



ISSN: 0067-2904

Survey of Human Face Mites *Demodex* Owen, 1843 (Acari, Demodicidae) in Patients with Blepharitis and Chalazia in Iraq

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Received: 7/3/2020

Accepted: 16/4/2020

Abstract

Demodex species are external parasites; they are transmitted via direct contact, and when present in elevated numbers it may induce several ocular diseases. However, the symptoms are very similar to other diseases; hence, its' role is often neglected. Therefore, an accurate diagnosis is important in order to avoid mistreatment. In this study, infestation rates in both blepharitis and chalazia were compared to an asymptomatic group, with relation to gender, age, personal hygiene, time of year, and residency. All specimens were examined immediately after collection. The aim of this study was to investigate the relationship between *Demodex* mites and ocular diseases. These mites were predominantly found in patients with chalazia (62.50%) followed by blepharitis (58.91%), while they were only observed in (22.64%) of asymptomatic patients, statistical analysis showed a significant relationship between infestation and both ocular diseases ($P < 0.01$). The infestation rates increased significantly with age reaching (100%) in patients above 70 years old, and especially during cold months with high humidity. These mites were also found in rural areas (57.59%), followed by urban areas (44.09%) and a significant relationship was found between residency and infestation rate ($P \leq 0.05$). However, no significant relationship was found according to gender nor personal hygiene.

Keywords: Blepharitis, Chalazion, *Demodex brevis*, *Demodex folliculorum*, Demodicosis, Face Mites.

مسح على حلم وجه الانسان لأنواع الجنس *Demodex* Owen, 1843 (Araci, Demodicidae) لدى المرضى المصابين بالتهاب الجفن والبردة في العراق

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الخلاصة

يعد طفيلي *Demodex* من الطفيليات الخارجية، وينتقل عن طريق الاتصال المباشر بين الأشخاص، وقد يحفز الإصابة بالعديد من الأمراض العينية عند تواجده بأعداد مرتفعة. لكن بسبب تشابه أعراضه مع الكثير من الأمراض الأخرى غالباً ما يتم إهمال دوره كعامل مرضي. لذلك، فإن التشخيص الدقيق مهم لتجنب العلاج الخاطئ. في هذه الدراسة، تمت مقارنة معدلات الإصابة في كل من المرضى المصابين بالتهاب الجفن والبردة بمجموعة خالية من الأعراض، بالإضافة لدراسة علاقة الطفيلي بالجنس والعمر والنظافة الشخصية وأوقات السنة ومكان الإقامة. تم فحص جميع العينات مباشرة بعد جمعها. كان الهدف من هذه

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الدراسة هو اكتشاف العلاقة بين حلم الوجه *Demodex* وأمراض العين. تم العثور على الحلم بصورة غالبية لدى المرضى المصابين بالبرد (62.50%)، يليها التهاب الجفن (58.91%)، بينما لوحظ الحلم بنسبة (22.64%) فقط لدى المرضى الذين كانوا لا يعانون من أي أعراض. التحليل الاحصائي للنتائج اظهر وجود علاقة بين نسبة اعداد الحلم والأمراض العينية السابقة ($P < 0.01$). لوحظ ايضا ان معدلات الاصابة ارتفعت بصورة طردية مع زيادة العمر وبنسبة (100%) لدى المرضى الذين زادت أعمارهم عن 70 عاماً، وخصوصاً خلال شهر كانون الأول حيث كانت درجات الحرارة منخفضة ونسبة الرطوبة عالية في الجو. تم العثور على الحلم أيضا في المناطق الريفية بنسبة (57.59%)، تليها المناطق الحضرية (44.09%)، وتم ايجاد علاقة احصائية بين مكان السكن ونسبة الاصابة ($P \leq 0.05$). لكن لم يتم ايجاد علاقة احصائية بالنسبة لجنس المريض أو النظافة الشخصية.

Introduction

Demodex spp. mites are cosmopolitan, obligate ectoparasites of the human pilosebaceous units, they feed on nutrients from roots of hairs, and cause damage to cell walls [1]. *Demodex folliculorum* Simon, 1842 lives around follicles of hairs, while *Demodex brevis* Akbulatova, 1963 lives in secretory ducts of sebaceous glands connected to the hair follicles, and within the Meibomian glands [2]. These mites are incapable of surviving without a host for long periods of time, thus they are transmitted by direct contact between hosts. The human face mites were found in almost all ages and races with an estimated colony of 1000 to 2000 mites on every human being [3, 4]. their infestation is believed to be in correlation with ocular diseases, but it is still unclear if it is the cause or the result of the inflammation [5]. Infestation rates are believed to increase with age [5]. However, the prevalence rate between genders is still in discussion [6]. *Demodex* infestation is usually asymptomatic, but symptoms may occur when the immune system undergoes imbalances [7], or when the mites are present in high densities [8]. Infestation of the eyelids (7 mites/8 eyelashes) may be associated with symptoms such as itching, dryness, cylindrical dandruff, ocular irritation, foreign body sensation, meibomian gland dysfunction, and inflammation along with blurry vision [9]. On the other hand, the possibility of mechanical damage due to blocking the hair follicles or inflammation by carrying other microorganisms is present, resulting in epithelial hyperplasia, hyperkeratinization and allergic reactions [10, 11]. The most traditional method used worldwide to diagnose ocular demodicosis is microscopic examination of epilated eyelashes, they are often seen near the hair root or attached to the shaft [5], however, this method is very limited in providing sufficient information in relation to the *Demodex* density within the meibomian or other modified sebaceous glands in the eye even though it aids in comparing the quantity of mites between patients and control groups.

Materials and Methods

During the period from November 2018 to June 2019, clinical specimens were collected from 255 patients suffering from ocular diseases. The selected patients comprised 123 males, and 132 females, with different age groups ranging from 10 to 80 years old with both symptomatic and asymptomatic cases. All studied cases were diagnosed and confirmed by specialized experienced dermatologists and ophthalmologists, and were collected from different hospitals in Baghdad, Iraq; Al-Imamain Al-Kadhmain Medical City, Al-Yarmuk Teaching Hospital, Al-Amirat Private Hospital, Al-Shahid Al-Hakim General Hospital, Al-Karama Teaching Hospital, and a private clinic in Al-Kadhmya district, in addition to The Biology Department/College of Science/University of Baghdad. Written informed consent was obtained from all patients, and their information was recorded in a questionnaire sheet. From each patient, multiple eyelashes were collected from the lids of both eyes using forceps, the eyelashes were then placed on a glass slide and covered with cover-slip to avoid losing the specimens [12].

For each month, the temperature (T) and humidity (H) ranges were recorded as shown in Table -1.

Table 1- The Temperature (T) and Humidity (H) ranges in Baghdad city, from November 2018 to June 2019.

Month	November	December	January	February	March	April	May	June
Temperature Range °C	10 - 30	6 - 22	-1 - 21	4 - 22	3 - 27	11 - 34	15 - 46	24 - 48
Humidity Range %	19 - 99	38 - 100	25 - 100	28 - 100	23 - 100	12 - 100	5 - 75	5 - 54

Samples examination

All collected specimens were examined immediately under light microscope (10× and 40× magnifications), a drop of Normal Saline can be added to enhance the visibility of the mites. Different life stages of *Demodex* spp. were observed, classified based on phenotypic characteristics, and recorded. The classification was confirmed by specialists in The Iraqi Natural History Museum and research Center in Iraq, University of Baghdad.

Results

The prevalence of these mites was observed in 263 cases, 53 were asymptomatic, 202 suffered from blepharitis, and 8 suffered from chalazia. The additional 8 belongs to patients that suffered from mixed symptoms (i.e.: Chalazia and blepharitis in the same eye). It was noticed that these mites were predominantly found in patients with chalazia (62.50%) followed by blepharitis (58.91%). However, these mites were only observed in (22.64%) of asymptomatic patients, and a significant relationship was found when compared statistically ($P < 0.01$).

According to gender, these mites were present in females (51.52%) at a higher percentage than in males (49.59%). However, there was no significant relationship when compared statistically, ($P < 0.01$). In relation to age, these mites were consistently found in elderly patients in the age group 71~80 (100.00%), followed by 61~70 (82.00%), and 51~60 (62.75%). While it was observed in lower amounts in the age groups: 41~50 (46.34%), 31~40 (41.67%), 21~30 (25.45%), and rarely in young patients in the age group 10~20 (17.65%), and a significant statistical relationship was found between infestation rates and age ($P < 0.01$).

It was noticed that the group with < 4 Washes/Day showed a slightly higher percentage (51.08%), while the ≥ 4 Washes/Day group showed a slightly lower percentage (50.00%) respectively. However, both percentages were too close and no significant relationship was found when compared statistically, ($P < 0.01$).

According to months, these mites were mostly found in December (72.00%), followed by both April (65.38%) and May (63.16%), after that comes January (52.63%) then March (52.00%). However, it was least found in November (26.19%), followed by June (45.45%) then February (48.72%), ($P < 0.05$), ($P < 0.01$). In total, it was found in (50.59%) of ocular infestations in Baghdad, Iraq. However, not all hospitals and districts were studied. Statistical analysis revealed that there was a significant relationship between the prevalence of *Demodex* mites in ocular diseases with the variations in temperature and humidity specified by the different seasons ($P < 0.05$), ($P < 0.01$).

And in relation to the type of residency, these mites were mostly found in rural areas (57.59%), followed by urban areas (44.09%). A significant relationship between infestation rates and residency was found when compared statistically, ($P \leq 0.05$).

Figure-1, represents the prevalence percentages of *Demodex* mites in the eyes according to: ocular diseases, personal hygiene, gender, residency, age, and month of year, in Baghdad, Iraq.

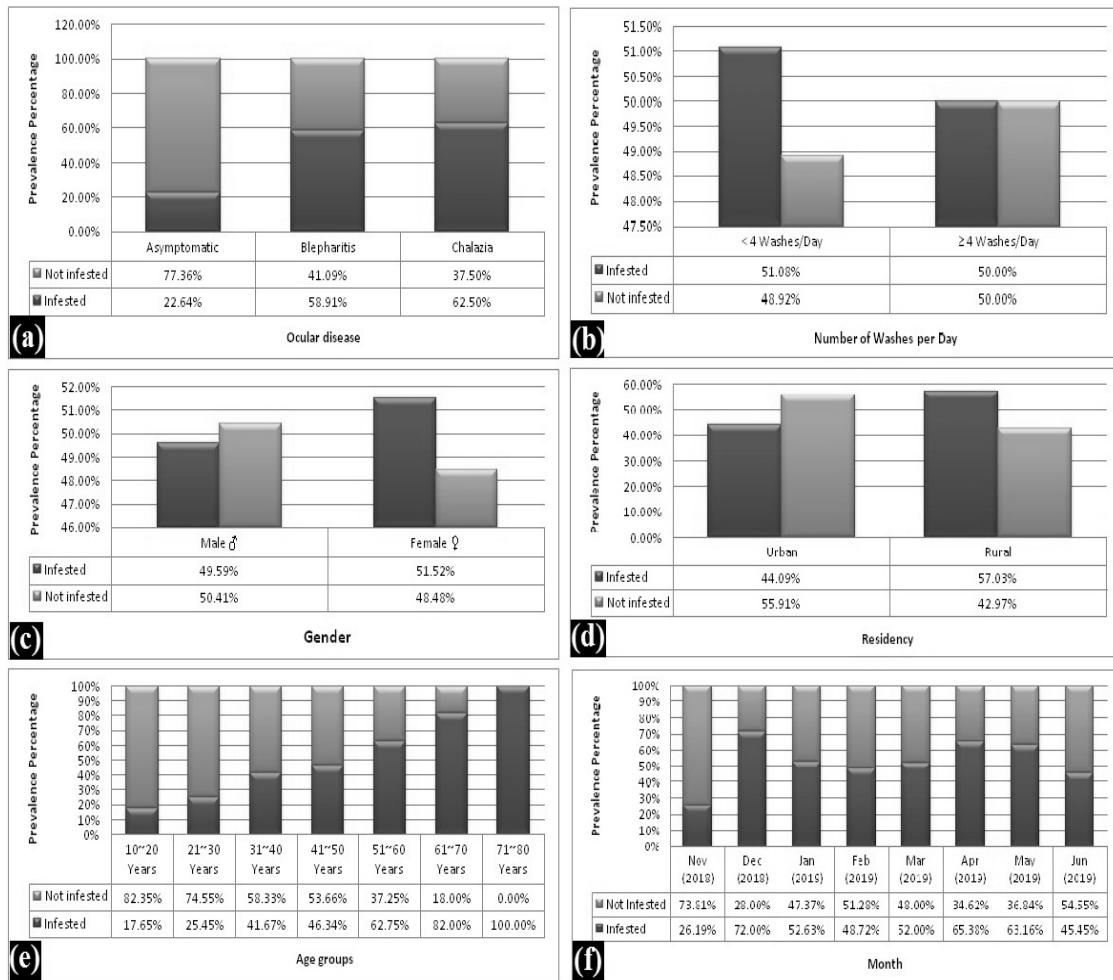


Figure 1-The relation between the Prevalence percentage of *Demodex* mites with: (a) Ocular diseases, (b) Number of washes per day, (c) Gender, (d) Residency, (e) Age groups, (f) Months.

Figure-2, shows an ocular case with cylindrical dandruff, and *Demodex* mites inside the dandruff and surrounding the roots of eyelashes when examined under microscope.

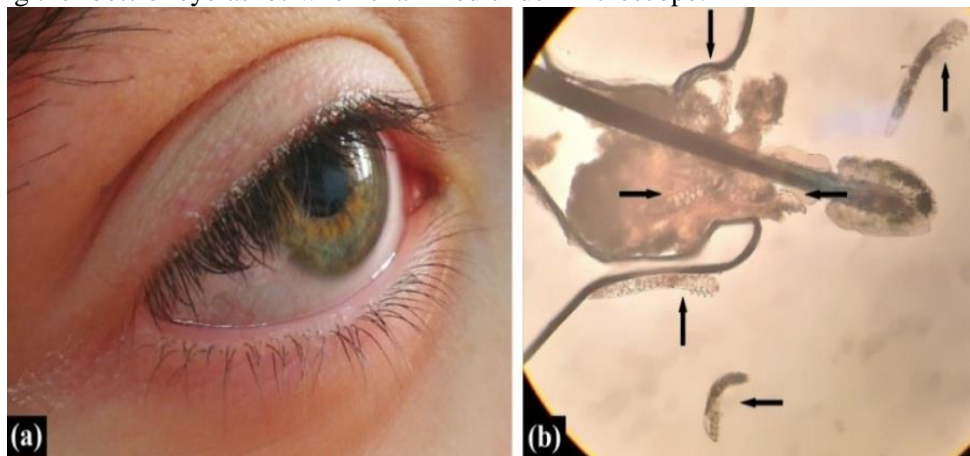


Figure 2-*Demodex* infestation in ocular diseases, (a) patient with cylindrical dandruff, (b) *D. folliculorum* mites under microscope (10×magnification).

Discussion

Statistical analysis of the observed data revealed that there is a significant relationship between the presence of *Demodex* mites and the previously mentioned ocular diseases (Chalazia and Blepharitis) ($P < 0.01$). These result are in agreement with the previously published studies where chalazia had been

reported as significantly in correlation with the presence of these mites [13, 14]; Along with blepharitis [10, 12, 15, 16]; and cylindrical dandruff [5]. However, few studies considered *Demodex* spp. as mere carriers for *B. oleronius* and do not play a main role in blepharitis [17].

The relation between gender and *Demodex* infestation was also in agreement with previous studies where no significant correlation was found between genders [18]. However, some studies found a higher incidence rate in males [16], while few suggested a higher incidence rate in females [2, 19]. These differences may be related to the health state, geography, or heredity of the individual patient, causing a fluctuation in the prevalence rates [20, 21].

Previous literature also confirmed the significant correlation between *Demodex* infestation and age [22, 23]. This increase may be explained by the fact that elderly tissues contain mature follicles and glands that are fully developed, this in turn may provide the mites with the required nutrition [24], along with the fact that they are relatively immuno-compromised [5, 25].

Personal hygiene was found to have no significant relationship with infestation rates. This agrees with previously published studies [15, 24, 26], despite the common belief where bad hygiene was considered suitable for the infestation of these mites. However, few studies suggested that *Demodex* prevalence was higher in patients with a low level of personal hygiene [27, 28]. This disagreement of findings may be explained due to the fact that the majority of the studied patients washed their faces with water only and did not use soap in all washes, which may not have cleaned the face efficiently from excess oils and mites. Along with the fact that the eyes are less prominent than other facial features like the nose and cheeks; hence, they are less likely to be reached and cleaned efficiently in all patients [5].

The relationship between the mites' infestation rates and time of year may indicate that the mites are positively affected by low temperatures and high humidity, and may be predominantly found during winter in Iraq; this is in agreement with previous literature [29].

Previous studies on the relationship between *Demodex* prevalence and residency are relatively scarce, however, this study reported no relationship between the type of residency and *Demodex* infestation rates, perhaps this finding was because malnourished and overweight patients are often found in rural areas in Iraq, and they are presumably more prone to infestation [30].

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