



UNIVERSITI PUTRA MALAYSIA

**RISK FACTORS FOR CONTACT LENS RELATED
MICROBIAL KERATITIS**

LILI ASMA ISMAIL

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**RISK FACTORS FOR CONTACT LENS RELATED
MICROBIAL KERATITIS**

By

LILI ASMA ISMAIL

**Thesis Submitted to the School of Graduate Studies, Universiti Putra
Malaysia in Fulfilment of the Requirements for the degree of
Doctor of Philosophy**

January 2011

The image features a large, semi-transparent watermark of the Universiti Putra Malaysia (UPM) logo. The logo is a shield-shaped emblem with a red and white color scheme. At the top left of the shield, the letters 'UPM' are written in white on a red background. The central part of the shield contains a stylized white graphic that resembles a book or a set of architectural lines. The entire shield is set against a light grey background.

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DEDICATION

To my parents, Dr. Ismail Mohd. Noor and Jamilah Mohd. Zaenal Abidin

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfillment of the requirement for the degree of Doctor of Philosophy

RISK FACTORS FOR CONTACT LENS RELATED MICROBIAL KERATITIS

By

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January 2011

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Faculty : Medicine and Health Sciences

Introduction

Contact lens related microbial keratitis (CLRMK) is a complication of contact lens wear and is sight threatening. Urgent treatment is required to reduce the possibility of losing vision. A hospital case control study on the risk factors of CLRMK was conducted in seven government hospitals in the Klang Valley.

Objectives

To determine the risk factors for CLRMK in relation to socio-demographics, contact lens characteristics, personal habit and contact lens care procedures in patients with CLRMK in government hospitals in the Klang Valley for the duration from January 2007 until December 2009.

Materials and methods

All patients who presented with CLRMK (n=94) at the hospitals were taken as respondents. Controls (n=94) were taken from contact lens users without CLRMK. Self administered questionnaire in *Bahasa Malaysia* was used. The questionnaire was developed, pre-tested and validated. The clinical examinations done were visual acuity, keratometry, corneal topography and contrast sensitivity. Microbial investigations on the suspected microorganism(s) was done using culture and sensitivity. Data was analysed using SPSS 16 which included t-test, chi-square test and multiple logistic regression.

Results

The most common causative agent was *Pseudomonas aeruginosa* with 29 (40.3%) cases isolated, followed by *Serratia marcescens* with six (8.3%) cases, *Acanthamoeba* with six (8.3%) cases, fungal with six (8.3%) cases and a mixture of several microorganisms.

Higher income level per month had a lower risk for CLRMK ie RM3000-3999 [USD980-1307] (OR 0.276, CI 0.096, 0.794 p=0.017) and income level of more than RM5000 [USD1634] (OR 0.191, CI 0.063, 0.583 p=0.004), when compared to income of less than RM1000 as the referent. The risk of CLRMK was highest with monthly disposable contact lens wear (OR 7.737, CI 1.535, 38.998

p=0.001). Smoking was also a risk factor for CLRMK (OR 2.393, CI 1.021, 5.607 p=0.045). Although gender was not significantly associated with CLRMK, the frequency of CLRMK was higher in women (N=73) compared to men (N=21).

Ethnicity and non-compliance contributed significantly to CLRMK. Chinese ethnicity (aOR 0.126, CI 0.045, 0.355 p=0.001) and Indian ethnicity (aOR 0.295, CI 0.088, 0.989 p=0.048) had decreased risks for CLRMK while Malay ethnicity was a predictor for CLRMK with an increased risk of 70%-87%. Non-compliance contributed to an increased risk of 2.6 times for CLRMK (aOR 2.590, CI 1.003, 6.689 p=0.049). Not washing hands with soap (aOR 2.98, CI 1.02, 8.70 p=0.046), not performing rubbing technique (aOR 3, CI 1.19, 7.54 p=0.019), not cleaning lens case with multipurpose solution (aOR 3.24, CI 1.46, 7.19 p=0.004) and sleeping in lenses (aOR 2.87, CI 0.98, 8.39 p=0.050) were identified as predictors for CLRMK.

Visual acuity in the cases improved at follow up visits. However, there was a reduction in corneal uniformity index and corneal asphericity. Contrast sensitivity function at all spatial frequencies in cases was also reduced. As for the visual outcome of CLRMK, 80 respondents (85.1%) had improved visual acuity at 3 months between of 6/6 and 6/12. Five respondents (5.3%) had visual acuity between 6/18 and 6/60 while nine (9.6%) had visual acuities ranging from 6/60 to no perception of light.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia
sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

**FAKTOR RISIKO PENYAKIT KERATITIS MIKROBIAL BERKAITAN
KANTA SENTUH**

Oleh

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Pendahuluan

Mikrobial keratitis berkaitan kanta sentuhan (CLRМК) adalah komplikasi daripada pemakaian kanta sentuh dan merupakan ancaman kepada penglihatan. Rawatan awal diperlukan untuk mengurangkan kemungkinan kehilangan penglihatan. Kajian kes kawalan telah dijalankan untuk menentukan faktor-faktor risiko yang berkaitan dengan penyakit keratitis mikrobial berkaitan kanta sentuh (CLRМК) di tujuh hospital-hospital kerajaan sekitar Lembah Klang.

Objektif

Untuk menentukan faktor risiko CLRMK berdasarkan kepada faktor demografik, ciri-ciri kanta sentuh, tabiat peribadi dan prosedur penjagaan kanta sentuh dalam pesakit CLRMK di hospital-hospital kerajaan sekitar Lembah Klang untuk tempoh daripada Januari 2007 sehingga Disember 2009.

Bahan dan kaedah

Kesemua pesakit dengan CLRMK (n=94) daripada hospital telah direkrut sebagai responden. Subjek kawalan (n=94) telah direkrut daripada kalangan pengguna kanta sentuh tanpa CLRMK. Borang soal selidik telah dibentuk, diprauji and divalidasi. Borang kaji selidik yang diisi oleh responden telah dianalisis. Ujian klinikal yang dilakukan adalah penentuan ketajaman akuiti penglihatan, keratometri, topografi kornea dan sensitiviti kontras. Ujian mikrobial dilakukan untuk penentuan mikroorganisma. Analisis statistik melalui penggunaan SPSS 16 merangkumi ujian t, ujian khi kuasa dua dan ujian regrasi logistik pelbagai.

Keputusan

Agan penyebab CLRMK yang paling kerap adalah *Pseudomonas aeruginosa* dengan 29 (40.3%) kes diikuti dengan *Serratia marcescens* dengan jumlah

enam (8.3%) kes, *Acanthamoeba* dengan jumlah enam (8.3%) kes, fungus dengan jumlah enam (8.3%) kes dan campuran beberapa mikroorganisma.

Tahap pendapatan yang tinggi sebulan juga dikaitkan dengan risiko yang rendah untuk mendapat CLRMK iaitu pada tahap pendapatan RM3000-3999 [USD980-1307] (OR 0.191, CI 0.096, 0.794 p=0.017) dan tahap pendapatan melebihi RM5000 [USD1634] (OR 0.191, CI 0.063, 0.583 p=0.004) menggunakan tahap pendapatan kurang daripada RM1000 sebagai referen. Pemakaian kanta sentuh pakai buang secara bulanan dikenalpasti sebagai faktor risiko tertinggi (OR 7.737, CI 1.535, 38.998 p=0.013). Merokok (OR 2.393, CI 1.021, 5.607 p=0.045) juga dikaitkan dengan peningkatan risiko CLRMK. Walaupun jantina tidak mempunyai kaitan signifikan dengan CLRMK, wanita mencatatkan frekuensi tertinggi (n=73) berbanding lelaki (n=21).

Ujian regresi logistik pelbagai mendapati faktor kaum dan tidak mematuhi prosedur penjagaan kanta menyumbang secara signifikan kepada CLRMK. Kaum Cina (aOR 0.126, CI 0.045, 0.355 p=0.001) dan India (aOR 0.295, CI 0.088, 0.989 p=0.048) mempunyai risiko yang lebih rendah untuk mendapat CLRMK sementara kaum Melayu mempunyai peningkatan risiko sebanyak 70%-87%. Tidak mematuhi prosedur penjagaan kanta pula mempunyai risiko yang lebih tinggi sebanyak 2.6 kali untuk mendapat CLRMK (aOR 2.590, CI 1.003, 6.689 p=0.049). Tidak membasuh tangan (aOR 2.98, CI 1.02, 8.70), tidak mengamalkan teknik menggosok (aOR 3, CI 1.19, 7.54 p=0.019), tidak

mencuci bekas kanta dengan larutan pelbagai guna (aOR 3.24, CI 1.46, 7.19 $p=0.004$) dan pemakaian kanta waktu tidur (aOR 2.87, CI 0.98, 8.39 $p=0.050$) dikenalpasti sebagai peramal untuk CLRMK.

Terdapatnya peningkatan dalam ketajaman penglihatan di kalangan kes sewaktu temujanji ulangan. Walaubagaimanapun, indeks keseragaman kornea dan aspherisiti kornea menurun. Fungsi sensitiviti kontras juga didapati menurun pada semua frekuensi spatial. Untuk keputusan penglihatan, 80 responden (85.1%) mengalami peningkatan dalam ketajaman penglihatan dalam tempoh tiga bulan pasca episod CLRMK, iaitu julat 6/6 hingga 6/12. Lima responden (5.3%) mempunyai ketajaman penglihatan antara julat 6/18 hingga 6/60 sementara sembilan responden (9.6%) mempunyai ketajaman penglihatan antara julat 6/60 hingga tiada persepsi cahaya.

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

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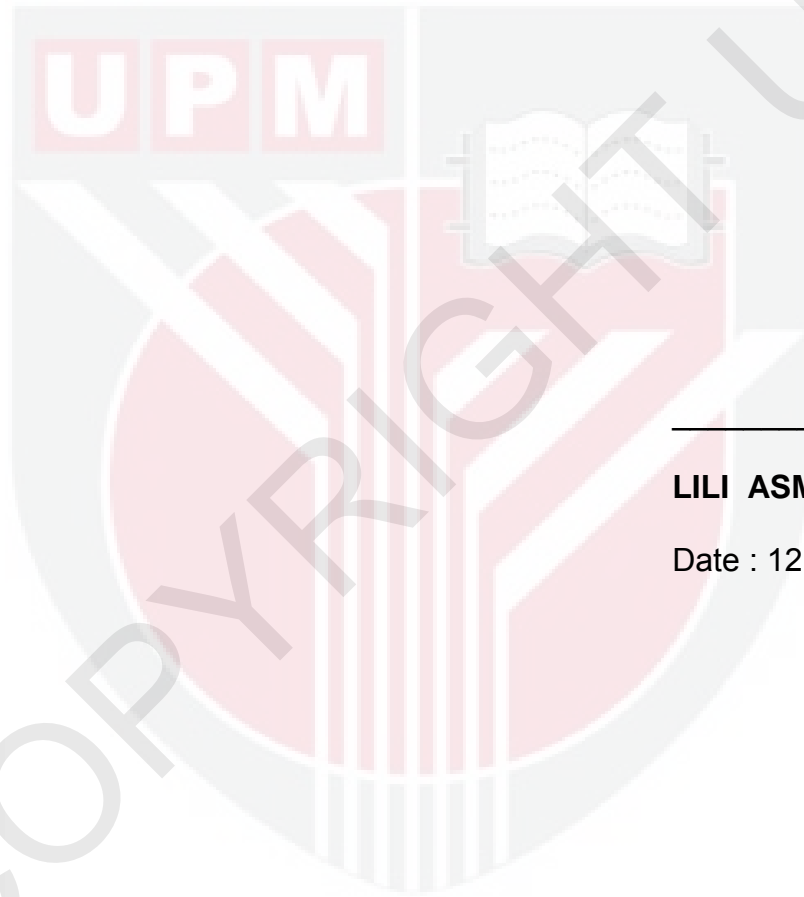
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DECLARATION

I declare that this thesis is my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or at any other institution.



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Date : 12 January 2011

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