

Diagnosis and Treatment of Demodectic Blepharitis

Tonay INCEBOZ¹, Aylin YAMAN², Leyla OVER¹, Arif Taylan OZTURK², Çiler AKISU¹

Dokuz Eylul University, ¹School of Medicine, Department of Parasitology ²Department of Ophthalmology,
Inciralti, Izmir, Turkey

SUMMARY: The aim of this study was to investigate the prevalence of *Demodex* spp. in the eyelash follicles obtained from patients seen in our ophthalmology clinic, to define the symptoms of this infestation, and to examine the effectivity of the therapy. This study was conducted in Department of Ophthalmology and Parasitology, Dokuz Eylul University, School of Medicine. Our study included 82 cases that were seen in the Ophthalmology Department and Parasitology Department for various reasons. We have also observed that the presence of *Demodex* spp. provokes itching and redness in the eyes and that using baby shampoo for cleansing the face reduces the risk of infestation. After the treatment of 32 cases with 4% pilocarpin HCl gel, we achieved a total cure in 12 eyes (37.5%), partial improvement in 13 eyes (40.6%), (making a total of 25 eyes, 78.1%). The treatment was unsuccessful in 7 eyes (21.9%). In patients with *Demodex* spp. cleansing with baby shampoo and treating by pilocarpin gel may be used in treatment.

Key Words: *Demodex* spp., blepharitis, epidemiology, treatment

Demodetik Blefaritli Olguların Tanısı ve Tedavisi

ÖZET: Bu çalışmanın amacı, oftalmoloji kliniğinde konsülte edilen hastalardan, kırpık folikülü olarak, *Demodex* spp. prevalansını, bu enfestasyonun semptomlarını ve tedavinin etkinliğini araştırmaktır. Çalışma Dokuz Eylül Üniversitesi Tıp Fakültesi Hastanesi Oftalmoloji ve Parazitoloji Bölümleri'nde gerçekleştirildi. Dokuz Eylül Üniversitesi Tıp Fakültesi Göz Hastalıkları Anabilim Dalı polikliniğine ve Parazitoloji Anabilim Dalına çeşitli nedenlerle başvuran hastalardan, 82 olguyu çalışma kapsamına aldık. Olgularda *Demodex* spp.nin kaşıntı ve gözde kızarıklıkla tetiklediğini gözlemledik ve enfestasyon riskini azaltmak için bebe şampuanı ile yüzün temizlenmesini uyguladık. Olguların 32'sinin 12'sinde %4 pilokarpin jel tedavisi sonrasında total kür saptadık ve kalan 13 olguda parsiyel iyileşme gördük. Bu tedavi 7 olguda başarısız oldu. *Demodex* spp. bulunan hastalarda bebe şampuanı ile yıkama ve pilokarpin jel uygulanması tedavide önerilebilir.

Anahtar Sözcükler: *Demodex* spp., blefaritis, epidemiyoloji, tedavi

INTRODUCTION

Demodex folliculorum (*D. folliculorum*), familia Demodicidae, is a parasite making part of Prostigmata. Immediately after it has been first defined by Henle and Berger, it has been demonstrated in all details by Simon in 1842, and another type, *Demodex brevis* was introduced by Akbulatova in 1963 (1).

This mite, living in the hair follicle, is a metazoan that is the frequent habitant of the sebaceous and apocrine gland of human lid (11). *D. folliculorum* is a transparent mite, with a length of 0.3mm, and has a density of ≤ 5 D/cm² in the adult population (13). It has been regarded as pathogenic when it is penetrated to the dermis, and its number is increased. Its life-span is approximately 15 days and it spreads via direct contact (29). It has been suggested that this metazoan might cause

pytiasis folliculorum, papulopustular roseacea, granulomatous roseacea, inflammatory papule, and folliculitis (3, 8, 31, 32). In 1967, Coston, for the first time, drew attention to the existence of *Demodex* spp. in the eyelid by describing the symptoms in the 22 patients (7).

The aim of this study is to investigate the relationship between the blepharitis and *Demodex* spp. in the eyelid, by examining and comparing the patients with and without blepharitis in terms of the existence of *Demodex* spp. The second aim of the study is to search for the efficacy of the treatment.

MATERIALS AND METHODS

After the ethical approval of the study by local Ethics Committee of Dokuz Eylul University, Medical Faculty, the study was started in ophthalmology clinic in collaboration with the Department of Parasitology. A total of 82 patients were examined both ophthalmologically and parasitologically for blepharitis and *Demodex* spp. The patients' characteristics as their sexuality, ages, whether owing a pet, face washing habits, and the symptoms of itching and redness in eyes were documented (23).

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Yazışma /Corresponding Author: Tonay Inceboz

Tel: (90) (232) 412 45 45 Fax: (90) (232) 259 05 41

E-mail: tonay.inceboz@deu.edu.tr

The consent form of the study has been read by patients, who were seen consecutively in the ophthalmology clinic for different reasons. Patients then were examined for blepharitis by the ophthalmologist (A.Y.) by using biomicroscope (Nikon NS-IV Slit-lamp biomicroscope-Japan). The eyelash specimen was taken from each side (right and left lid) of the patients. The patients with blepharitis were accepted as the "study group". The patients without blepharitis were accepted as control group.

After having minimum 4 eyelashes from each eye, eye lashes collected systematically from the lower eye lid, eyelashes were mixed with Canadian balsam. As soon as the samples were arrived at the laboratory, they were examined under the light microscope at the magnification of X10, X20 and X40. All clearly identified *Demodex* spp. were counted (11). The determination of even one *Demodex* spp. was accepted as "positive".

The therapy was planned regarding to the existence of blepharitis and *Demodex* spp. The cases with *Demodex* spp. were randomly divided into 2 groups; for the first group, 4% pilocarpin HCl gel therapy has been applied via massaging in the mornings and at nights for a month; for the second group, the mechanical cleaning has been made by washing eye lids with 50% diluted baby shampoo on a cotton stick in the mornings and at nights for 3 months.

Statistical analysis: Statistical analysis was done using the chi-square test. A "p" value of <0.05 was considered significant.

RESULTS

This study consisted of 82 cases. All 82 patients (female/male:57/25) were examined both ophthalmologically and parasitologically. Of the 82 cases, 14 did not come for the follow up and 2 did not use the treatment properly. Thus, total of 66 cases (132 eyes) were evaluated.

A view of *Demodex folliculorum* adult and egg forms located on an eyelash follicle is shown in Figure 1.

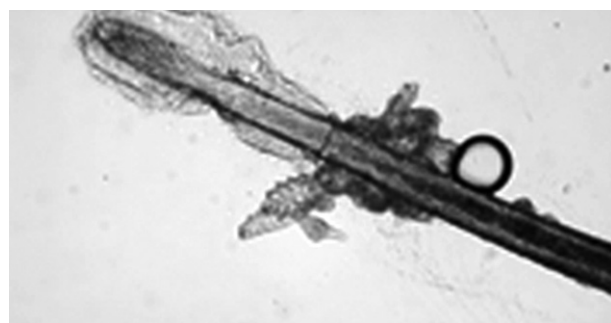


Figure 1. A view of *Demodex folliculorum* adult and egg forms located on an eyelash follicle

The results of 66 cases (132 eyes) were analyzed. Female to male ratio of the patients was 47/19 (71.2% / 28.8%). Mean

age (\pm SD) was 55.20 ± 15.2 . Of 66 cases, blepharitis was diagnosed in 53 cases (106 eyes) (80.3%). There was no blepharitis in the rest 13 cases (26 eyes) (Table 1).

When we noticed the relationship between the age distribution and *Demodex* spp. positivity, we found that the incidence of *Demodex* spp. positivity increased with 45 age upper (Table 2).

Of 53 cases (106 eyes), that were clinically diagnosed as blepharitis, *Demodex* was positive in 46 eyes and negative in 60 eyes, whereas in the control group (13 cases (26 eyes) without blepharitis), *Demodex* was positive in 3 eyes and negative in 23 eyes. The sum of the *Demodex* spp. positivity in both groups was 49 eyes (Table 3).

There was not any side (right or left) difference in terms of *Demodex* spp. positivity (53.1% right eyes, 46.9% left eyes, $p < 0.05$). The highest density of *Demodex* spp. determined in one case with blepharitis was 24 parasites onto 5 eyelashes. In another patient with normal ophthalmological examination, 27 parasites were found on 6 eyelashes. Interestingly, this patient had no complaint at all.

Of 46 eyes that were both with blepharitis and positive for *Demodex*, 4% pilocarpin HCl gel treatment was started in 32 eyes, and cleansing baby shampoo was applied in the other 14 eyes.

Of 32 eyes treated with 4% pilocarpin HCl gel therapy was performed once in 30 eyes, and more than once in 2 eyes.

In group treated with 4% pilocarpin HCl gel (32 eyes), 12 eyes (37.5%) had total cure, 13 (40.6%) had partial improvement, whereas 7 eyes were not changed with the therapy. In the group that cleansing with baby shampoo was applied in (14 eyes), 4 eyes (28.6%) had total cure, 5 eyes (37.5%) had partial improvement, 5 eyes (37.5%) had no change whatsoever.

Concerning 66 cases, in *Demodex* spp. positive cases, 65% had redness, 82.9% had itching in the eyes, whereas in *Demodex* spp. negative cases, 47.4% had redness and 75% had itching in the eyes. These percentages are not statistically different in both groups ($p > 0.05$).

There was no significant correlation between *Demodex* spp. positivity and pet owning, and face cleaning habits, in itching and red-eyes (Table 4).

DISCUSSION

In the presented 82 cases, 80.3% had confirmed blepharitis. Epidemiologically, demodectic blepharitis is common. One important question for *Demodex* spp. in the eyelid is if there is a correlation between immune deficiency and demodicosis. In our study, none of the patients had immune deficiency. Forton et al. showed that 96% demodicosis occurred in immunologically competent cases (13). In their study on patients with chronic renal insufficiency, Ozcelik et al found that there was not any statistically significant difference between the

Table 1. The Results and the Follow up of the patients in terms of demodex spp investigation

<i>Demodex</i>	Parasitologic examination	Ophthalmologic examination	Both parasitologic and ophthalmologic examination eyes
Both parasitologic and ophthalmologic examination (82 patients)	Did not use the treatment properly	Blepharitis (+) (53 patients) 106 eyes	Demodex (+) 46 eyes Demodex (-) 60 eyes
	Not followed up properly Demodex(+) (2 patients)		
	Demodex(+) (16 patients) did not come for the controls Demodex(+) (14 patients)		
	Proper followed up (66 patients) Demodex (+) (35 patients)	Blepharitis (-) (13 patients) 26 eyes	Demodex (+) 3 eyes Demodex (-) 23 eyes
Total Demodex (+)	Demodex (+) (56 patients)		Demodex (+) 49 eyes
Total Demodex (-)	Demodex (-) (39 patients)		Demodex (-) 83 eyes
Total	(82 patients)	(66 patients)	(132 eyes)

Table 2. Age distribution of the patients and *Demodex* spp. positivity

Age	No of Patients	<i>Demodex</i> positivity	
		No of patients	%
0-15	2	1	50.0
16-44	14	4	28.6
45-65	38	29	76.3
65+	28	22	78.5
Total	82	56	68.3

Table 3. *Demodex* spp. positivity in patients with and without blepharitis

Blepharitis	Eyes examined	<i>Demodex</i> positive	
	n (%)	Eye (n)	%
Yes	106(80.3)	46	43.4
No	26 (19.7)	3	11.5
Total	132 (100)	49	37.1

Table 4. The relationship between the clinical symptoms and *Demodex* mite presence

Symptoms and characteristics	<i>Demodex</i> positive (%)	<i>Demodex</i> negative (%)
Itching	61,7	38,3
Red eye	59,1	40,9

patients with renal insufficiency and the healthy control group in terms of the existence of *D. folliculorum* in the eye-lids and eye-lashes (25). Duzgun et al reported no significant difference in terms of demodex intensity in their study in patients undergoing hemodialysis (33). However, Kulac et al stated that the frequency of demodicosis was significantly increased in patients having phototherapy (20).

There are 3 important factors for multiplication of the *Demodex* spp. hypervascular tissue, poor hygienic conditions, and immune deficiency In our study, 53.3% cases in the demodex positive group and 46.7% in the demodex negative group reported using soap for face cleaning. Forton et al demonstrated that most of the patients with demodicosis (62%) were not used to use soap for face cleaning (13).

According to the literature, itching, tightness and burning sensation in the skin, and dry skin are the most common symptoms associated with the cases of facial demodicosis (13, 19). In this study, itching was present in 82.9% of cases with *Demodex* spp., and 75% of cases without *Demodex* spp. We

did not find any correlation between *Demodex* positivity, and itching, redness, pet owning and soap using.

In the field of ophthalmology, *Demodex* spp. is thought to play a role in the etiology of blepharitis, chronic eczematous blepharitis (blepharitis acarica), madarosis (loss of eyelashes), and treatment-resistant chronic blepharitis (9, 26, 27, 30). When *Demodex folliculorum* is present in both eyelids, the situation is accepted as multiplication of this parasite (22). Investigation for *Demodex* spp. is suggested for the cases with treatment-resistant chronic blepharitis (14).

Roth has reported the pathological changes related to *Demodex* in the eyelid, such as follicular distention, hyperkeratosis, mild perifolliculitis (28). Clifford et al found 16% *D. folliculorum* positivity from in the eyelashes of 256 cases. They have also investigated the co-existence of *Staphylococcus aureus* and observed that in cases with *Staphylococcus aureus*, the number of *Demodex* spp. increases (6). In their study, English and Nutting found that the whole life of *Demodex folliculorum* was spent in small hair and eyelash folli-

cles (11). English et al. (12) elegantly demonstrated moving *Demodex folliculorum* on the eyelid surface by using scanning electron microscope, and drew the attention to its potential role for being a vector. In a series of 206 patients, Norn (24), found *Demodex folliculorum* in the nose in 17% of cases, in the lower eyelid in 13%, in the upper eyelid in 8%. In a similar study, in 86 patients, Boge-Rasmussen et al found *Demodex* in 29% on the eyelashes, and in 25% in the nasal hair follicles (4). Of 139 patients with blepharitis, Demler et al (10), demonstrated *D. folliculorum* in 20% of cases with acute blepharitis, and 52% of cases with chronic blepharitis, whereas *Demodex* positivity was in 29% of cases without any complaint. They have also noticed that in cases with *Demodex*, co-existence of Gram (+) and (-) stained bacteria increase. Humiczewska (16) demonstrated *Demodex* on the palpebral edges in 68% of 568 chronic marginal blepharitis. Cheikh-Rouhou et al (5), in a retrospective analysis of a 4-year period, showed that *Demodex folliculorum* was the top first in the list of all causes of cases with ocular parasitosis and mycosis (16). Arıcı et al. (2), *Demodex* positivity was in 27.4% (137/500) in all patients.

In our study, we found *Demodex* positivity in cases with and without blepharitis in 34.9% and 17.4%, respectively.

Demodex blepharitis is thought to be a chronic blepharitis and it does not respond well to a conventional therapy (5, 13). The increase in the number of *Demodex folliculorum* in the eyelash follicle may cause itching. Existence of *Demodex* in huge numbers is one of the most common causes of itching in the eye especially in elderly people (22). Mechanical cleaning and hygiene is important in the treatment of cases with blepharitis (17). Washing the face and eyelids with a soft soap twice daily was suggested in cases with demodicosis (13). Fulk et al (14), demonstrated treatment with 4% pilocarpin HCl gel decreased the number of parasites, and diminished itching. In addition to cleansing, pomades with mercury can be suggested for the treatment; however the treatment period with pomades with mercury should not exceed 6 weeks because of corneal toxicity (5). Oral ivermectin was successful in a case with treatment-resistant chronic blepharitis and rosacea (30). One month metranidazole gel (2%) treatment combined with cleansing was shown to diminish the symptoms and decrease the number of the parasites (5, 18, 21). Apart from this, pomades with erythromycin are also suggested for the treatment (15, 17, 18, 21).

In our study, treatment with 4% pilocarpin HCl gel yielded complete cure in 37.5%, partial improvement in 40.6%, but was unsuccessful in 21.9%. With cleaning, total cure and partial improvement was observed in 28.6% and 37.5% respectively, whereas it was unsuccessful in 37.5% of cases.

In conclusion, demodicosis is quite common in the eyes. It has been shown that its prevalence is higher in patients with blepharitis. Demodicosis may cause redness in the eyes and itching. Infestations may be decreased by carefully washing the

hands and the face. In the management of demodicosis, 4% pilocarpin HCl gel treatment and cleansing the eyes with baby shampoo may be used. In a small group of patients since this management did not improve, some new treatment modalities may be needed.

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