

PREVALENCE OF *DEMODEX* MITES IN EYELASHES AMONG PEOPLE OF OAXACA, MEXICO

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This study was carried out to determine the prevalence of *Demodex* mites in eyelashes of people from different places from Oaxaca. One thousand and ten patients underwent epilation of eight eyelashes from each eye and they were processed to search *Demodex* which was found in 208 (20%) of the patients and among them male was more affected than female, 119 (57%) and 89 (43%), respectively. There was not found a relationship between clinical manifestations among these patients since 101 (49%) and 107 (51%) of them were symptomatic and asymptomatic, respectively. The range of age that was more affected was 96–105 (100%), followed by 86–95 (75%) and 76–85 (64%) years old. The less affected were individuals of 15–25 years old (11%). *Demodex folliculorum* was relatively high in the eyelashes of individuals in young and old people in the rural region studied. These people are generally the most vulnerable patients because they live in overcrowded conditions and poor hygiene which facilitates the direct infection. *Demodex brevis* was found in only one sample.

Keywords: *Demodex folliculorum*, *Demodex brevis*, eyelashes, prevalence, Mexico

Introduction

The called “follicle mites” are intracutaneous parasites and members of the family *Demodicidae*. Among the several species reported, only two species infect humans and are the etiological agents of the demodicidosis. *Demodex follicu-*

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lorum occurs in the hair follicles and *Demodex brevis* which inhabit in the sebaceous glands, usually in the face skin [1]. This disease has nonspecific facial signs and symptoms [2]. They commonly inhabit in the skin and their biology and medical importance has been reviewed elsewhere [3, 4]. However, it is not clear their role as a commensal or human pathogen [5–8] and therefore has received the attention of dermatologists and ophthalmologists. *D. folliculorum* and *D. brevis* cause anterior blepharitis and posterior blepharitis, respectively [9], chronic blepharitis and chronic marginal blepharitis [10, 11], but they also have been associated with ocular discomfort [12], rosacea [13] and several skin diseases [14]. Although there is a relationship between *Demodex* infestation and the affections above mentioned, it could be found in asymptomatic people. The diagnosis of demodicidosis is not common in the daily practice; it is based on the clinical manifestations which could be masked by other skin diseases. Diagnostic procedures such as the standardized skin surface biopsy (SSSB) and direct microscopic examination of fresh secretions from sebaceous glands (DME) are used; however, they could not be useful in the daily practice [15]. However, some authors have developed more efficient techniques like the polarized-light dermoscopy [16], the laser scanning confocal microscopy for ocular demodicosis [17] or molecular techniques [18], nevertheless, these techniques could not be practical in many laboratories of underdeveloped countries. *D. folliculorum* and *D. brevis* are cosmopolitan parasites that can be found in Europe, Asia, America, Africa or Australia. In Mexico there have been reported a prevalence of 27.3% in a region of Monterrey, NL [19]; however, actually there are no sufficient data about the prevalence of *Demodex* in other states of Mexico as in the Oaxaca state where there is a greater percentage of the population which speak only indigenous languages. The aim of this work is to report the prevalence of demodicidosis in a population of Oaxaca and establish if there is a relationship between the range of age and symptomatology with the presence of *Demodex* mites.

Materials and Methods

Subjects

The study included 1010 subjects from different places of Oaxaca, Mexico. We used a single sampling method in each of the individuals who participated voluntarily in this study. All subjects receive a questionnaire which pertained to general data of the patient and ocular symptoms.

Identification of Demodex using the Evans blue dye

From each individual we collected 16 eyelashes (8 of each eye) and they were placed in plastic bags, previously labeled, for internal management. The samples were sent immediately to the laboratory. The eyelashes were placed on slides, previously labeled, with the name of the patient. Evans blue 0.5% was added to the eyelashes and then they were covered with a coverslip. The eyelashes were carefully examined at $\times 10$ and $\times 40$ magnifications for the search of *Demodex* mites. The level of significance were set as $P = 0.05$ by using Holm–Sidak method.

Results*Prevalence of Demodex*

The results of the prevalence of *Demodex* count are summarized in Table I and Table II. We analyzed samples from 1010 individuals (809 male and 409 female, mean age of 60 years; range 15–105) from different areas of Oaxaca City, Mexico. The prevalence of *Demodex* according to age and gender is shown in Table I. *Demodex* was found in 208 (20%) individuals where from these individuals positive for *Demodex*, the most affected were 119 male (57%) followed by female

Table I
Prevalence of *Demodex* according to age group and gender

Age (y)	Individuals (n)	Individuals with <i>Demodex</i> n (%) ^a	Individuals with <i>Demodex</i> by gender n (%) ^b	
			Male	Female
15–25	448	50 (11)	32 (64)	18 (36)
26–35	241	47 (19)	25 (53)	22 (47)
36–45	158	38 (24)	19 (50)	19 (50)
46–55	67	26 (38)	16 (61)	10 (39)
56–65	41	15 (36)	12 (80)	3 (20)
66–75	22	8 (36)	4 (50)	4 (50)
76–85	14	9 (64)	6 (66)	3 (34)
86–95	16	12 (75)	4 (33)	8 (67)
96–105	3	3 (100)	1 (33)	2 (67)
Total	1010	208 (20)	119 (57)	89 (43)

^a Percentage were calculated by dividing the number of people with *Demodex* by the number of individuals in each range of age; ^b Percentage were calculated by dividing the number of male or female with *Demodex* by the number of individuals with *Demodex*. There was no statistical significance in the age groups.

Table IIRelationship between *Demodex* and symptomatology

Individuals	Individuals with <i>Demodex</i> (%)	Individuals with <i>Demodex</i> (%)	
		Symptomatic	Asymptomatic
1010	208 (20)	101 (49)	107 (51)

There was no statistical significance between symptomatic and asymptomatic individuals.

89 (43%). People with *Demodex*, 101 (49%) showed ocular symptomatology whereas 107 (51%) did not show ocular discomfort (Table II). There was no statistical significance between symptomatic and asymptomatic individuals with mites. *Demodex* had high frequency in 3 (100%) people aged from 96 to 105 years, 12 (75%) people aged from 86 to 95 years and 9 (64%) people aged from 76 to 85 years, whereas there was less frequent in 50 (11%) people aged from 15 to 25 years. There was no statistical significance among different groups of people with mites. Among the 208 people with *Demodex*, *D. brevis* was found in one sample whereas *D. folliculorum* was found in 207 samples.

Discussion

Several recent reports had shown the prevalence of *Demodex* [19, 20], in patients and age groups [21] and in patients with ocular discomfort [12]. In our study, we found that *Demodex* were more frequent in elderly people (76–105 years) and the frequency was lower in individuals ranging 15–75 years. We found only one sample of *D. brevis* indicating that *D. folliculorum* is the most common parasitic mite among this population. In addition, the use of Evans blue was a suitable dye for the accurate diagnosis of *Demodex* species which can be widely used in various laboratories.

We found an overall prevalence of 20%, where male (57%) was slightly more affected than female (43%). Among individuals with *Demodex*, the frequency was lower in women in the range of age: 46–55, 15–25, 76–85 and 56–65. Probably the use of make-up in the skin and eyelid, use of soaps and cosmetics by female could reduce the establishment of *Demodex* in this group of people. There are predisposing factors that could play an important role to develop demodidosis. Among them we can mention several biophysical parameters of the face skin such as transepidermal water loss (TEWL), skin blood flow, stratum corneum hydration (capacitance), temperature, pH, and sebum content of the skin surface

[22] which can vary among age, health condition or other factors. In our study, *Demodex* was mainly found in elderly people. Since older people have a relatively weak immune system and an increased production of sebum by the sebaceous glands, it allows an ideal environment for the growth and reproduction of the parasite.

Temperature plays an important role in the viability of these mites [23]. They found that *D. folliculorum* and *D. brevis* have an *in vitro* optimum temperature of development that range 16 to 20°C. So variations of the skin could facilitate the establishment of mites in this ocular zone, but also in the skin. Recently, there was found a prevalence of 17% of *Demodex* in young adults [20] and found that people with *Demodex* described dry skin, more prone to erythema but less for folliculitis. In our study, there was no difference between individuals with *Demodex*, since 49% and 51% were symptomatic and asymptomatic, respectively. The most common symptomatology in infected individuals was mild eye discomfort, itching and dryness of the eyelids. None of the people positive for *Demodex* and with symptomatology received medical treatment to lessen the symptoms. Some of the people, who participated in this study, live in rural communities so poor sanitary conditions and hygiene habits and even overcrowding may be associated with the presence of *Demodex*. In addition, it is necessary to carry out further studies to determine the prevalence of *Demodex* in other regions because these infections can present as asymptomatic or remain underdiagnosed and need to be taken into account for epidemiologic studies.

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