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The Association Between the Presence of Human Facial Mites *Demodex* (Acari, Demodicidae) and Dermatological Symptoms in Rosacea Patients in Central Anatolia, Türkiye

Türkiye'nin Orta Anadolu Bölgesi'ndeki Rosacea Hastalarında İnsan Yüz Akarları Demodex (Acari, Demodicidae) Varlığı ile Dermatolojik Semptomlar Arasındaki İlişki

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ABSTRACT

Objective: This study aimed to investigate the potential relationship between the presence of *Demodex* mites and dermatological symptoms in patients with rosacea in the Central Anatolian Region of Türkiye.

Methods: A total of 63 patients diagnosed with rosacea were enrolled in the study. Skin samples were obtained using a standardized skin surface biopsy technique, and a questionnaire was administered to assess skin symptoms. Statistical analysis was performed to evaluate the association between *Demodex* infestation and specific skin symptoms.

Results: Among the study participants, 65.1% exhibited *Demodex* infestation. Statistical analysis revealed significant associations between the presence of *Demodex* and skin burning (p=0.018), skin pain (p=0.012), and skin stinging (p=0.001). However, no statistically significant associations were observed between *Demodex* presence and gender, skin dryness, itching, irritation, skin rash or the presence of red/pink bumps on the skin.

Conclusion: This study provides evidence suggesting a potential role for *Demodex* mites in the pathogenesis of rosacea, specifically in relation to skin symptoms such as burning, pain, and stinging. The findings underscore the complexity of the relationship between *Demodex* infestation and rosacea and highlight the need for further research, including longitudinal and mechanistic studies, to better understand this association and its clinical implications. Ultimately, understanding the role of *Demodex* mites in rosacea may lead to innovative therapeutic approaches, offering hope for improved management of this challenging dermatological condition.

Keywords: *Demodex*, rosacea, dermatological symptoms

ÖZ

Amaç: Bu çalışmada, Türkiye'nin İç Anadolu Bölgesi'ndeki rosacea hastalarında *Demodex* akarlarının varlığı ile dermatolojik semptomlar arasındaki potansiyel ilişkinin araştırılması amaçlanmıştır.

Yöntemler: Çalışmaya rosacea tanısı alan toplam 63 hasta dahil edilmiştir. Deri örnekleri standart bir deri yüzeyi biyopsisi tekniği kullanılarak elde edilmekte ve deri semptomlarını değerlendirmek için bir anket uygulanmıştır. *Demodex* istilası ile spesifik deri semptomları arasındaki ilişkiyi değerlendirmek için istatistiksel analiz yapılmıştır.

Bulgular: Çalışmaya katılanların %65,1'inde *Demodex* istilası görüldü. İstatistiksel analiz, *Demodex* varlığı ile deri yanması (p=0,018), deri ağrısı (p=0,012) ve deri batması (p=0,001) arasında anlamlı ilişkiler olduğunu ortaya konulmuştur. Ancak *Demodex* varlığı ile cinsiyet, deri kuruluğu, kaşıntı, tahriş, deri döküntüsü veya deride kırmızı/pembe şişliklerin varlığı arasında istatistiksel olarak anlamlı bir ilişki gözlenmemiştir.

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Türkiye PARAZİTOLOJİ Dergisi

Sonuç: Bu çalışma, özellikle yanma, ağrı ve batma gibi deri semptomlarıyla ilişkili olarak, rosacea patogenezinde *Demodex* akarlarının potansiyel bir rol oynadığını öne süren kanıtlar sunmaktadır. Bulgular, *Demodex* istilası ile rosacea arasındaki ilişkinin karmaşıklığının altını çizmekte ve bu ilişkiyi ve klinik sonuçlarını daha iyi anlamak için boylamsal ve mekanik çalışmalar da dahil olmak üzere daha fazla araştırmaya ihtiyaç duyulmaktadır. Sonuçta, *Demodex* akarlarının rosaceadaki rolünün anlaşılması, yenilikçi terapötik yaklaşımlara yol açarak bu zorlu dermatolojik durumun daha iyi açıklanmasını umut etmektedir.

Anahtar Kelimeler: *Demodex*, rosacea, dermatolojik semptomlar

INTRODUCTION

Rosacea is a chronic and common dermatological condition that predominantly affects the central regions of the face, including the cheeks, nose, chin and forehead. This skin condition is characterised by a range of symptoms including facial erythema, persistent flushing, papules, pustules and telangiectasias. Despite its prevalence, the aetiology of rosacea remains incompletely understood, posing significant challenges to its management and treatment (1-3). The pathogenesis of rosacea is thought to be multifactorial, involving complex interactions between genetic predisposition, environmental triggers, neurovascular dysregulation and immune dysfunction. In addition, the impact of rosacea goes beyond physical symptoms and significantly affects patients' quality of life and self-esteem. Given the complexity of the disease, elucidating the underlying mechanisms and identifying effective therapeutic strategies is of paramount importance (2,4).

Demodex is a genus of microscopic parasitic mites that commonly inhabit the skin and hair follicles of mammals, including humans. The two species that primarily affect humans are *Demodex folliculorum* and *D. brevis* (5,6). These mites are considered commensals as they generally coexist harmlessly with their host. However, under certain conditions, such as a weakened immune system or an overpopulation of mites, *Demodex* can contribute to skin problems. They are particularly associated with skin conditions such as rosacea and demodicosis, the latter being a more severe infestation that can cause skin inflammation and irritation (7,8). *Demodex* mites feed on sebum and cellular debris and are primarily found in the pilosebaceous units where hair follicles and sebaceous glands are located. Although *Demodex* mites are relatively common, more research is needed to better understand their role in skin health and the factors that contribute to their proliferation (6).

The presence of *Demodex* mites in rosacea patients has been associated with various symptoms and could exacerbate the severity of the condition. Studies have shown a positive correlation between *Demodex* mite density and the severity of rosacea symptoms, including facial redness, papules, and pustules. Individuals with higher *Demodex* counts were more likely to experience dryness, itchiness, and skin irritation. Furthermore, *Demodex* mite infestation was significantly associated with rough, scaly skin in rosacea patients. Treatments aimed at reducing *Demodex* mite counts have shown improvements in skin symptoms such as stinging and pain sensations. Though the exact mechanisms are still being investigated, the presence of *Demodex* mites appears to influence rosacea symptoms, suggesting potential avenues for targeted therapeutic interventions (6,9-11).

The primary aim of this study is to investigate the possible relationship between the presence of *Demodex* and the dermatological symptoms of rosacea patients in the Central Anatolian Region of Türkiye. By conducting an analysis of *Demodex* infestation and associated symptoms, we aim to contribute to the understanding of the aetiological factors underlying rosacea.

METHODS

Study Population and Ethical Considerations

The study included 63 patients diagnosed with rosacea who registered at Elazığ Universal Eye Hospital Dermatology Clinic and Fırat University Dermatology Outpatient Clinic between November 2022 and February 2023. Individuals with concomitant skin or systemic diseases, a history of dermatological surgery, or receiving systemic/topical treatment were excluded to minimise potential confounding factors.

The study received ethical approval from the Clinical Research Ethics Committee of Sivas Cumhuriyet University, with the approval number 2022-10/02.

Sample Collection

Skin samples were taken from the cheek, nasolabial and chin regions of each participant using a standardised skin surface biopsy (SSSB) technique. The sampling sites were first cleaned with alcohol and dried. An area of one square centimetre (cm^2) was then marked on a clean glass slide. A drop of cyanoacrylate adhesive was applied to the opposite side of the slide, in the centre of the marked area. The marked area of skin was gently pressed onto the adhesive and then carefully lifted after approximately one minute.

Survey Administration

The questionnaire designed to assess the relationship between the presence of *Demodex* and skin symptoms was administered face-to-face to the rosacea patients participating in the study.

Statistical Analysis

The data collected were entered into SPSS software (Statistical Package for the Social Sciences, version 22.0 for Windows). Descriptive statistics such as percentiles and means were used to evaluate the data. Chi-square tests were also used, with a significance level of 0.05.

RESULTS

A total of 63 patients diagnosed with rosacea were included in this study to investigate the prevalence of *Demodex* spp. infestation and its association with various skin symptoms. Among the study participants, *Demodex* spp. was detected in 65.1% of rosacea patients (Table 1).

Analysis of the relationship between the presence of *Demodex* spp. and individual skin symptoms revealed statistically significant associations with specific symptoms. *Demodex* spp. infestation was significantly associated with skin burning (p=0.018),

skin pain (p=0.012) and skin stinging (p=0.001). However, no statistically significant associations were observed between the presence of *Demodex* spp. and gender (p=0.388), skin dryness (p=0.340), skin itching (p=0.432), skin irritation (p=0.087), skin rash (p=0.053) or the presence of red/pink bumps on the skin (p=0.237). Among the different age groups of rosacea patients, the highest incidence of *Demodex* infestation was observed in individuals aged 51-69 years. However, our statistical analysis showed no significant difference in *Demodex* prevalence between age groups (Table 1).

DISCUSSION

The association between *Demodex* mites and rosacea has been the subject of considerable interest in the field of dermatology (12,13). Several studies have suggested a possible link between the presence of *Demodex* mites, particularly *D. folliculorum* and *D. brevis*, and the development or exacerbation of rosacea symptoms (5,14,15). A meta-analysis of 1.513 rosacea patients showed that the prevalence (70.4% vs. 31.8%) of *Demodex* mites were significantly higher in rosacea patients compared to controls (7,16). Our findings revealed that *Demodex* mites were detected in a substantial proportion of our rosacea patient population, with a prevalence of 65.1%. This observation aligns with previous studies suggesting a high prevalence of *Demodex* infestation in individuals with rosacea.

Rosacea, which usually appears in men after the age of 50 depending on gender and age factors, has been shown to start at an earlier age in women and is therefore three times more common in women than in men (9,17,18). Females accounted for 85.7% of rosacea patients in the study group. However, the presence of *Demodex* in rosacea patients was not statistically significantly different between the sexes.

One of the key findings of our study was the significant association between *Demodex* infestation and specific skin symptoms. We observed statistically significant relationships between the presence of *Demodex* and symptoms such as burning, pain and stinging of the skin. These findings raise the possibility that *Demodex* mites may actively contribute to the development or aggravation of these specific symptoms in rosacea patients. These microscopic ectoparasites are commonly found in human hair follicles and sebaceous glands, and their overpopulation is thought to trigger inflammatory responses that contribute to the and other micro-organisms in the follicles. However, this process can cause damage to the host's follicular epithelium. As the number

Table 1. Age, gender and skin symptoms associated with *Demodex* spp. presence

		n (%)	*Demodex* spp. (+) - n (%)	p-value
Rosacea patients		63	41 (65.1)	-
Age, (mean ± SD) -				
19-30		13 (20.6)	11 (17.4)	0.434
31-40		7 (11.1)	4 (6.3)	
41-50		16 (25.4)	8 (12.7)	
51-68		27 (42.8)	18 (28.6)	
Sex				
Female		54 (85.7)	34 (54.0)	0.388
Male		9 (14.3%)	7 (11.1)	
Skin symptoms				
Dryness of the skin	+	50 (79.4)	34 (54.0)	0.340
	-	13 (20.6)	7 (11.1)	
Itching of the skin	+	44 (69.8)	30 (47.6)	0.432
	-	19 (30.2)	11 (17.5)	
Irritation of the skin	+	48 (76.2)	34 (54.0)	0.087
	-	15 (23.8)	7 (11.1)	
Burning on the skin	+	54 (85.7)	32 (50.8)	0.018
	-	9 (100.0)	9 (22.0)	
Rashes on the skin	+	44 (69.8)	32 (50.8)	0.053
	-	19 (30.2)	9 (14.3)	
Stinging on the skin	+	35 (55.6)	15 (23.8)	0.001
	-	28 (44.4)	26 (41.3)	
Pain on the skin	+	18 (28.6)	16 (25.4)	0.012
	-	45 (71.4)	25 (39.7)	
Red/pink bumps on the skin	+	60 (95.2)	40 (63.5)	0.237
	-	3 (4.8)	1 (1.6)	

SD: Standard deviation

of mites increases, they mechanically occlude the hair follicles and sebaceous glands, causing tissue damage and disruption of the cutaneous barrier. The dying *Demodex* releases the chitin layer that forms the exoskeleton and the mite's own pathogenesis of rosacea. While the exact mechanisms underlying this association are still under investigation, it is clear that *Demodex* mites may play a role in the inflammatory cascade characteristic of rosacea (19-21). In a favourable microenvironment (skin pH, humidity, sebum lipid profiles, etc.) *Demodex* lives in balance with the host immune system. The human immune system has an inhibitory effect on the proliferation of mites. Their numbers are under control without any inflammatory reaction or symptoms. However, if this balance is disturbed, clinical symptoms occur. *Demodex* uses lipase enzymes to digest the sebum from the lipids. In this way it digests bacteria contents, including bacterial antigens, are shed into the environment. The onset of the inflammatory process and the clinical symptoms and severity of the resulting demodicosis are increased in certain inflammatory diseases such as rosacea (22,23).

Interestingly, we did not find statistically significant differences between the presence of *Demodex* and other common skin symptoms associated with rosacea, including dryness, itching, irritation, rash, and the presence of red/pink bumps on the skin. This suggests that the relationship between *Demodex* infestation and rosacea may be specific to certain symptoms, highlighting the complexity of the condition.

In a study by Forton and Seys (24) the presence of *Demodex* was associated with itching symptoms. In different studies, a statistically significant difference was found between itching, redness and rash symptoms in rosacea patients with *Demodex* (10,25-29). According to our research results, contrary to the findings in the literature, no relationship was found between itching and the presence of *Demodex*.

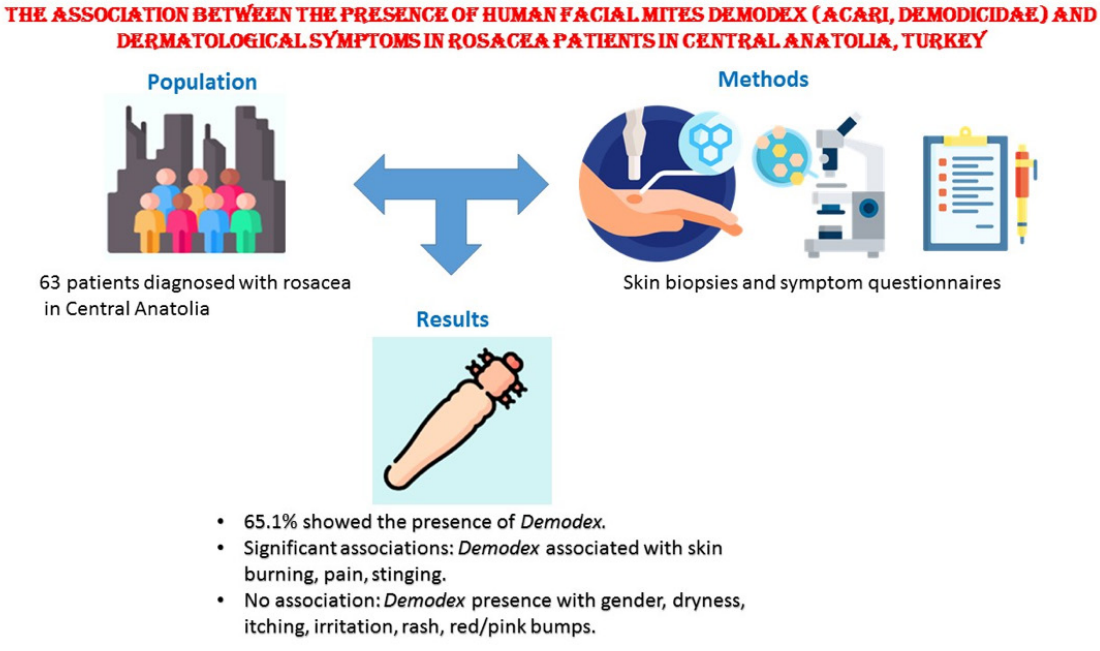
Our study found a statistically significant association between the presence of *Demodex* mites and the occurrence of symptoms such as burning, pain and stinging in rosacea patients (Graphic 1). This finding adds to the growing body of evidence suggesting that *Demodex* mites may play an important role in the aetiology of rosacea-related symptoms. While the exact mechanisms by which *Demodex* mites exacerbate these symptoms require further investigation, our findings highlight the need for continued research in this area. Understanding the interactions between *Demodex* mites and the host's skin microenvironment could potentially lead to novel therapeutic strategies to manage and alleviate the discomfort associated with rosacea, offering hope for an improved quality of life for those affected. It's important to acknowledge several limitations of our study. First, our sample size was relatively small, which may limit the generalizability of our findings to the broader population of rosacea patients. Additionally, our study design was cross-sectional, and therefore, we cannot establish causality or the temporal relationship between *Demodex* infestation and the observed skin symptoms.

Study Limitations

Small sample size is a limitation of the study. The lack of an objective scoring system in the diagnosis of *Demodex* infestation is another limitation.

CONCLUSION

In conclusion, our study adds to the growing body of evidence suggesting a potential role for *Demodex* mites in the pathogenesis of rosacea. The significant associations between *Demodex* infestation and specific skin symptoms such as burning, pain and stinging provide important insights into the multifaceted nature of rosacea. Understanding the role of *Demodex* mites in rosacea may open new avenues for therapeutic intervention and improve the management of this challenging dermatological condition. Although this study provides evidence suggesting a potential role for *Demodex* mites in the pathogenesis of rosacea,



Graphic 1. Study of 63 rosacea patients in Central Anatolia explored *Demodex* mite ties to symptoms. Significant link found: *Demodex* presence correlated with skin burning, pain and stinging. No significant associations seen with other symptoms or demographic factors

it is observational in nature and does not evaluate symptom improvement after treatment. Further longitudinal and interventional studies are needed to clarify the causal relationship and therapeutic implications.

*Ethics

Ethics Committee Approval: The study received ethical approval from the Clinical Research Ethics Committee of Sivas Cumhuriyet University, with the approval number 2022-10/02.

Informed Consent: Written informed consent was obtained from all participants.

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Footnotes

*Authorship Contributions

Concept: M.K., Z.A.P., Design: M.K., Z.A.P., Data Collection or Processing: M.K., Z.A.P., M.E., F.Ç.G., Analysis or Interpretation: M.K., Z.A.P., Literature Search: M.K., Z.A.P., Writing: M.K., Z.A.P.

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REFERENCES

1. Plewig G, Kligman AM. Acne and rosacea: Springer; 2012.
2. Woo YR, Lim JH, Cho DH, Park HJ. Rosacea: molecular mechanisms and management of a chronic cutaneous inflammatory condition. Int J Mol Sci. 2016; 17: 1562.
3. Juliandri J, Wang X, Liu Z, Zhang J, Xu Y, Yuan C. Global rosacea treatment guidelines and expert consensus points: the differences. J Cosmet Dermatol. 2019; 18: 960-5.
4. Vemuri RC, Gundamaraju R, Sekaran SD, Manikam R. Major pathophysiological correlations of rosacea: a complete clinical appraisal. Int J Med Sci. 2015; 12: 387.
5. Elston CA, Elston DM. *Demodex* mites. Clin Dermatol. 2014; 32: 739-43.
6. Foley R, Kelly P, Gatault S, Powell F. *Demodex*: a skin resident in man and his best friend. J Eur Acad Dermatol Venereol. 2021; 35: 62-72.
7. Chang YS, Huang YC. Role of *Demodex* mite infestation in rosacea: a systematic review and meta-analysis. J Am Acad Dermatol. 2017; 77: 441-7.e6.
8. Hay R. *Demodex* and skin infection: fact or fiction. Curr Opin Infect Dis. 2010; 23: 103-5.
9. Yasak Guner R, Tosun M, Akyol M, Hayta SB. *Demodex* infestation as a cause of sensitive skin in a dermatology outpatient clinic. J Cosmet Dermatol. 2022; 21: 1610-5.
10. Forton F, Germaux M-A, Brasseur T, De Liever A, Laporte M, Mathys C, et al. Demodicosis and rosacea: epidemiology and significance in daily dermatologic practice. J Am Acad Dermatol. 2005; 52: 74-87.
11. Forton FM. The pathogenic role of *Demodex* mites in Rosacea: a potential therapeutic target already in erythematotelangiectatic Rosacea? Dermatol Ther (Heidelb). 2020; 10: 1229-53.
12. Türkmen D, Türkoğlu G. Rozase hastalarında *Demodex* enfestasyonu. Turkiye Parazitol Derg. 2019; 43: 194-7.
13. Koşar N, Sabancılar E, Karasartova D, Güreser AS, Öztekin A, Derici MK, ve ark. Rozasea hastalarında *Demodex* spp.'nin araştırılması. Hitit Med J. 2019; 1: 18-22.
14. Holmes AD. Potential role of microorganisms in the pathogenesis of rosacea. J Am Acad Dermatol. 2013; 69: 1025-32.
15. Ünal ES, Akçınar ÜG, Al FD, Parlak N. Rosacea and the relationship between *demodex* spp., cigarette and alcohol: Case-control study. Sağ Aka Derg. 2021; 8: 323-9.
16. Roihu T, Kariniemi AL. *Demodex* mites in acne rosacea. J Cutan Pathol. 1998; 25: 550-2.
17. Isa N, Loong LW, Fang GH, Mohamad AM, Razali N, Rani NI, et al. Demodicosis among university medical students in Malaysia and the effects of facial cleanser and moisturizer usage. Southeast Asian J Trop Med Public Health. 2011; 42: 1375-80.
18. Li J, Luo X, Liao Y, Liang L. Age differences in ocular demodicosis: *Demodex* profiles and clinical manifestations. Ann Transl Med. 2021; 9: 791.
19. Thoemmes MS, Fergus DJ, Urban J, Trautwein M, Dunn RR. Ubiquity and diversity of human-associated *Demodex* mites. PLoS One. 2014; 9: e106265.
20. Forton F. Elucidating the role of *Demodex folliculorum* in the pathogenesis of rosacea: exciting first steps. Br J Dermatol. 2018; 179: 252-3.
21. Aroni K, Tsagroni E, Lazaris AC, Patsouris E, Agapitos E. Rosacea: a clinicopathological approach. Dermatology. 2004; 209: 177-82.
22. Paichitrojjana A. *Demodex*: the worst enemies are the ones that used to be friends. Dermatol Reports. 2022; 14: 9339.
23. Gonzalez-Hinojosa D, Jaime-Villalonga A, Aguilar-Montes G, Lammoglia-Ordiales L. *Demodex* and rosacea: Is there a relationship? Indian J Ophthalmol. 2018; 66: 36.
24. Forton F, Seys B. Density of *Demodex folliculorum* in rosacea: a case-control study using standardized skin-surface biopsy. Br J Dermatol. 1993; 128: 650-9.
25. Karincaoglu Y, Bayram N, Aycan O, Esrefoglu M. The clinical importance of *Demodex folliculorum* presenting with nonspecific facial signs and symptoms. J Dermatol. 2004; 31: 618-26.
26. Bikowski JB, Del Rosso JQ. *Demodex* dermatitis: a retrospective analysis of clinical diagnosis and successful treatment with topical crotamiton. J Clin Esthet Dermatol. 2009; 2: 20.
27. Yazısız H, Çekin Y, Koçlar FG. Yüzünde dermatolojik semptomları olan hastalarda *Demodex* akarlarının varlığı. Turkiye Parazitol Derg. 2019; 43: 143-8.
28. Tileklioğlu E, Yıldız İ, Malatyalı E, Ertabaklar H. Aydın Adnan Menderes Üniversitesi Tıp Fakültesi Hastanesi Parazitoloji Laboratuvarı *Demodex* spp. sonuçlarının retrospektif olarak değerlendirilmesi. Turkiye Parazitol Derg. 2020; 44: 72.
29. Przydatek-Tyrajska R, Sędzikowska A, Bartosik K. Primary facial demodicosis as a health problem and aesthetic challenge: a case report. J Cosmet Dermatol. 2021; 20: 420-4.