PARASITOLOGY

Retrospective Study of *Acanthamoeba* Keratitis at Hospital Universiti Kebangsaan Malaysia between 2010-2012

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ABSTRACT

Introduction: **Increasing numbers of *Acanthamoeba* keratitis (AK) cases are reported from many countries including Malaysia, in line with the popularity contact lens wear. However, the true extent or exact frequency of the disease is not known in Malaysia since it is not a notifiable disease in this country.**

Objective: **This study aims to retrospectively analyze all cases diagnosed at Hospital Universiti Kebangsaan Malaysia (HUKM) in a 3-year period between 2010-2012.**

Materials and Methods: **This retrospective study involved clinical samples submitted to the Acanthamoeba laboratory at the Department of Parasitology, HUKM from the year 2010-2012. The study only included patients diagnosed as having microbial keratitis with *Acanthamoeba* as the presumptive causative agent. Records from the request forms for *Acanthamoeba* isolation and the culture results were analyzed.**

Results: **A total of 64 suspected cases had their corneal scrapings sent to the *Acanthamoeba* laboratory from various hospitals across Malaysia. 10 (15.6%) parasitologically confirmed culture positive cases were identified from the total 64 suspected cases during the period 2010-2012. All 10 positive cases were contact lens wearers and were predominantly women (80%) while men (20%). All patients presented with similar symptoms of redness, pain, watery eye and photophobia.**

Conclusion: **All 10 AK cases were diagnosed at only one study center and it would be anticipated that the number of cases would increase if there were more study centers involved throughout Malaysia. This study has proven that AK is not extremely rare in Malaysia and it should be considered as part of the differential diagnosis of most cases of presumed microbial keratitis especially those involving contact lens wearers.**

KEY WORDS

***Acanthamoeba* keratitis, retrospective study, HUKM, Malaysia**

INTRODUCTION

Acanthamoeba keratitis (AK), is the infection of cornea by *Acanthamoeba*, characterized by a dramatic course with increasing pain and significant reduction of visual acuity. In Malaysia, *Acanthamoeba* keratitis was first reported in 1995 involving a long-term contact lens wearer (Mohamed Kamel & Norazah 1995). Ever since then, there has been increasing number of AK cases due partly to the increased awareness amongst the doctors and laboratory technologists as well as to the increasing trend of contact lens usage among Malaysians (Kamel *et al*. 2005).

Previous research on the isolation of *Acanthamoeba* spp. from contact lens paraphernalia in Malaysia (Mohamed Kamel *et al*. 2013) has shown the presence of *Acanthamoeba* parasites in contact lenses (10.6%), and in contact lens casings (13.5%). These figures are worrying and high enough to alert contact lens wearers, doctors and researchers. Though the number of *Acanthamoeba* keratitis cases is increasing, it is difficult to know the exact incidence or prevalence of this infection since it is not a notifiable disease. Hence this retrospective study is conducted to give an insight on the frequency of this disease in the country.

MATERIALS AND METHODS

This retrospective study involved the submission of clinical samples (corneal scrapings) to the *Acanthamoeba* laboratory at the Department of Parasitology, Hospital Universiti Kebangsaan Malaysia (HUKM) from the year of 2010-2012. The study only included patients diagnosed as having microbial keratitis with *Acanthamoeba* as the presumptive causative agent.

Data on patients' demography, clinical findings of the microbial keratitis, and the causative risk factors whenever available, were also retrieved from the request form records. Reports from the request forms for *Acanthamoeba* isolation and the culture results were analyzed.

RESULTS

A total of 64 cases of microbial keratitis with *Acanthamoeba* as the presumptive agent, participated in this study. Among the 64 cases, 20 were men and 44 were women. In proportion, 22 cases were from Hospital Universiti Kebangsaan Malaysia (HUKM), 5 cases were from Hospital Kuala Lumpur (HKL) and 28 were from private hospitals

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Table 1: *Acanthamoeba* keratitis cases from various Hospitals diagnosed at HUKM

Hospitals	Total samples	*Acanthamoeba* Positive Cases (%)
HUKM	22	4(18.2)
HKL	5	0
Private Hospitals	28	5(17.8)
HTAR Klang	9	1(11.1)

Table 2: *Acanthamoeba* keratitis cases diagnosed at HUKM based on Gender

Gender	Total Samples	*Acanthamoeba* Positive Cases (%)
Male	20	2 (10)
Female	44	8 (18.2)
Total	64	10 (15.6)

Table 3: *Acanthamoeba* keratitis cases diagnosed at HUKM based on Year

Year	Total Samples	*Acanthamoeba* Positive Cases (%)
2010	11	3 (27.3)
2011	27	4 (14.8)
2012	26	3 (11.5)

Table 4: *Acanthamoeba* keratitis cases diagnosed at HUKM based on Symptoms

Gender	Symptoms (Painful red eye, photophobia, watery eye)	*Acanthamoeba* Positive Cases (%)
Male	2	2 (100)
Female	8	8 (100)
Total	10	10 (100)

across Malaysia and 9 from Hospital Tengku Ampuan Rahimah, Klang (HTAR Klang) as shown in Table 1. Overall, this study has shown 10 (15.6%) *Acanthamoeba* culture positive cases from the total of 64 (Table 2). In terms of percentage of *Acanthamoeba* positivity, year 2010 shows the highest prevalence at 27.3%, followed by 2011 at 14.8% and 2012 at 11.5% (Table 3).

From the 10 *Acanthamoeba* positive cases, 8 (80%) were females and 2 (20%) were males and all of them were contact lens wearers (Table 4). The age range of positive patients were from 19 to 68 years old. All the patients had similarity in reporting their symptoms of having redness of the eye, pain, photophobia and watery eyes, as shown in Table 4.

DISCUSSION

Microbial keratitis is infection of the cornea that can be caused by a range of pathogens including bacteria, viruses, protists (eg. *Acanthamoeba*), and fungi. Amongst these pathogens, the least common cause is *Acanthamoeba* but it can result in debilitating monocular visual impairment leading to blindness. According to the contact-lens related corneal ulcers (CLRCU) registry which was established in 2007 as a surveillance tool used by Malaysian Ministry of Health, during 2007-2008, majority of patients had bacterial CLRCU and the most common causative organism was *Pseudomonas* (79.7% of bacterial cases). *Acanthamoeba* was suspected in 13 of the cases but eventually when the culture results came back, only one case was confirmed (Goh *et al*. 2010).

In a more recent study on microbial keratitis conducted between 2015-2017 at the Hospital Universiti Sains Malaysia (HUSM), Jin Yi *et al*. 2019 reported bacterial keratitis (51.1%) was found to be more common than fungal keratitis (24.8%). In cases of bacterial keratitis, *Pseudomonas* spp. was also the commonest causative agent, while in cases of fungal keratitis, *Fusarium spp*. was the commonest fungus microbial agent (Jin Yi *et al*. 2019). However, this study only included the patients diagnosed as having microbial keratitis caused either by bacterial or fungal organisms, excluding virus and *Acanthamoeba*.

Although reliable incidence data for *Acanthamoeba* keratitis are not available for Malaysia, in most series, the organism has been implicated in less than 5% of contact lens related microbial keratitis cases (Radford *et al*. 1998). In our retrospective study commencing from 2010 to 2012, the *Acanthamoeba* laboratory received 64 corneal scrapings from 64 suspected patients of AK. Culture of the corneal scrapings yielded 10 (15.6%) positive results confirming *Acanthamoeba* as the causative agent of keratitis. Sixty-four specimens over a 3-year period may seem to look like a very small number, however this *Acanthamoeba* lab is only dedicated to culturing *Acanthamoeba* and not other organisms causing keratitis. Therefore the ophthalmologists had selectively chosen to submit the specimens (corneal scrapings) from patients that were highly suspicious to be infected with *Acanthamoeba*. Moreover, clinical diagnosis of AK is difficult, especially in the early phases of the disease, and it often is misdiagnosed and treated as a herpes simplex infection. Most cases were either referred by the general medical practitioner clinic and community health clinic or by other subspecialty such as the Accident and Emergency Department. This underlined the importance of medical officers to be aware of this condition to diagnose and refer microbial keratitis cases for further management by ophthalmologist.

All the 10 (15.6%) confirmed AK cases were contact lens wearers but details on the type of contact lenses and disinfecting solutions used, were not available from the request forms. This has again proven that contact lens wear, is a single most important risk factor for contracting AK. Nazri *et al*. 2017, reported that contact lens was the most frequent predisposing risk factor for microbial keratitis, followed by ocular trauma and bacteria especially *Pseudomonas* spp. were the predominant causative agent. Our previous study (Mutalib *et al*. 2005) also showed high yields of *Acanthamoeba* isolates obtained from the lens storage cases (13.5%) and the contact lenses itself (10.6%) but no isolation was observed from the disinfecting solutions used. The potential sources of *Acanthamoeba* infection were traced to the contact lenses and the lens storage cases. The oral questionnaires showed high percentage of incompliance among contact lens wearers where many used tap water for cleaning lenses and rinsing storage cases (Mutalib *et al*. 2005).

Bariah & Xuan 2019, reported that contact lenses were more popular than spectacles for vision correction amongst the youth in Malaysia. The majority of the wearers were females (76.0%) and wore soft contact lenses (92.2%) and cosmetic purposes (58.1%) and comfort (24.6%) were the main reasons for wearing contact lenses (Bariah & Xuan 2019). These findings were reflected in our results where the positive cases of AK were predominantly females (80%) compared to males at only 20%. This is also supported by the fact that more females are using contact lenses compared to males (Cope *et al*. 2017). According to Cope *et al*. 2017, two thirds of the contact lens users of the world are females. This contributes to the finding of more females AK patients than males. Ismail *et al*. 2016, also reported a majority (78%) of contact lens related microbial keratitis cases in Klang Valley in Malaysia, were predominantly females.

The soft lenses which are popular in Malaysia, carry higher risk of *Acanthamoeba* infection than rigid lenses (Dart *et al*. 2009). However in this retrospective study, information on the type of contact lens used by the patients, was not available as it was not specified in the request form and formal report. The symptoms showed by the patients were also common symptoms of *Acanthamoeba* keratitis which included redness of the eye, pain, photophobia and watery eye. As this retrospective study was based on the request forms for *Acanthamoeba* isolation, not much additional information could be gathered such as treatment, details of contact lenses used and patients health progress. As our study was also only single centered, the data collected though useful, may not reflect an accurate picture of AK in Malaysia and a multicenter involvement is highly recommended in future.

CONCLUSION

Acanthamoeba has been proven to be an important cause of microbial keratitis in Malaysia. Though the number of cases are not that many in this study, it might not reflect the true frequency of *Acanthamoeba* keratitis cases in Malaysia, as this only represents the result from one study center. Contact lens wear has been the most important risk factor in this study and all positive cases are proven to be associated with the use of contact lens.

Contact lens users should be educated of proper use and care of different types of contact lens available in the market as well as the potential harms arising from its use including the microbial keratitis.

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