Influence of *demodex* mites on quality of life of patients with acne and rosacea

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**Abstract**

**Background:** Dermatology life quality index (DLQI) is the objective tool for the evaluation of the impact of dermatovenerological diseases on people’s lives. The article assessed DLQI in patients with acne and rosacea, with and without *Demodex* mites.

**Methods:** 60 patients with acne and rosacea were observed and divided into two equal groups (30 patients each) depending on the presence of the *Demodex* mites. All patients completed a DLQI questionnaire.

**Results:** DLQI score of patients of group I (with the presence of the *Demodex* mites) have a very strong effect of the diseases on a patient’s life, whereas in group II the diseases affect moderately. Quality of life of patients in group I varied depending on the type of *Demodex* mites species.

**Discussion:** It was revealed that *Demodex folliculorum brevis* had a moderate effect on the life of patients, while in the presence of *Demodex folliculorum* diseases affect greatly on the patient’s life.

**Conclusion:** In the course of the study, it was revealed that the *Demodex* mites aggravated the self-perception of patients with acne and rosacea.

**Keywords:** acne, *Demodex* mites, dermatology life quality index, DLQI, rosacea

**Background**

As it is known, skin diseases may impact on the patients’ life directly. Virtually, all aspects of human life can suffer from this reason. Often, skin diseases cause serious psychological anxiety in patients, making them difficult to work in a team, communicate with friends and colleagues, public activities and personal relationships. Acne and rosacea are not life-threatening diseases, but their presence has a significant effect on the patient’s self-perception as a person and their adequate adaptation in society.

Diagnoses of acne and rosacea are based on anamnesis and clinical features. Acne is characterized by open (blackheads) and closed comedones (whiteheads), papulopustular lesions, nodules. According to the National Rosacea Society, the presence of one or more primary or secondary features indicates rosacea. All symptoms can occur independently of each other. The primary signs include erythema (transient, non-transient), papules and pustules, telangiectasia. Burning and stinging, plaques, dry appearance, edema, ocular manifestations, peripheral location, phymatous changes constitute secondary symptoms. Patients with the presence of acne and rosacea sometimes take suicidal attempts, prone to depression and psycho-neurotic disorders. The actual issue is the influence of *Demodex* mites on acne and rosacea patients’ quality of life.

One of the most objective questionnaires for the evaluation of the effect of disease on patients’ psycho-emotional state. Dermatology life quality index (DLQI) was created in 1990-1994 by Prof. Andrew Y Finlay and Dr. Gul Karim Khan from the Cardiff University Department of Dermatology. The aim of the study was to investigate the influence of *Demodex* mites on the acne and rosacea patients based on DLQI.

**Methods**

The study was conducted in a period of 2014 to 2018. The protocol of study and clinical
examinations were approved at the meeting of the Ethical Committee of the Russian Medical Academy of Continuous Professional Education (Moscow, Russia).

During the study, a total of 60 people (male and female) were examined. The study included patients with diagnoses of acne and rosacea, with the presence or absence of *Demodex* mites. The subjects were recruited by the method of simple randomisation.

Criteria for inclusion of the study:
1. Male or female with the diagnosis of acne and rosacea
2. Age over 18-year-old
3. Consent to become study participants

Criteria for the exclusion of the study:
1. The presence of concomitant somatic diseases of severe course or neoplastic nature
2. The presence of addictions (alcohol or drug)
3. Voluntary refusal to participate in the study
4. Pregnancy and lactation

Before entering the study, all subjects were informed of the content of the work, received a "Biomedical Research Participant Information Brochure" and signed "Informed consent of the participant in biomedical research" for inclusion in the study.

Participants of group I and II received and filled out the "DLQI" questionnaires on the primary medical assessment. DLQI questionnaire includes 10 questions with the copyright statement. The official translation from English to Russian was used in the study. The questions concerned both the personal well-being and self-perception of the patients, as well as the subjective assessment of patients adaptation among colleagues at work, as well as personal relationships. The average response time in filling out the questionnaire was about two minutes. Each answer was rated from 0 to 3 points. Then, the results were summarised and analysed with statistical methods. Statistical analysis was done not only between two groups, but also in terms of group I in depend on the *Demodex* mites species.

Diagnoses of acne and rosacea were established on the basis of clinical manifestations. To determine the severity of acne manifestations classification of disease activity by European Acne Treatment Guidelines (EU Guidelines group, 2012) were used:
1. Comedonal acne
2. Mild-moderate papulopustular acne
3. Severe papulopustular acne, moderate nodular acne
4. Severe nodular acne, conglobate acne

The severity of rosacea was determined according to the National Rosacea Society Expert Committee Classification:
1. Subtype I – erythematotelangiectatic rosacea
2. Subtype II – papulopustular rosacea
3. Subtype III – phymatous rosacea
4. Subtype IV – ocular rosacea
5. Variant – granulomatous rosacea

Laboratory examination determined the presence and species affiliation of *Demodex* mites using light microscopy of skin scraping and then counting the detected mites per unit area (1 cm²). Statistical processing of data was carried out by IBM SPSS Statistic 21. The differences were considered reliable at p<0.05.

In the study, two groups of patients aged 18 years and over were formed. Group I included patients with diagnoses of acne, rosacea, associated with *Demodex* mites. Group II consisted of patients with acne and rosacea without *Demodex* mites.

The presence of *Demodex* mites was determined by conducting light microscopy of skin scraping of the face. Eyelashes and eyebrows were also taken from patients and analysed. The method was chosen due to its specificity and sensitivity to *Demodex* mites identification.

Two days before the study, patients were asked to not apply external medicines to the skin of the face. On the day of the study - they were asked to not wash their face. The study was carried out using a disposable scarifier and tweezers. The material was taken from the places with the largest accumulation of sebaceous glands on the face - the wings of the nose, the chin, the inter brow area with the technique of scraping. The eyebrows and eyelashes were plucked out with tweezers.

At a given location, a section of 1 cm² was selected and marked with a pencil. The resulting material was placed on an object glass in a drop of 10% KOH solution and covered with a slide for a period of two hours in order to achieve complete dissolution of the epithelial cells. Then, microscopy of the material was carried out with the obligatory determination of the species affiliation of the *Demodex* mites (*Demodex folliculorum, Demodex folliculorum brevis*) and their quantitative meanings per unit area (1 cm²). The magnification of the microscope was 40x and 100x. Patients with a presence of more than 5 adult mites per 1 cm² and
the clinical picture of the diseases accounted for the first group.

Results

The distribution of patients according to the severity of acne and rosacea is presented in Table 1 and 2. It was revealed that Demodex mites accompanied the most severe form of acne and rosacea. Table 1 contains the following information: the observed cell totals, (the expected cell totals) and [the chi-square statistic for each cell]. The chi-square statistic is 14.4877. The p-value is 0.002311. The result is significant at p<0.05.

In group I, the mean value of the Dermatological Life Quality Index was 13.6±2.8 (min= 6.0, max= 18.0). In group II, the mean value of the DLQI was 8.0±2.8 (min = 4.0, max = 14.0). There is a statistical difference between two groups in DLQI (Kruskal-Wallis Test, p<0.05).

Table 2 contains the following information: the observed cell totals, (the expected cell totals) and [the chi-square statistic for each cell]. The chi-square statistic is 6.8056. The p-value is 0.033281. The result is significant at p<0.05. During the whole process of our clinical study, no cases of an ocular subtype of rosacea were recorded.

The average means of the DLQI of patients within the group I - between the carriers Demodex folliculorum and Demodex folliculorum brevis, and also in the presence of parasites of both species of mites were compared. The data are presented in Table 3.

During the whole process of our clinical study, no cases of an ocular subtype of rosacea were recorded.

Table 1. The Severity of Acne of Patients in Group I and II Patients

<table>
<thead>
<tr>
<th>Severity of acne</th>
<th>I group</th>
<th>II group</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comedonal</td>
<td>2 (3.60) [0.71]</td>
<td>6 (4.40) [0.58]</td>
<td>8</td>
</tr>
<tr>
<td>Mild to moderate papulopustular</td>
<td>2 (6.30) [2.93]</td>
<td>12 (7.70) [2.40]</td>
<td>14</td>
</tr>
<tr>
<td>Severe papulopustular, moderate nodular</td>
<td>8 (4.50) [2.72]</td>
<td>2 (5.50) [2.23]</td>
<td>10</td>
</tr>
<tr>
<td>Severe nodular, conglobate</td>
<td>6 (3.60) [1.60]</td>
<td>2 (4.40) [1.31]</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
<td>22</td>
<td>40</td>
</tr>
</tbody>
</table>

p<0.05

Table 2. The Severity of Rosacea in Group I and II Patients

<table>
<thead>
<tr>
<th>Subtype of rosacea</th>
<th>I group</th>
<th>II group</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erythematotelangiectatic</td>
<td>1 (3.60) [1.88]</td>
<td>5 (2.40) [2.82]</td>
<td>6</td>
</tr>
<tr>
<td>Papulopustular</td>
<td>6 (4.80) [0.30]</td>
<td>2 (3.20) [0.45]</td>
<td>8</td>
</tr>
<tr>
<td>Phymatous</td>
<td>5 (3.60) [0.54]</td>
<td>1 (2.40) [0.82]</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
<td>8</td>
<td>20</td>
</tr>
</tbody>
</table>

p<0.05

Table 3. The DLQI Meanings in the Presence of Demodex Mites

<table>
<thead>
<tr>
<th>Type of mites</th>
<th>Number of patients</th>
<th>Mean DLQI</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demodex folliculorum</td>
<td>18</td>
<td>14.83±1.76</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>Demodex folliculorum brevis</td>
<td>7</td>
<td>10.29±2.69</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>Combined cases</td>
<td>5</td>
<td>13.8±2.59</td>
<td>10</td>
<td>17</td>
</tr>
</tbody>
</table>

Kruskal-Wallis Test, p<0.05
Discussion

Rosacea is a chronic facial skin condition characterized by the appearance on the central face of erythema, inflammatory papules, pustules, telangiectasia, or hyperplasia of the connective tissue. Acne is a chronic disorder of the pilosebaceous follicles of the skin and can be expressed by comedones, erythematous and inflammatory papules, pustules and nodules.

There are different studies proved that acne and rosacea affect patients’ life. These diseases can be the cause of a variety of psychological conditions such as anxiety, depression, embarrassment, social withdrawal, problems with correct self-estimation etc.

In our study as in the other studies, acne and rosacea have a moderate effect on patients’ lives. It was proved that the patients of group II have the value of DLQI which means that the disease moderately affects the life of patients.

One of the factors that can provoke and maintain an inflammatory process in acne and rosacea patients can be Demodex mites.

Comparing the average mean of the DLQI in two groups of patient, a statistically significant difference was revealed. In group I patients with the presence of Demodex mites, the DLQI score indicates that the disease has a very strong effect on the patient’s life (13.6±2.8), whereas without Demodex mites the average mean of DLQI in acne and rosacea patients was 8.0±2.8. (p<0.05)

Independence with types of Demodex mites, our study revealed that acne and rosacea cases, complicated by the presence of Demodex folliculorum brevis, have a moderate effect on the life of patients (the average value of the dermatological quality of life index is 10.29±2.69).

Whilst in the presence of Demodex folliculorum and the simultaneous detection of two types of mites, the diseases greatly affect the life of patients (14.83±1.76 and 13.6±2.59, respectively).

Conclusion

Thus, when analysing the clinical picture of facial skin lesions and the severity of the pathological process in acne and rosacea, it is established that Demodex mites significantly influence the course of diseases: they reduce the quality of life of patients (DLQI=13.6±2.8). Consequently, the identification of Demodex mites is essential and therapy for the successful treatment of diseases.

References


