OPHTHALMOLOGY

Acanthamoeba keratitis: A 3-Year Retrospective Study at HUKM (2013-2015)

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ABSTRACT

Introduction: ***Acanthamoeba*** **keratitis (AK), caused by a pathogenic amoeba, is a sight-threatening corneal infection usually affecting contact lens wearers. Increasing numbers of** ***Acanthamoeba*** **keratitis cases are reported globally including Malaysia, along with increased use of soft contact lenses. 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 investigates the prevalence of** ***Acanthamoeba*** **keratitis from 2013-2015 at the Hospital Universiti Kebangsaan Malaysia (HUKM) in Kuala Lumpur, Malaysia.**

Materials and Methods: **This retrospective study involved clinical samples submitted to the** ***Acanthamoeba*** **laboratory at the Department of Parasitology and Medical Entomology UKM from the year of 2013-2015. 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 analysed.**

Results: **A total of 62 suspected cases had their corneal scrapings sent to the** ***Acanthamoeba*** **laboratory from different hospitals across Malaysia. 14 (22.6%) parasitologically confirmed culture positive cases were identified from the total 62 suspected cases during the period 2013-2015. All the 14 positive cases were contact lens wearers and they all presented with similar symptoms of redness, pain, watery eye and photophobia. All cases came from private hospitals throughout Malaysia. Majority of them (34.6%) were women and men constituted 13.8%.**

Conclusion: **All 14 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, microbial, HUKM, Malaysia**

INTRODUCTION

Acanthamoeba keratitis (AK), caused by a pathogenic amoeba, is a sight-threatening corneal infection with severe pain, epithelial defect, epithelial haze, pseudodendrites and, most characteristically, radial keratoneuritis. The corneal infection of AK was first recognized in the mid 1970s. Since then, a growing number of AK cases were diagnosed, mainly resulting from improper use of soft contact lenses. 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). Improper contact lens usage has been regarded as the main risk for AK. In addition to the lack of cleanliness, exposure to contaminated water and corneal trauma have also been found to contribute to the infection (Khan, 2006).

Even when *Acanthamoeba* keratitis is an uncommon infection, it is worrying the contact lens users in Malaysia as the severity of the infection could possibly results in blindness. 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 is not a notifiable disease. Hence this retrospective study is conducted to give an insight on the frequency of this disease in the country.

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Table 1: AK cases from various hospitals diagnosed at HUKM (2013-2015)

HOSPITALS	TOTAL SAMPLES	POSITIVE CASES (%)
HUKM	12	0
SUNGAI BULOH HOSPITAL	8	0
PRIVATE HOSPITALS	42	14 (33.3)

Table 2: AK cases diagnosed at HUKM based on Years

YEAR	TOTAL SAMPLES	POSITIVE CASES (%)
2013	21	8 (38.1)
2014	20	3 (15)
2015	21	3 (14.3)

Table 3: AK cases diagnosed at HUKM based on Gender

GENDER	TOTAL SAMPLES	POSITIVE CASES (%)
MALE	36	5 (13.8)
FEMALE	26	9 (34.6)
TOTAL	62	14 (22.6)

Table 4: AK cases from 2013-2015 at HUKM based on Symptoms

GENDER	SYMPTOMS (Painful red eye, photophobia, watery eye)	POSITIVE CASES (%)
MALE	5	5 (100)
FEMALE	9	9 (100)
TOTAL	14	14 (100)

MATERIALS AND METHODS

This retrospective study involved clinical samples (corneal scrapings) submitted to the *Acanthamoeba* laboratory at the Department of Parasitology and Medical Entomology UKM from the year of 2013-2015. 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. Records from the request forms for *Acanthamoeba* isolation and the culture results were analysed.

RESULTS

A total of 62 cases of microbial keratitis with *Acanthamoeba* as the presumptive agent, participated in this study. Among the 62 cases, 36 were men and 26 were women. The age of patients ranged from newborn to 84 years old. In proportion, 12 cases were from Hospital Universiti Kebangsaan Malaysia (HUKM), 8 cases were from Sungai Buloh Hospital and 42 were from private hospitals across Malaysia (Table 1). Overall, this study has shown 14 (22.6%) culture positive cases from the total of 62 (Table 1). The year 2013, recorded the highest number of positive cases with 8 (38.1%) out of 21 (Table 2).

All the 14 cases (33.3%) were from samples that had been sent from private hospitals (Table 1). From the 14 cases, 9 (34.6%) were females and 5 (13.8%) were males and all of them were contact lens wearers (Table 3). Their age ranged from 19 to 35 years. All the patients had similarity in reporting their symptoms of having redness of the eye, pain, photophobia and watery eyes (Table 4).

DISCUSSION

Microbial keratitis which is also known as corneal ulcer, is a common ocular infection that can result in debilitating monocular visual impairment. Based on the national eye survey in Malaysia, in 1996, corneal disease affected about 3.42% of the total population and ranked the fourth commonest cause resulting in low vision or blindness (Zainal *et al*. 2002). The incidence of corneal ulcer leading to monocular blindness worldwide, including Malaysia, is significant.

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 2013 to 2015, the *Acanthamoeba* laboratory received 62 corneal scrapings from 62 suspected patients of AK. Culture of the corneal scrapings yielded 14 (22.6%) positive results confirming *Acanthamoeba* as the causative agent of keratitis. Sixty-two 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 they were confident 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.

All the 14 (33.3%) confirmed AK cases came from private hospitals across Malaysia. They were all 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. 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 (34.6%) compared to males at only 13.8%. 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.

Based on the findings of our analysis, the age group of the infected patients ranged from 19-35 years old. This is further supported by a previous study in Malaysia which had shown that most cases of contact lens related microbial keratitis occurred among patients at the age of 18-29 years old (Ismail *et al*. 2016).

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. Therefore, detailed analysis of contact lens care practices among the patients in this study is important, as it could help identify the predictors for AK. As most of contact lens wearers in Malaysia do not have sufficient knowledge about the risks of wearing contact lenses, aggressive public health education aimed at youngsters is needed to prevent improper contact lens usage.

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