely access to appropriate eye care so as to reduce complications like corneal scarring, whose management is limited and costly.

MATERIALS AND METHODS

Study design and study period: This was a hospital-based cross-sectional study conducted over six months, from July to December 2021.

Study setting: The study was conducted at Muhimbili National Hospital (MNH) and Comprehensive Community-Based Rehabilitation Tanzania (CCBRT) hospital in Dar es Salaam, Tanzania. MNH has a well-established eye department that provides tertiary eye care services for both pediatric and adult patients, including outpatient and inpatient services. Data were collected from the general ophthalmology adult clinic, which attends approximately 1,000 patients per month. CCBRT hospital is among the major providers of specialised eye care in Tanzania. It receives patients referred from both primary and secondary health facilities across Dar es Salaam and other regions, as well as self-referred patients. Data were collected from the general eye clinic, which serves an average of 6,200 patients per month.

Study population: All adult patients with a clinical diagnosis of microbial keratitis attending the general adult eye clinic at each hospital during the study period were eligible for inclusion.

Inclusion criteria: Adult patients aged 18 years and older who provided informed consent to participate in the study.

Exclusion criteria: Patients who were seriously ill and unable to participate in the interview.

Sampling and sample size

Participants with MK were identified during routine clinical care in general ophthalmology clinics at both hospitals using a consecutive sampling technique until the required sample size was reached. All clinicians in the eye department were informed about the study objectives and inclusion criteria and were requested to notify the research team whenever a patient with a clinical diagnosis of MK presented. After receiving the standard clinical management, eligible patients were approached by the principal investigator or trained research assistant, provided the information about the study, and those who gave written informed consent were consecutively enrolled.

The minimum sample size required for this study was calculated by using Cochran's formula below:

$$n = Z^2 p(1-p) / \epsilon^2$$

Where; n=minimum sample required

Z=SD at 1.96(CI of 95%)

p is the estimated proportion of patients exhibiting appropriate healthcare-seeking behaviour (31.6%) based on a study conducted in Kwara State, Nigeria⁶, and e is the margin of error (5%). Substituting these values yielded a minimum required sample size of 332 participants. A proportional to sample size was employed to allocate the sample size between the two study facilities. Given the substantially higher patient's volume at CCBRT, this facility contributed approximately 85% of the total sample.

Data collection: Data were collected using a structured, interviewer-administered questionnaire. Information obtained included demographic characteristics, the estimated distance from the patient's home to the nearest primary health facility, and relevant clinical data. Clinical data comprised the time elapsed from symptom onset to seeking treatment, actions taken before presenting to the health facility (including types of self-treatment and initial care-seeking locations), and patients' awareness of potential adverse effects of microbial keratitis. Appropriate health-seeking behaviour was defined as seeking care at a formal health facility within 48 hours of symptom onset without prior self-treatment. Inappropriate health-seeking behaviour was defined as initially seeking care from informal providers, prayer houses, local medical shops, or engaging in self-treatment. Patients who presented to a formal health facility for the first time more than 48 hours after symptom onset, without prior care elsewhere, were also classified as exhibiting inappropriate health-seeking behaviour. The 48-hour cut-off was defined as the time to presentation to any formal health facility, not specifically a facility capable of diagnosing MK.

Data storage: Filled questionnaires were reviewed daily by the principal investigator for completeness and accuracy and stored in locked cabinets accessible only to the research team. Data were entered into SPSS and stored in a password-protected computer. Unique study identification numbers were used to ensure participant confidentiality.

Data analysis: Data were analyzed using SPSS version 23 (IBM Corp., Armonk, NY, USA). The Chi-square test was used to examine associations between independent variables and healthcare-seeking behavior. Logistic regression analysis was performed to determine the relationship between independent variables and healthcare-seeking behavior, with Odds Ratios (ORs) reported alongside 95% Confidence Intervals (CIs). A p-value of less than 0.05 was considered statistically significant.

Ethical consideration: Ethical clearance for the study was obtained from the Institutional Review Board of Muhimbili University of Health and Allied Sciences. The directors of the respective hospitals granted permission for the study to be conducted. Written informed consent was obtained from all participants before data collection.

RESULTS

A total of 351 (53 from MNH and 298 from CCBRT) participants were recruited, and all were included in the analysis. The sample comprised slightly more males (183, 52.1%). Most participants (221, 63%) were aged 18–40 years, with a median age of 36 IQR 24. Regarding education, 119 (33.9%) participants had completed primary school. Nearly half of the participants (172, 49%) were single, and more than one-third (135, 38.5%) were petty traders. Approximately half (181, 51.6%) reported a monthly income of less than 300,000 Tanzanian Shillings (~150 USD), and most (213, 61%) did not have health insurance coverage. The majority of participants (334, 95%) lived within ten kilometres of the health facility. Clinically, more than half of the participants (196, 55.8%) presented with severe symptoms of microbial keratitis, and most (278, 79.2%) were unaware of potential vision-threatening complications (Table 1).

Inappropriate healthcare-seeking behaviour was more common among participants who were over 60 years, had no formal educational level, were petty traders, did not have health insurance, lived more than 10 km from the nearest health facility, or were unaware of the potential adverse effects of microbial keratitis, $p < 0.05$ (Table 1).

Table 1: Social demographic, baseline characteristics, and healthcare seeking behavior of patients with microbial keratitis (N=351)

Variable	Healthcare-seeking behavior			Chi square P-value
	Total No. (%)	Appropriate No. (%)	Inappropriate No. (%)	
Sex				
Male	183 (52.1)	62 (33.9)	121 (66.1)	0.642
Female	168 (47.9)	53 (31.6)	115 (68.5)	
Age (years)				
18-40	221(63.0)	84 (38.0)	137 (62.0)	0.021
41-60	109 (31.1)	27 (24.8)	82 (75.2)	
60+	21 (6.0)	4 (19.1)	17 (81.0)	
Education level				
Non formal	18 (5.1)	2 (11.1)	16 (88.9)	0.001
Primary	119 (33.9)	34 (28.6)	85 (71.4)	
Secondary	113 (32.2)	31 (27.4)	82 (72.6)	
College	101 (28.8)	48 (47.5)	53 (52.5)	
Marital status				
Single	172 (49.0)	49 (28.5)	123 (71.2)	0.272
Married	140 (39.9)	54 (38.6)	86 (61.4)	
Divorced	27 (7.7)	9 (33.3)	18 (66.7)	
Cohabiting	12 (3.4)	3 (25.0)	9 (75.0)	

Occupation				
Employed	69 (19.7)	29 (42.0)	40 (58.0)	<0.001
Petty trade	135 (38.5)	33 (28.1)	102 (75.4)	
Peasant	60 (17.1)	20 (16.7)	40 (66.6)	
Unemployed	87 (24.8)	38 (43.7)	49 (56.3)	
Health insurance scheme				
Insured	138 (39.3)	66 (47.8)	72 (52.2)	<0.001
Not insured	213 (60.7)	49 (23.0)	164 (77.0)	
Bad	288 (82.1)	72 (25.0)	216 (75.0)	
Severity of symptoms				
Severe	196 (55.8)	43 (21.9)	153 (78.1)	0.052
Less severe	155 (44.2)	72 (46.4)	83 (53.6)	
Distance to the health facility				
>10 kilometers	17 (4.8)	1(5.9)	16 (94.1)	<0.001
≤10 kilometers	334 (95.2)	114 (34.1)	220 (65.9)	
Awareness of adverse effects of disease				
Yes	73 (20.8)	57 (78.1)	16 (21.9)	<0.001
No	278 (79.2)	58 (20.9)	220 (79.1)	

Overall, only 25% of participants exhibited appropriate healthcare-seeking behaviour. Regarding the timing of healthcare-seeking, only 59 (16.8%) participants sought care within 24 hours of symptom onset. Most (193, 60%) sought care within 24 to 48 hours, 69 (19.7%) sought care after 3 to 6 days, and 30 (8.6%) patients sought care after 7 days. The first places where participants sought care were health facilities (150, 42.7%), medical shops (113,

32.2%), traditional healers (46, 13.1%), prayer houses (9, 2.6%), and self-treatment (33, 9.4%). Among those who sought care directly at a health facility, (59%) did so within the first 48 hours of symptom onset. In contrast, (78%) of participants who initially visited prayer houses did so after 48 hours (Figure 1).

Figure 1: A place where participants first accessed healthcare, and the time taken (N=351)

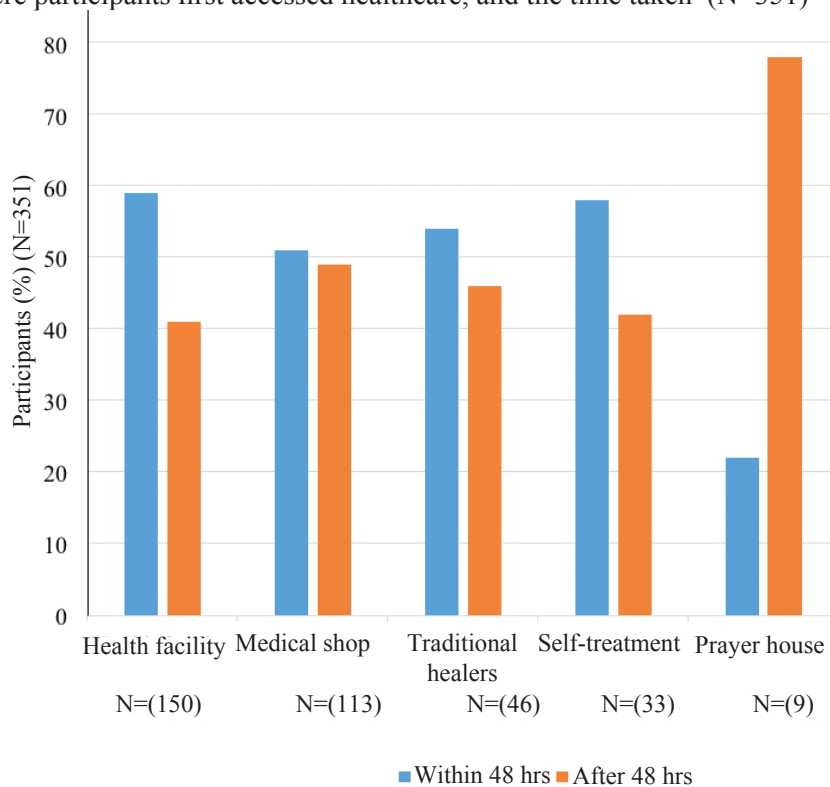


Table 2: Logistic regression analysis for factors associated with inappropriate healthcare seeking behaviour among patients with microbial keratitis (N=351)

Variable	Bivariable analysis			Multivariable analysis		
	cOR	(95%CI)	P-value	aOR	(95%CI)	P-value
Age (years)						
18- 40	Ref					
41-60	1.21	1.05-1.41	0.011	1.20	0.93-1.56	0.160
> 60	1.31	1.04-1.65	0.024	1.06	0.89-1.27	0.501
Education level						
Non formal	1.32	1.04-1.67	0.000			
Primary level	1.40	1.09-1.69	0.002	1.06	0.86-1.31	0.591
Secondary school	1.38	1.11-1.72	0.004	1.11	0.90-1.37	0.342
College education	Ref					
Occupation						
Employed	1.03	0.78-1.35	0.836	1.23	0.89-1.70	0.189
Petty trade	1.23	1.03-1.58	0.025	1.37	1.02-1.85	0.034
Peasant	1.47	1.19-1.83	<0.001	1.10	0.87-1.40	0.429
Unemployed	Ref)					
Insurance scheme						
Insured	Ref					
Not insured	1.48	1.24-1.76	<0.001	1.30	1.09-1.53	0.003
Severity of symptoms						
Severe	Ref					
Less severe	1.46	1.24-1.72	<0.001	1.19	1.10-1.41	0.050
Distance to the health facility						
>10 kilometres	1.43	1.24-1.65	<0.001	1.16	0.96-1.39	0.130
≤10 kilometres	Ref					
Awareness of adverse effects of the disease						
Yes	Ref		Ref			
No	3.61	2.33-5.59	<0.001	2.79	1.71-4.56	<0.001

Participants who lacked health insurance (aOR: 1.30, 95% CI: 1.09-1.53, $p = 0.003$), those unaware of the disease's effects on vision (aOR: 2.79, 95% CI: 1.71-4.56, $p < 0.001$), petty traders (aOR: 1.37, 95% CI: 1.02-1.85, $p = 0.034$), and individuals with less severe symptoms (aOR: 1.19, 95% CI: 1.10-1.41, $p = 0.050$) were more likely to exhibit inappropriate health-seeking behavior on multivariate analysis, however, the effect size was small (Table 2).

DISCUSSION

This study assessed the eye care-seeking behaviour and associated factors among patients with Microbial Keratitis (MK) at two tertiary eye hospitals in Dar es Salaam, Tanzania. Only one quarter of patients sought care appropriately, with inappropriate health-seeking care strongly associated with occupation, lack of health

insurance and poor awareness of the consequences of the disease.

In this study, only 25% of participants with Microbial Keratitis (MK) exhibited appropriate Healthcare-Seeking Behaviour (HSB). This proportion is lower than that reported in Ghana by Kuuire *et al.*¹⁹ where 48% of MK patients sought care appropriately. The lower rate in our setting may be related to the lack of health insurance among the majority of participants, whereas universal health coverage in Ghana facilitates access to care. Expanding health insurance coverage through affordable schemes could improve eye health-seeking behaviour, as evidenced in other areas of healthcare.

We found that participants who lacked health insurance were more likely to engage in inappropriate health-seeking behaviour compared to those with insurance. Uninsured individuals may delay expert advice due to out-of-pocket costs for consultations, tests, and treatments. This emphasises the need for interventions like expanded health insurance coverage to mitigate such disparities.

Participants who were unaware of how MK impacts vision were nearly 2.8 times more likely to display inappropriate HSB than those who were aware. A similar observation has been reported by Puri *et al.*²⁰ in India, where lack of awareness about the disease and its impact on vision contributed to inappropriate care seeking. This underscores the role of health literacy in decision-making. Lack of awareness of the consequences of the disease may lead the affected individuals to trivialise early symptoms rather than seek prompt and appropriate intervention. Interventions like targeted awareness programs disseminated through social media, schools, or community outreach could tackle this issue. By empowering individuals to recognise the urgency of their situations, these programs may help reduce inappropriate behaviours and encourage people to seek care more promptly.

Petty traders participants were more likely to exhibit inappropriate HSB, likely due to busy work schedules and limited financial resources that constrain their ability to travel to formal healthcare facilities. Similar findings have been reported in Nigeria and Ghana^{4,21-22}. Petty traders face the high opportunity cost of seeking appropriate care as they often rely on daily earnings and cannot easily leave work for an appointment. While similar constraints may exist in other occupations, the combination of daily income needs and limited flexibility may make the petty traders particularly more vulnerable to inappropriate HSB.

Participants in this study sought eye care from a variety of sources. Less than half (42.7%) of the participants sought first care at a primary health facility, and only 59% of them did so appropriately by directly seeking care within 48 hours of symptom onset without prior self-

treatment or visiting other sources. Similar findings have been reported in Ghana, where 44% of patients with eye diseases sought hospital care as their first point of contact⁷. These findings underscore the need to strengthen service provision at primary health facilities by improving the knowledge and skills of healthcare personnel to ensure accurate diagnosis, management, and timely referral of patients with eye conditions.

A notable proportion (more than half) of participants sought care from traditional healers, prayer houses, or medical shops, or engaged in self-treatment directly. This aligns with other studies^{7,9-10} and is associated with delays in seeking appropriate treatment, hence increasing the risk of adverse outcomes^{4,6,23}. Traditional medicines may contain harmful substances that exacerbate eye disease and potentially lead to blindness²⁴. Medical shops often provide easily accessible eyedrops without a prescription, which can cause delays in seeking appropriate treatment. Similarly, prayer house leaders may advise spiritual remedies that may postpone medical treatment. Educating traditional healers, spiritual leaders and the medical shop drug sellers on the impact of their interventions and encouraging timely referrals for emergency eye conditions is therefore essential.

Age may also influence health-seeking behavior, as younger individuals are generally more proactive in seeking care². In this study, older participants (over 60 years) had higher odds of inappropriate HSB in univariable analysis, although this was not statistically significant in multivariable analysis. Delayed healthcare seeking in older individuals is probably caused by a combination of financial constraints, comorbidities that necessitate escorts, and additional travel costs.

Educational level was found to influence HSB, whereby participants with lower educational levels were more likely to have inappropriate care-seeking behaviors compared to those with higher levels. Individuals with higher education are typically more knowledgeable about health issues and the potential complications of disease^{22,25}. Lack of awareness regarding MK complications likely contributed to inappropriate HSB in our study.

One-third of participants initially sought care at medical shops, consistent with studies from Uganda, Nepal, and Tanzania^{6,10,26}. The convenience, proximity, and lower cost of medical shops make them more attractive, particularly for working-age individuals who may prioritise minimizing disruption to income-generating activities. However, these shops often sell eye drops containing steroids, which can worsen keratitis and lead to poor outcomes²⁶⁻²⁷. Most sellers have minimal training (average 1.4 years)²⁶ and although regulations require at least four years of health-related training, compliance is inconsistent²⁷. Given the risk of inappropriate dispensing of topical steroids containing eyedrops at medical shops,

regulatory reinforcement should be strengthened to restrict their availability without prescription. In parallel, targeted training of medical shop personnel on the dangers of using steroids in suspected MK and the importance of urgent referral may help reduce the delays in seeking appropriate treatment.

Implications for clinical practice and public health

Our findings highlight the need for targeted interventions to improve timely healthcare-seeking behaviour among patients with MK. Providing health education on disease complications, training medical shop personnel, prayer house leaders, and traditional healers to identify and refer these patients, as well as expanding health insurance coverage, can enhance appropriate care-seeking behaviours among this population.

Study limitation

This was a hospital based cross-sectional study, which may limit the generalizability of the findings to entire population. However, both centers provide tertiary eyecare services and receive patients from all regions of Tanzania, support broader applicability. Additionally, the health seeking behavior was self-reported which may be subject to recall bias. Finally, this was a cross-sectional study design which limit the causal inferences.

CONCLUSION

Only 25% of patients with microbial keratitis sought care appropriately. Inappropriate care-seeking behaviour was associated with occupation, lack of health insurance, and poor awareness of the disease. Interventions focusing on expanding health insurance coverage and targeted education may enhance appropriate health-seeking behaviours in these patients.

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