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Does intranasal *Demodex* infestation play a role in allergic rhinitis?

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ABSTRACT

Aims: The aim of this study is to evaluate the prevalence of *Demodex* mites in the intranasal follicles of patients with allergic rhinitis and investigate their potential role in the etiology of allergic rhinitis.

Methods: The study involved 50 patients diagnosed with allergic rhinitis and 50 healthy controls matched for age and gender. The severity of the disease was evaluated using the Score for Allergic Rhinitis and the Total Nasal Symptom Score (TNSS). To evaluate the presence of *Demodex* in nasal follicles, a total of 8 terminal follicles, 4 from each of the right and left nasal vestibules, were epilated using sterile forceps. The samples were examined under a light microscope at 10x, 40x, and 100x magnification by two dermatologists.

Results: *Demodex* mites were found in the intranasal follicles of 3 (6%) individuals from the healthy control group. Intranasal *Demodex* mites were found in 3 (6%) patients with allergic rhinitis, showing no statistically significant difference between the two groups (p=1). The mean total nasal symptom score was 7.66±1.52 in the 3 allergic rhinitis patients with *Demodex* positivity, and 7.61±1.13 in the 47 patients without *Demodex* infestation, with no statistically significant difference between the two groups (p>0.05). No significant correlation was observed between *Demodex* positivity, disease severity, and TNSS in patients with allergic rhinitis (p>0.05).

Conclusion: Based on our study results, we think that intranasal antiparasitic treatments may be unnecessary in patients with allergic rhinitis.

Keywords: Demodex, allergic rhinitis, TNSS

INTRODUCTION

Allergic rhinitis (AR) is the most prevalent form of non-infectious rhinitis, impacting approximately 40% of adults d 25% of children worldwide. AR is characterized by symptoms such as sneezing, nasal itching, congestion, excessive nasal discharge, and watery eyes. These symptoms arise from IgE-mediated responses to airborne allergens, including pollen, dust mites, and pet dander.[1-3] The diagnosis of AR relies on a thorough patient history, the presence of characteristic clinical symptoms, and a favorable response to empirical treatment with antihistamines or nasal glucocorticoids.[2] *Demodex* mites are among the most frequently encountered ectoparasites in humans. They inhabit the normal skin of adults, predominantly within the pilosebaceous units of the face. *Demodex* mites can cause mechanical obstruction of follicles, and their antigens, secretions, and excretions may trigger delayed-type hypersensitivity and inflammatory reactions in the host. In recent years, only a few researchers have explored the role of *Demodex* infestation in the pathogenesis of AR.[4,5] To the best of our knowledge, this is the first study to evaluate the frequency of detecting *Demodex* mites in intranasal follicles in patients with AR. This study aims to explore the potential relationship between AR and *Demodex* mites and to assess the necessity of antiparasitic treatment in managing AR.

METHODS

This study was conducted between January and July 2022 in the Dermatology and Otolaryngology Clinics of Elazığ Fethi Sekin City Hospital. The study involved 50 patients diagnosed with AR and 50 healthy controls matched by age and gender. The diagnosis of AR was made by an ear, nose, and throat (ENT) specialist based on patient history and clinical presentation in patients with symptoms of nasal discharge, congestion, itching, and sneezing, with a good response to empirical treatment using an antihistamine or nasal glucocorticoid. Healthy controls were selected based on the absence of a history of atopy or AR symptoms, and no dermatological conditions such as rosacea, seborrheic dermatitis, acne vulgaris, atopic dermatitis, or perioral dermatitis, particularly in the facial area. Additionally, all controls had normal results

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on other systemic examinations. The study adhered to the ethical principles outlined in the World Medical Association's Declaration of Helsinki and received approval from the Ethics Committee of Fırat University Faculty of Medicine (Date: 10.02.2022, Decision No: 2022/02-23). Informed about the study's details, all participants provided written consent before participation. Patients and healthy volunteers who had not used any systemic or local antibiotics, topical steroids or drops, or received local or systemic radiotherapy and chemotherapy, acaricidal or immunosuppressive therapy within past month were included in the study. The AR score and Total Nasal Symptom Score (TNSS) system were used to assess disease severity. AR severity was classified as mild or moderate-to-severe based on the intensity of symptoms and their impact on sleep, as well as social, work, and school life. The TNSS is one of the most important subjective tests used to diagnose rhinitis. In this scoring, 4 symptoms including sneezing, nasal itching, nasal congestion and runny nose were questioned. Patients rated their symptoms as 0 (none), 1 (mild), 2 (moderate), or 3 (severe). The TNSS was calculated by summing the scores corresponding to the severity of these four symptoms.

Demodex Diagnosis

The presence of *Demodex* mites was examined in both nasal vestibules of all volunteers who agreed to participate in the study. To assess *Demodex* infestation in the nasal follicles, a total of 8 terminal follicles, 4 from each of the right and left nasal vestibules, were epilated using sterile forceps. Two drops of immersion oil were placed on the slide, covered with coverslips, and examined under a light microscope at 10x, 40x, and 100x magnification by two dermatologists. The number of *Demodex* mites detected was recorded. The presence of at least one *Demodex* mite was considered evidence of *Demodex* infestation.

Statistical Analysis

Study results were presented as numbers, and percentages. Fisher's exact test was used to compare the rates of intranasal *Demodex* infestation between the groups. SPSS (SPSS Inc., Chicago, IL) statistical analysis was performed for statistical analysis. A p-value of less than 0.05 was considered statistically significant.

RESULTS

The age range of the 50 patients included in the study was 18 to 60 years, with a mean age of 21.4±2.92 years. The 50 healthy control subjects had an age range of 19 to 58 years, with a mean age of 22.4±2.86 years. The patient group consisted of 38 (76%) females and 12 (24%) males, while the control group included 35 (70%) females and 15 (30%) males. There was no significant difference between the groups in terms of age or gender (p>0.05 In this study, *Demodex* positivity in intranasal follicles was detected in 3 (6%) individuals from the healthy control group. Similarly, 3 (6%) patients with AR were found to have *Demodex* mites intranasally, with no statistically significant difference compared to the healthy controls (p=1). The mean TNSS score in the 3 AR patients with *Demodex* positivity was 7.66±1.52, compared to 7.61±1.13 in the 47 AR patients with *Demodex* negativity, with no statistically significant difference between the two groups (p>0.05). Additionally, no significant correlation was found between *Demodex* positivity, disease severity, and TNSS scores in AR patients (p>0.05).

DISCUSSION

AR has been reported to negatively impact quality of life.[9] In adult patients, sleep disorders affect up to 66%, and both work and school performance deteriorate. The diagnosis of AR relies on a thorough medical history, the presence of characteristic symptoms, and the patient's response to empirical treatment with antihistamines or nasal glucocorticoids.[1-3]

Demodex mites are typically present in the pilosebaceous units of the skin, with a preference for areas such as the face, forehead, cheeks, nose, nasolabial folds, and eyelashes.[5] It is believed that the penetration of *Demodex* mites into the dermis, or more commonly, a proliferation of mites in the pilosebaceous unit exceeding >5/cm², triggers inflammation by promoting the release of inflammatory cytokines.[10] The proteins within *Demodex* mites, along with their remnants or waste products, can trigger inflammatory responses in the host through delayed hypersensitivity or an innate immune reaction.[11-14]

In recent years, research has emphasized uncovering the involvement of *Demodex* mites in the etiology of AR. According to research conducted by Yengil et al.[8] involving 63 patients with allergic rhinitis (AR) and 65 healthy individuals, the prevalence of *Demodex* on the eyelashes and cheeks was examined in relation to AR. Four eyelashes were collected from each participant to assess the density of *Demodex*. They found that the frequency of *Demodex* on the eyelashes was 50.8% in the AR group compared to 38.1% in the control group. On the face, the frequency was 38.1% in the AR group and 12.3% in the control group. As a result, the prevalence of *Demodex* on the face and eyelashes was markedly higher in the AR group compared to the control group (p=0.001 and p=0.0001, in that order). The authors observed a significant association between ocular symptoms and *Demodex* positivity on the eyelashes in AR patients. However, no significant relationship was found between nasal symptoms and *Demodex* positivity on the eyelashes or cheeks in AR patients.[8]

In another study investigating the coexistence of AR and diabetes mellitus (DM) and the role of *Demodex* mites, the researchers included 92 patients and 30 healthy individuals as the control group. They identified *Demodex* positivity in 44 out of 92 patients (47.8%) and in 1 out of 30 individuals in the control group (3.3%). *Demodex* positivity was observed in 14 patients with DM (43.7%), 12 patients with AR (40%), and 18 patients with coexisting AR and DM (60%). The researchers observed a statistically significant prevalence of *Demodex* across all three patient groups relative to the control group. They concluded that *Demodex* mites ought to be considered in cases of AR unresponsive to conventional treatments. Furthermore, the same study suggested that the elevated prevalence of *Demodex* infestation might worsen existing AR

symptoms and that antiparasitic treatment could positively impact the quality of life in this patient group.[7,13]

No studies were identified in the literature investigating the frequency of intranasal *Demodex* infestation. In our study, we detected *Demodex* positivity in the intranasal follicles of 3 (6%) individuals in the healthy control group. *Demodex* positivity was detected in our 3 (6%) patients with AR without any statistically significant difference compared to healthy controls (p=1). We found no significant correlation between *Demodex* positivity and disease severity or TNSS scores in the AR patient group. The reason why *Demodex* was found less frequently in the nasal cavity of our healthy control group compared to other parts of the face may be related to the the continuous airflow in the nasal passage and regular expulsion of nasal secretions. Likewise, we think that the reason for the lower than the expected *Demodex* positivity rates in our group of patients with AR may be increased nasal discharge and continuous mechanical cleaning of the nasal follicles and its surroundings.

CONCLUSION

We could not establish a link between nasal anatomy and intranasal *Demodex* infestation in AR patients. Although the study by Aril et al.[7] reported that antiparasitic treatment could potentially alleviate symptoms in patients with a high *Demodex* infestation, our findings did not reveal a significant association between *Demodex* and AR. In conclusion, we suggest that intranasal antiparasitic treatments may be unnecessary in the management of patients with AR.

ETHICAL DECLARATIONS

Ethics Committee Approval

The study was carried out with the permission of Ethical Committee of the Fırat University Faculty of Medicine (Date: 10.02.2022, Decision No: 2022/02-23).

Informed Consent

All patients signed and free and informed consent form.

Referee Evaluation Process

Externally peer-reviewed.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Financial Disclosure

The authors declared that this study has received no financial support.

Author Contributions

All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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