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## Incidence of dry eye in a sample population in Kuala Lumpur

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### ABSTRACT

**Background:** Dry eye disease is one of the most frequently encountered ocular problems and yet limited prevalence data on Asian population is available in the literature.

**Aims and Objective:** To determine the incidence of dry eye in a sample population in Kuala Lumpur using the McMonnies dry eye questionnaire (MDEQ).

**Methods:** Around 900 subjects were invited to participate in this study. The MDEQ was distributed to all subjects and the survey was self administered. The results were analyzed using t-test and ANOVA.

**Results:** A total of 850 subjects completed the MDEQ with 375 (44.1%) males and 475 (55.9%) females. The age distribution was 353 (41.5%) under 25 years (Group 1), 247 (29.1%) between 25 to 45 years (Group 2) and 250 (29.4%) above 45 years (Group 3). Around 44% were Malays, 48.1% Chinese, 7.4% Indians and 0.5% from other races. 14.6% of the population was having dry eye. Mean score for all subjects were  $9.38 \pm 5.63$  with significantly higher score ( $10.01 \pm 5.86$ ) for females than males ( $8.57 \pm 5.21$ ) ( $p=0.02$ ). No significant difference was detected between races ( $p=0.07$ ). Following age, mean score for Group 1, 2 and 3 was  $6.80 \pm 4.01$ ,  $10.17 \pm 5.64$  and  $12.24 \pm 5.96$  respectively with significant difference between Group 1 and other groups ( $p<0.05$ ).

**Conclusion:** Around 15% of the sample population is having dry eye, with higher score in females and older age groups. The MDEQ should be considered by eye care practitioners for screening dry eye and the results may improve the management of dry eye problems in this region.

**Keywords:** McMonnies dry eye questionnaire, dry eye, normal population, tears

### Introduction

Dry eye is one of the most frequently encountered ocular problems. Twenty-five percent of patients who visit ophthalmic clinics report symptoms of dry eye, making it a growing public health problem and one of the most common conditions seen by eye care practitioners (1). If neglected, dry eye can increase the risk of ocular surface infection and cause visual disturbances (2, 3). The prevalence of dry eye varies between

countries and was estimated to be around 7.4% to 33.7% (4-7). The Beaver Dam population-based study found the prevalence rate to be 14% in adults 48 to 91 years of age (4). The study also found that dry eye affects more women than men (16.7% versus 11.4%, respectively). Reliable epidemiological studies from the large Women's Health Study and Physician's Health Study indicate that the prevalence of symptomatic dry eye in the United States is about 7% in women and 4% in men over the age of 50 years (5). The

prevalence of dry eye is approximately 7.4% in Australia, with significant increase of prevalence in older patients and a significant decrease of tear production in women 50 to 59 years of age. In Indonesia, dry eye prevalence is approximately 27.5%, with increased prevalence associated with age, cigarette smoking, and pterygium (6).

According to the published reports from the International Dry Eye workshop, dry eye refers to multi factorial diseases of tears and ocular surface that results in symptoms of discomfort, visual disturbance and tear film instability that potentially damage the ocular surface (7, 8). It is by definition a symptomatic disorder with various level of severity that interferes with daily activities such as reading, working with computer and driving a car (3, 9). Questionnaires have been shown to deliver reliable information of dry eye symptoms and may provide a more integrated view of the clinical condition over time (10, 11). Several questionnaires have been developed to be used both in epidemiological and clinical researches to serve as screening instrument and to grade the severity of symptoms. Among the symptom questionnaires available, the Ocular Surface Disease Index (OSDI), the Dry Eye Questionnaire (DEQ), and the McMonnies Dry Eye Questionnaire (MDEQ) have been widely used (10 - 12). These questionnaires vary in length, design focus, and extent of validation. However, MDEQ has been considered a 'gold standard' for screening dry eye symptoms around the world (13) and therefore is reasonable to use in this study.

This study was planned to determine the incidence of or dry eye in a sample population in Kuala Lumpur using symptoms questionnaires. The prevalence and incidence of dry eye in the clinical settings may be under-reported, as patients may fail to recognize the symptoms of dry eye or do not

report the problem to a physician or Optometrist (14). To our knowledge there is no reported data on the incidence of dry eye in Malaysian population using any symptoms questionnaire available in the literature. The results of this investigation may improve our understanding about dry eye and the management of dry eye patients within this region.

## **METHODOLOGY**

### **Data collection**

This is a cross sectional study where participants were only required to answer the MDEQ. The survey was invented in 1986 and consists of 12 questions that focus on clinical risk factors for dry eye (12). The questions employ response options that vary in number and type and provide a score from 0 to 45. Respondents were required to answer all the 12 questions and the score of each question (which has a weighted scoring scale) was calculated. Scores above 14.5 are consistent with dry eye. The reliability and validity of MDEQ has been evaluated by earlier workers (13, 16) and their results showed good reliability and validity for clinical use.

This survey was conducted in Kuala Lumpur in 2008. To ensure that the sample size meet at least 80% power of the study, number of subjects were calculated using statistical software CCSTAT (version 3.1) and the number of subjects found were around 500. To increase the validity and power of this research, a higher number of subjects were chosen. This project is part of a postgraduate research project conducted at the Optometry Department, Universiti Kebangsaan Malaysia. Therefore, there is a time limitation (around 2-3 months) allowed for data collection. To ensure that sufficient data can obtained

through the time frame, 3 different Optometry clinics that were located in highly populated areas around Kuala Lumpur were selected to distribute the survey. Participants were visitors (including patients, family members and friends who accompanied the patients) to the clinics and were explained about the purpose of study prior to answering the survey. There was no bias in the selection of participants and the survey was self administered. This research was approved by the Medical Ethics Committee of Universiti Kebangsaan Malaysia (UKM 1.5.3.5/244/PPP2) and followed the tenets of Declaration of Helsinki for the use of human subjects.

### **Statistical analysis**

The results of this study were analyzed using descriptive statistics. Bar charts were plotted to demonstrate the subjects' distribution following gender, race and age groups. For the purpose of statistical analysis, subjects were divided into 3 age groups, that is young adult (less than 25 years old), adult (25 to 45 years old) and older population (above 45 years old). Parametric (t-test) analysis was used to compare mean scores between genders and one way ANOVA was used to compare the mean scores between races and age groups.

## **Results**

The survey was distributed to 900 adult participants, but only 850 of them completed the questionnaires. The incomplete questionnaires were excluded from the analysis and did not significantly reduce the power of the study. The gender distribution was 375 (44.1%) males and 475 (55.9%) females. The age range was between 18 to 60 years old. Three hundred and fifty-three of them (41.5%) were of the age under 25 years, 247 (29.1%) were of the ages between 25 to

45 years and another 250 (29.4%) were above 45 years. The racial mix was 44.0% Malays, 48.1% Chinese, 7.4% Indians and 0.5% others. The subjects' distributions are shown in Figures 1 and 2 below.

The MDEQ scoring criteria were used to determine dry eyes. The incidence of dry eye found in this study was 14.6%. The results showed a range of scoring from 0 to 39, with mean score of  $9.38 \pm 5.63$ . The mean score for females was  $10.01 \pm 5.86$  and for males was  $8.57 \pm 5.21$ . Statistical analysis indicated significantly lower score ( $p=0.02$ ) for females than males in this study. However, no significant difference was detected between races ( $p=0.07$ ). The mean score for Malays was  $8.94 \pm 4.42$ , for Chinese was  $8.56 \pm 3.25$  and Indians was  $8.75 \pm 5.55$ .

In the age group 25 years and below, the mean score was  $6.80 \pm 4.01$ . Mean score for the age group from 25 to 45 years was  $10.17 \pm 5.64$  and the mean score for the age group above 45 years was  $12.24 \pm 5.96$ . Statistical analysis showed significantly different scores between the youngest (below 25 years) age group and other groups ( $p<0.05$ ). Mean scores following gender and age are summarized in Tables 1 and 2 below.

## **Discussion**

Dry eye is one of the most prevalent eye diseases. Results of the present study estimated that around 15% of the sample population in Kuala Lumpur has dry eye. The data showed similar value to an earlier study using clinical measurements on 200 outpatients attending an eye clinic in Kuala Lumpur (15). In the earlier study, dry eye was determined based on clinical signs and

symptoms with Schirmer tests and tear break up time (TBUT) values. The similarity in results indicates that MDEQ is a reliable test to use to screen for dry eye. Earlier works on MDEQ reported a sensitivity of 98% and a specificity of 97%, thus making it a tool which will be beneficial to clinicians and primary eye care professionals (16).

Results of this study also showed significantly higher mean score for females than males ( $p < 0.05$ ). This signifies that female sex has higher risk of developing dry eye than males in this sample population. The results concurred with a large scale epidemiological study in US that showed higher prevalence of symptomatic dry eye in women than in men (5). However, it is also possible that women are more likely to report about the symptoms than men. A study in Taiwan indicated significantly higher percentage of women reporting dry eye symptoms to their practitioners compared to men (17).

With regards to different ethnic groups, the present results showed insignificant difference in the mean score between the three main groups. However, we duly noted that the racial percentage was not well distributed in this study. According to the Malaysia census population and housing report 2010, almost 50% of the population are Malays, around 23% Chinese and only 1.3% Indians (18). In this study, majority of the subjects were Chinese, followed by Malays and Indians. It is possible that the unequal ethnic distribution may influence the results. Earlier clinical studies have shown that Asians have lower tear break up time (TBUT) values compared to Caucasians (19, 20). Future studies with larger sample size are required to confirm this finding.

Aging has been identified as one of the risk factors of developing dry eye. The mean score for older age groups in this study were

significantly higher when compared to the younger age group (below 25 years old). Significant increment in prevalence of dry eye in older patients was found in many earlier studies (2-5). The prevalence of dry eye is around 7.4% in Australia, with significant increase in older population and significant decrease in tear production in women in 50 to 59 years of age (4).

## **Limitations of study**

Time constraint is the major limitation in this study. Due to this factor, subjects of this study were not well distributed to represent the population of Kuala Lumpur. Future studies with better distribution of subjects from the general population are needed to confirm our findings.

## **Conclusion**

This study concludes that the incidence of dry eye in a sample population in Kuala Lumpur using MDEQ is around 15%. The women were found to have higher risk than men in developing dry eye. The MDEQ should be used more frequently by general and eye care practitioners in this country to screen for dry eye and to improve the management of dry eye patients.

### **List of abbreviations (if any)**

MDEQ: McMonnies Dry Eye Questionnaire

### **IRB permissions**

This study was approved by the Medical ethics committee of Universiti Kebangsaan Malaysia. (UKM 1.5.3.5/244/PPP2).



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**Competing interest**

None to declare

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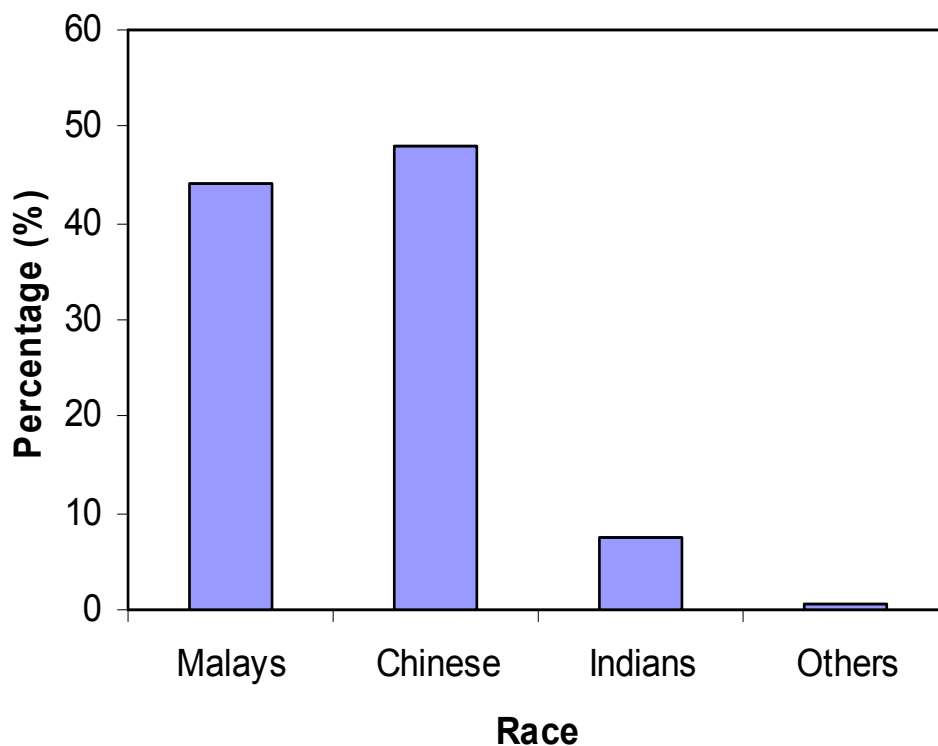
**Conflict of interest**

None to declare

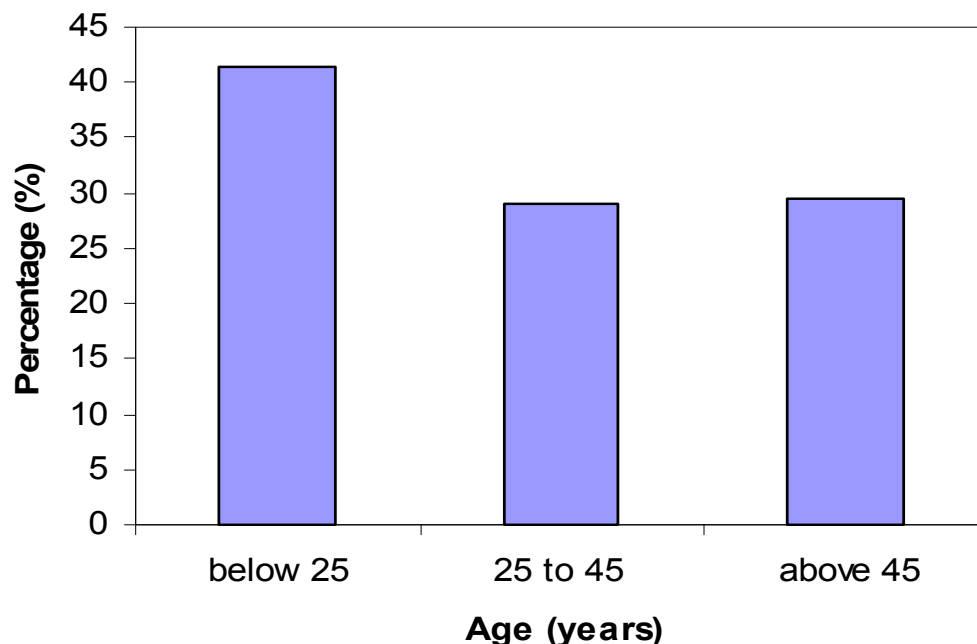
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**Figure 1: Percentage of respondents according to gender**



**Figure 2: Percentage of respondents following age groups**

**Table 1: Mean score of McMonnies Dry Eye Questionnaire following gender**

Group	Number of subjects (n)	Mean score
Females	475	10.01 ± 5.86
Males	375	8.57 ± 5.21
<b>TOTAL</b>	850	9.38 ± 5.63

**Table 2: Mean score of McMonnies Dry Eye Questionnaire following races**

Race	Number of subjects (n)	Mean score
Malays	374	8.94 ± 4.42
Chinese	409	8.56 ± 3.25
Indians	67	8.75 ± 5.55
<b>TOTAL</b>	850	9.38 ± 5.63

**Table 3: Mean score of McMonnies Dry Eye Questionnaire following age group**

Age Group	Number of subjects (n)	Mean score
Below 25 years	353	6.80 ± 4.01
Between 25 to 45 years	247	10.17 ± 5.64
Above 45 years	250	12.24 ± 5.96