Diagnosis and Treatment of Demodectic Blepharitis

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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 effectiveness 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

Demodektik Blefariti Olgularının Tanısı ve Tedavisi


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 inhabitant 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 female (13). It has been regarded as pathogenic when it is penetrated to the dermis, and its number is increased. Its lifespan is approximately 15 days and it spreads via direct contact (29). It has been suggested that this metazoan might cause pityriasis folliculorum, papulo-pustular 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 owning a pet, face washing habits, and the symptoms of itching and redness in eyes were documented (23).
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-1V 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.

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 (±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 owing, 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
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).

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 follicles.

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

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

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

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

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

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

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

<table>
<thead>
<tr>
<th>Symptoms and characteristics</th>
<th><em>Demodex</em> positive (%)</th>
<th><em>Demodex</em> negative (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Itching</td>
<td>61.7</td>
<td>38.3</td>
</tr>
<tr>
<td>Red eye</td>
<td>59.1</td>
<td>40.9</td>
</tr>
</tbody>
</table>
Demodectic blepharitis

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 chronical marginal blepharitis. Cheikh-Rouhou et al (5), in a retrospective analysis of a 4-year period, showed that Demodex folliculorum was the first top 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 metronidazole 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.

REFERENCES

Inceboz T. et al.


