ORIGINAL ARTICLE

Accuracy of Direct Microscopy in Early Diagnosis of Fungal Keratitis using Potassium Hydroxide

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ABSTRACT

Objective: To determine the accuracy of direct microscopy in early diagnosis of fungal keratitis using potassium hydroxide.

Methods: This cross sectional study was conducted in the department of Ophthalmology at Peoples University of Medical & Health Sciences for Women Nawabshah District Shaheed Benazirabad and Khairpur Medical College Khairpur Mirs, Sindh, from 1st January 2016 to 30th June 2016. This study included 200 patients, from Two Health Centers on daily basis enrolled by convenience sampling method having clinical diagnosis of fungal keratitis through eye OPD. After considering inclusion and exclusion criteria the patients were divided into two groups A and B, each containing 100 patients.

Results: 200 Patients had mean age of 37.25 13.87 Years. 121 (60.5%) were males while 79 (39.5%) were females with male to female ratio of 1.4:1. Mostly the age range affected was 31 to 50 years, 83 (41.5%), 15-30 years 69 (34.5%) patients and 51 to 70 years 48 (24%) patients respectively. Out of 100 patient of group A, who was started topical antifungal without scraping & stain 56 (56%) patients responded and fulfilled the improvement criteria at the end of 4th week. In group B out of 100, 71 (71%) patients stained positive with potassium hydro oxide (KOH) stain on scrape material. These 71 patients were started with topical antifungal and 65 (91.54%) patients responded and fulfilled the improvement criteria at the end of 4th week.

Conclusion: Direct microscopy with KOH stain is very much useful with regard to accuracy for the suspected cases of fungal keratitis which is a preventable cause of blindness in corneal ulcers. It is therefore beneficial in early detection and management of keratitis.

Key words: Corneal ulcer, Fungal keratitis, Direct microscopy, Potassium hydroxide.

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INTRODUCTION:

One of the most severe eye diseases worldwide that may lead to blindness is Fungal Keratitis, particularly in agricultural regions with temperate climates[1]. Common risk factors are trauma (vegetative), topical corticosteroid use, use of contact lenses, corneal surgery, herpes simplex keratitis, herpes zoster keratitis and venereal kerato-conjunctivitis (VKC)[2]. Fungal corneal ulcers are morphologically characterized by grayish white corneal ulcer with feathery margins, bordered by thick endothelial exudate and surrounded by satellite lesions[3].

If the normal corneal defense mechanism is compromised, any organism can invade the cornea and when causative organism is identified clinically and on slit lamp biomicroscopically, additional laboratory investigations are required. The outcome of microbial corneal ulcers is either corneal opacification or perforation. A major cause

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of this morbidity is inability to diagnose the ulcer on time and treat it appropriately. This is possible only by prompt and accurate identification of causative microorganisms via clinical methods and laboratory investigations.[4]

A definite diagnosis of fungal corneal ulcer is possible with saboraud's agar culture which takes nearly three weeks to grow the micro-organism. Alternate to which is stain with chemicals like Potassium Hydroxide (KOH), gram stain, gomori, calcoflour white and acridine orange, among which the KOH and gram stain are the simplest and most convenient methods to perform[5].

In a study carried out at Liaquat University of Medical and Health Sciences (LUMHS) Hyderabad Pakistan, the corneal scrapings which were examined by direct microscopy with potassium hydroxide showed fungi alone as the etiologic agent in 80.1% and bacteria along with fungi in 11.9% cases. Candida albicans was the most frequent organism which was isolated in 78.6% patients. The study result shows 35% of all the ulcers in our country are of fungal origin[6].

Another study compared the relative sensitivity of 10% (KOH) Potassium hydroxide in comparison with gram stain with higher sensitivity with former i-e 99.23% vs 88.73%[7].

In a study conducted on 3399 patients in South India, clinically diagnosed Fungal keratitis were scraped for direct microscopy, the results were positive for fungus in 91% of KOH preparation cases, 91.4% in Calcoflour white preparation, 88.2% in gram stain and 85.1% in Giemsa stain[8].

These studies revealed that nevertheless culture being the gold standard method for definite diagnosis of fungal keratitis, direct microscopic examination still has a great role in rapid preliminary diagnosis[9].

In our community with sub-tropical environment and agricultural dominance along with high prevalence and incidence of keratitis, this study will be helpful in early diagnosis of fungal keratitis in a cost effective way and will ensure a better visual outcome. With the early identification of the causative organism we will be able to give the specific treatment without any excessive medications which will lead to better patient compliance and less side effects.

This study will also highlight the importance of a cheaper technique using Potassium hydroxide stain for the diagnosis of fungal keratitis via direct microscopy. With ease of availability of diagnostic tools at secondary to tertiary level we will be able to introduce this easy method in rural healthcare centers in the periphery of our country.

METHODS:

This cross sectional study was performed on patients clinically diagnosed to have fungal Keratitis on daily basis by convenience sampling method through eye OPD Peoples University of Medical & Health Sciences for Women Hospital Nawabshah and Khairpur Medical College Khairpur Mirs from 1st January 2016 to 30 June 2016. A total of 200 patients were included in the study by Convenience sampling having clinical diagnosis of fungal keratitis, after considering inclusion criteria as patients with corneal ulcer having clinical fungal infection diagnosed through eye OPD, observed under slit lamp bio-microscopic examination, age over 12 years, with history of trauma, history of contact lenses and age less than 12 years (Needs general anesthesia, un-cooperative and do not sit on slit lamp easily), patient already on topical medications, descemetocele, endophthalmitis, perforated corneal ulcer, patients with other ocular or systemic comorbid all were excluded. The Patients were divided into two groups A and B, each containing 100 patients. Group A (100 Patients) who was started directly topical antifungal without scraping & staining procedure for 4 weeks. Group B (100 Patients) was first stained with potassium hydro oxide (KOH) stain on scrape material. Help was taken from the laboratory Department of Pathology Peoples University of Medical & Health Sciences for Women Nawabshah. Then all positive cases were started with topical antifungal treatment. Clinical response was seen after checking on slit lamp examination at 1st week and 4th week post treatment. The data was collected on a predesigned questionnaire. All data was analyzed by using statistical package for social

sciences (SPSS) version 16.0. The level of significance was assessed by considering 'p' value of 0.05 and confidence interval was 95%.

RESULTS:

Out of 200 patients enrolled the mean age of the patients was 37.25 ± 13.87years (table 1). There were 121 males and 79 females with male to female ratio of 1.4:1.Most commonly the age range affected was 31-50 yrs n=83 (41.85%), 15-30yrs in n=69(34.5 %) and 51-70yrs in n=48 (24%).

Table No. I: Demographic Variables

Variables	Frequency (Percentage)
Age in years Mean+SD	37.25+13.87
Gender Male: female	121:79 (60.5%:39.5%)
Occupation	
Farmer	66 (40.5%)
House Wives	45 (22.5%)
Service workers	51 (25.5%)
Laborers	38 (19%)

The occupation of the patients was farmer in n=66(40.5%), house wives in n=45(22.5%), service workers in n=51(25.5%) and laborers in n=38(19%).

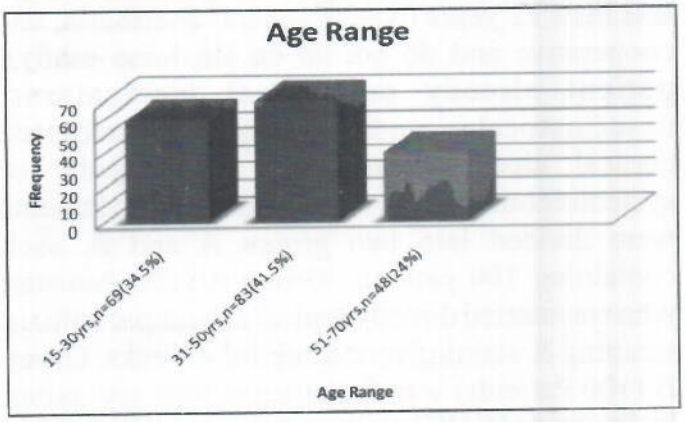

Table No. II: Group Wise Statistics

Group	Total Patients (n)	Stain Potassium Oxide (KOH)	Response to Treatment	%
A	100	--	56	56
B	100	71	65	91.54

Patients presenting with corneal ulcer mimicking fungal infection signs were observed under slit lamp bio microscopic examination. Out of n-100 patient of group A who was started topical antifungal without scraping & stain n-56 (56%) patients responded and fulfilled the improvement criteria at the end of 4th week. In group B out of n-100 patient's' n-71 (71%) patients stained positive with potassium hydro oxide (KOH) stain on scrape material. These 71 patients were started with topical antifungal and out of then n-65 (91.54%) patients responded and fulfilled the improvement criteria at the end of 4th week. Table II.

DISCUSSION:

Worldwide, Mycotic Keratitis vary in incidence from 17-36% more incidence seen in tropical areas i-e; 14-40%[10]. In Pakistan according to one study the incidence is around 40.6%[11]. In India the incidence is around 44-47%[12].It is the second most reason of blindness in the developing states. The paradigm shift has occurred in the recent years and fungal keratitis is given much of importance.

There is a variation in incidence and spectrum of fungi from place to place because various factors such as gender, age, weather, environmental and socioeconomic circumstances has an important mantle in altering the prevalence and incidence of fungal corneal viruses. There are around 60 species of fungal Keratitis and duration of interval till the development of clinical features of organism, inoculums size and resistance of host varies. Antibiotics resistance has rising alarmingly and has immerged has major health threat not only in the West but also in resource poor countries of Asia. Pakistan like many countries of world faces the uses antibiotics resistance as well. There is urgency for many health care setting because of associated higher morbidity, mortality and coasts[13,14].

In our study the age group most commonly affected was 31-50 years with predominant male incidence. Previous studies have shown increased incidence among males also.

Generally males were affected more as compared to females, which is normally the case. Though, a greater incidence in females is observed in various studies. The virus was more widespread in the age bracket of 41-60 years which is in difference to the study results of Chowdhury and Singh in which prevalence was observed among

age group of 31-40 years[15,16]. The likely cause could be that our care providers facilitates to huge number of patients who belong to rural settings. The foremost risk factors concerned in source of fungal corneal ulcers comprise professional farming, a trauma background, exercise of systematic/topical steroids or antibiotics, diabetes mellitus and immune compromised states.

Most of the patients 30% belong to working in farms and vegetative cultivation in our study. This reflects being an agricultural country with 25.1% accounting to GDP and 43% accounting to labour force by occupation. Vegetative trauma therefore being common cause of fungal keratitis in this part of world.

This over the counter medication prescribed by the doctors is due to either neglection or lack of diagnostic facilities. Corneal ulcers face the same scenario, as when a patient in encountered by an ophthalmologist his first priority is to use all antibiotics, antivirals and antifungal as a cocktail with falling into the problems of diagnosis.

One study is a land mark to shows the importance, in another way accuracy of potassium hydro oxide stain as diagnosing fungal keratitis cases.

It has shown that when antifungal are used blindly based only on clinical findings, the response is only 51.7% on contrary to it if we first diagnose the case with potassium hydro oxide staining on scrape material the response rate to the same antifungal rises to 73.2%. Thus alleviating the future need of keratoplasty and other procedures for these cases. As well as preventing a major cause of irreversible blindness.

Current study has therefore not only identified the importance of diagnostic management of fungal keratitis cases but also urged the ophthalmologist to take steps to establish a setup for diagnosing these case at primary & secondary health care level.

The results also show that potassium hydro oxide stain for fungal keratitis in our working conditions is quite cheap and accurate to start the treatment with antifungal. The next step as holds true will be to reach more accuracy to fungal keratitis diagnosis by creating laboratory facilities for culture media with trained staff at primary & secondary health care level.

CONCLUSION:

The direct microscopy with KOH stain is very much useful for the treatment of suspected cases of fungal keratitis which is a preventable cause of blindness in corneal ulcers. It is therefore beneficial in early detection of keratitis. Measures should be taken to identify the magnitude of the problem in order to control this health problem.

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