

# DEMODICOSIS AMONG UNIVERSITY MEDICAL STUDENTS IN MALAYSIA AND THE EFFECTS OF FACIAL CLEANSER AND MOISTURIZER USAGE

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**Abstract.** Demodicosis is an infestation of the skin with *Demodex*, an ectoparasite commonly found on the face. A cross-sectional study was conducted to detect the presence of the ectoparasite and the outcome of facial cleanser and moisturizer usage on its infestation. Universal sampling was performed among 390 medical students, age 20-25 years old in the Klang Valley of Malaysia. The biodata of the participants and information on the use of facial cleanser and moisturizer were obtained through questionnaire. Skin samples were obtained using both skin scraping and cellophane tape method and were subsequently examined directly by microscopy. The results show an overall prevalence of 17.2%. Males (21.5%) were affected more often than females (12.8%) ( $p=0.022$ ). There were no significant differences in the prevalence of the ectoparasite among different ethnic groups, age-groups and the presence of existing facial problems among the subjects. A lower infestation rate (11.45%) was found to be associated with the use of a moisturizer ( $p=0.033$ ). Both species of ectoparasites that infest man, *Demodex folliculorum* and *D. brevis*, were detected in this study either as single or mixed infestations.

**Keywords:** *Demodex folliculorum*, *Demodex brevis*, demodicosis, skin scraping, cellophane tape, moisturizer

## INTRODUCTION

Demodicosis is infestation with an ectoparasitic mite known as *Demodex*, among the smallest of arthropods. Many species of *Demodex* are known to infest mammals worldwide; *D. folliculorum* and

*D. brevis* are the two species commonly found on humans. The former inhabits the hair follicles while the latter lives in sebaceous glands connected to hair follicles. Both are usually found around the face, specifically on the nose and in the malar area. However, they can be found elsewhere on the body (Roihu and Kariniemi, 1998).

The mobility of the mite is facilitated by the scales covering its body surface. Hair follicles are the center for most of its activities, including mating and feeding on skin-cells, hormones and oils (sebum).

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The effective digestive system results in little waste being produced by the ectoparasite. Therefore, no excretory orifices are required. Like most ectoparasites, the *Demodex* mite is nocturnally active. It travels around on the face and migrates from follicle to follicle especially during the night (Rufli and Mumcoglu, 1981).

Both male and female mites have a genital opening. Mating and reproduction occur at the hair follicle opening. The eggs are laid in the follicles. The six-legged larvae hatch after a few days and grow into the adult stage within a week. The life cycle completes after several weeks. Decomposition of the dead ectoparasite occurs in the hair follicles.

Infestation with *Demodex* often causes few problems, but its number can rapidly increase, especially when the host is immunologically suppressed (Yagdiran and Aytakin, 2007). Most patients are not aware of the infestation until they have certain facial skin disorders. A diagnosis is usually made only when the patient seeks help from a dermatologist who is knowledgeable about the problems caused by this particular ectoparasite. The common clinical signs and symptoms are facial itching, redness, papules and pustules (Anonymous, 2004). Other symptoms include nonspecific erythema, pityriasisiform squamous lesions, acneiform, granulomatous rosacea-like and perioral dermatitis-like symptoms (Karincauglu *et al*, 2004). The first documented case of *Demodex* infestation in Malaysia was manifested only by dryness and scaly skin (Jeffery *et al*, 1983). Blepharitis is also known to be associated with demodicosis (Heacock, 1986; Fulk and Clifford, 1990; Fulk *et al*, 1996).

Hu and Wang (2001) reported a positive correlation between demodicosis and

facial problems. Ljubojeviæ *et al* (2002) suggested the mite may have provoked an inflammatory or allergic reaction by impeding the hair follicles. It is possible the ectoparasite may serve as a vector for microorganisms that cause skin problems. Healthy individuals are sometimes positive for mite infestation, therefore it is thought facial problems only manifest when the ectoparasite is present in abundance on the face. Sabine *et al* (2007) investigated the effect of facial moisturizer use on demodicosis. They found moisturizers helped to re-establishing a skin barrier and significantly reduced skin dryness, roughness and desquamation due to the infestation.

As facial problems are common among teenagers and young adults, our study aimed to determine the prevalence of demodicosis among young adults, and the relationship between regular use of facial moisturizer and the infestation. Our study included subjects who presented with any one of the symptoms reported in previous studies of the clinical manifestations of this ectoparasite (Ljubojeviæ *et al*, 2002; Anonymous, 2004; Karincauglu *et al*, 2004; Yagdiran and Aytakin, 2007).

## MATERIALS AND METHODS

This cross-sectional study was conducted on 390 medical students aged 20-25 years in Klang Valley, Malaysia, and included 195 males and 195 females. The sample size was determined using the formula by Kish (1965). Universal sampling was used.

A self-directed, closed ended questionnaire was used. The variables studied were gender, age, ethnic group, and information about facial problems, facial cleanser and moisturizer usage.

Table 1  
 Characteristics of subjects infested with *Demodex* by gender, age-group, ethnicity, and use of facial cleanser, moisturizer and having a facial problem.

Characteristics	Total number	Number positive (%)	p-value
Male	195	42 (21.54%)	0.022
Female	195	25 (12.82%)	
20-22 years old	262	44 (16.79%)	NS
23-25 years old	128	23 (17.97%)	
Malay	226	36 (15.93%)	NS
Chinese	132	23 (17.42%)	
Indian	32	8 (25.00%)	
Used facial cleanser	305	47 (15.41%)	NS
Did not use facial cleanser	85	20 (23.53%)	
Used moisturizer	131	15 (11.45%)	0.033
Did not use moisturizer	259	52 (20.07%)	
Had facial problem	285	50 (17.54%)	NS
Did not have facial problem	105	17 (16.19%)	

NS, not significant ( $p>0.05$ )

Both skin scrapings and scotch-tape cellophane methods were used on each subject. Samples were obtained by scraping the left side of the nose and malar area with a No. 21 scalpel blade after cleaning the area with sterile water. Each skin scraping was then transferred to a microscope slide, which was then mixed with Hoyer's medium. Cover slip was then applied for later examination.

For the scotch-tape cellophane method, a sample from each subject was obtained by pasting and pressing firmly the cellophane tape on the right side of the nose and malar area after cleaning the area with sterile water. The tape was then removed and applied to a microscope slide for immediate examination.

A light microscope was used to detect the presence of ectoparasites from both skin scrapings and cellophane tape samples. All samples were examined by the first author and trained laboratory technologists. A positive case was defined

as the presence of any developmental stage of *Demodex* ectoparasite either as an adult, nymph or ova, in samples either from skin scrapings or cellophane tape.

All data were analyzed using the Statistical Package for Social Sciences (SPSS) version 17. A chi-square test was used to analyze the association between the variables of the study where a  $p$ -value $<0.05$  was considered significant.

The study protocol was approved by the Universiti Kebangsaan Malaysia (UKM) Research Ethical Committee. Informed written consent was obtained from each subject.

## RESULTS

Of the 390 subjects studied, 67% (262/390) were 20-22 years old, and 33% (128/390) were 23-25 years old. Fifty-eight percent (226) were Malays, 34% (132) were Chinese and 8% (32) were Indians. About 78% of subjects (305) used facial cleanser

and 33% (131) used moisturizer for facial care. The majority of the students (73%) had facial problems.

Of the 390 subjects examined, 17.2% (67) were infested with *Demodex* sp, either by a single or two different species. *Demodex* infestation was significantly more common in males (1.7 times) ( $p=0.022$ ) than females (Table 1). Prevalence of infestation among 20-22 year olds was slightly lower than 23-25 year olds but the difference was not significant ( $p>0.05$ ).

The prevalence of demodicosis was slightly higher among Indian study subjects than Chinese and Malay subjects, but the difference was not significant.

There was no association between the use of facial cleanser and *Demodex* infestation ( $p>0.05$ ). There was a significant association between moisturizer use and *Demodex* infestation ( $p=0.33$ ). Subjects who used moisturizers had a lower infestation rate than those who did not. There was no significant association between facial problems of the subjects and the presence of demodicosis.

The majority of subjects (92.5%) were infested by one species of *Demodex*. The dominant species was *Demodex folliculorum* (61.2%) followed by *Demodex brevis* (31.3%). Mixed infestation with both species was observed in 7.5% of infested subjects.

## DISCUSSION

The overall prevalence of demodicosis in this study was 17.2%, which is slightly lower than the prevalence of 18.9% reported by Chew *et al* (2010). This difference may be attributed to a difference in the academic background of the study subjects. In the present study, the study subjects were exclusively medical

students who might be more aware of the causal relationship between pathogens and disease, and were more likely to pay more attention to their personal hygiene.

The higher infestation rate among male students in our study in accordance with a study by Chew *et al* (2010) involving adults 20-29 years old in Malaysia, and by Hu and Wang (2001) in Inner Mongolia, where the infestation rate in the male subjects was about twice that of females. The higher prevalence of demodicosis in the male population may be attributed to the fact that men are generally more active throughout the day which may result in the secretion of more sebum and sweat. Men tend not to use facial moisturizers routinely. The combination of these two factors may have contributed to their susceptibility to infestation.

A study by Aycan *et al* (2007) found that as a person ages, the prevalence of demodicosis increases. Our study found students in the older age group (23-25) had a slightly higher prevalence of demodicosis than the younger age-group.

Of the three ethnic groups in our study, Indians had a slightly higher infestation rate. There is paucity of data regarding the prevalence of demodicosis among the three ethnic groups. We obtained samples from subjects based on their population distribution in Malaysia. The small sample size of Indian subjects might not be significant enough to represent the actual population. Therefore, we suggest future epidemiological studies should be conducted with larger sample sizes from each ethnic group to determine the distribution of demodicosis among the ethnic groups.

Fabienne *et al* (2005) suggested cleaning the face with cleanser or soap twice daily could reduce demodicosis. The use

of a facial cloth with a chemical agent in the soap was thought to be the mechanism to prevent or control the infestation. Nevertheless, our study showed no significant association between the daily usage of facial cleanser and prevalence of demodicosis. We did not take into consideration the ingredients of facial cleansers used by our study subjects; some of these facial skin care products contain only the usual ingredients of soap, whereas others may include acaricidal agents.

In our study, we found that there was a significant association between the usage of moisturizer and the lower prevalence of demodicosis. For those who used moisturizer, they were less likely to be infested with mites. We think moisturizers might create a physical barrier to protect against mite infestation. It is possible certain moisturizers may contain acaricidal chemical agents.

Contrary to previous studies (Hu and Wang, 2001; Ljubojeviæ *et al*, 2002), our study did not show a significant association between facial problems and the prevalence of demodicosis. This can be explained by the fact that besides *Demodex* infestation, the cause of facial problems may be multi-factorial, including environmental, hormonal, and personal hygiene. As such, other factors may have been more decisive in causing facial skin conditions.

Similar to a study by Roihu and Kariniemi (1998), the species of *Demodex* we identified were *D. folliculorum* and *D. brevis*. Most of subjects found infected in the present study had *D. folliculorum*, followed by *D. brevis* and mixed infection. Besides the likelihood of being the more dominant species, the higher prevalence of *D. folliculorum* may be explained by its localization on the superficial layers of the

skin, and are much more easily isolated with superficial skin scrapings and cellophane tape.

In conclusion, males were more likely to be infested with *Demodex* ectoparasite. Although facial cleanser did not significantly reduce the prevalence of demodicosis, facial moisturizers seemed to be associated with a lower infestation rate. Future studies are required to look into the role of moisturizers and the specific mechanisms of prevention and control of infestations.

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