



Relationship between *Demodex* spp. infestation and acne disease

Noha Sammer Ahmed, Nada Abd El-Fattah El-Nadi, wafaa mohamed Abd Elmaged, Esraa Omar Ali,

Department of Medical Parasitology, Faculty of Medicine, Sohag University

Abstract:

Background: *Demodex* mites present on the skin of healthy individuals. *Demodex* mites in high densities may play a pathogenic role.

Aims: To evaluate the correlation between *Demodex* infestation and acne vulgaris.

Setting: Outpatient Clinic of Dermatology Department, Faculty of Medicine, Sohag University.

Patients and methods: One hundred patients diagnosed with acne and an equal number of healthy volunteers (with age and sex matching) as control groups were enrolled in this study. Skin scrapping was taken in the patient and the control groups. Samples were examined by the light microscope, and *Demodex* were counted.

Results: regarding gender and age, no significant difference was present between the patients and controls ($p > 0.05$). *Demodex* infestation was higher in patients than in controls ($p = 0.001$). no statistically significant relationship between age, sex, family history, presence of animal at home, or severity of acne and the positivity of *Demodex* mites (p -value for all > 0.05).

Conclusion: Acne vulgaris is significantly correlated with *Demodex* infestation.

Key Words: *Demodex* infestation, Acne vulgaris, Skin scrapping.

INTRODUCTION

Demodicidae is the family to which *Demodex* mite belongs to. *Demodex folliculorum* and *Demodex brevis* are divided into two types dermal and follicular (1). The parasite prefers the facial area. They may be found on healthy skin but with a density of < 5 mites/cm². the clinical manifestations (acne, rosacea, perioral dermatitis, and seborrheic dermatitis are skin diseases claimed to be caused by *Demodex* (3), or when more than 5 mites/cm² are present or when they present deeply in the dermis are necessary to diagnose *Demodex* infestation (2).

Acne is a disease of the pilosebaceous unit presented by comedones, papules, pustules, nodules, and scarring in many

cases(4). Although acne is not a dangerous disease, it can lead to Psychological problems due to facial scars (5).

Aims of the Study:

Our study was done to find the correlation between acne vulgaris and its severity and *Demodex* mites.

Patients and methods:

The study was done in the Parasitology Department and Dermatology outpatients clinic, Faculty of Medicine, Sohag University. One hundred patients diagnosed with acne and an equal number of healthy volunteers (with age and sex matching) as control groups were enro-

lled in this study. They were taken from the outpatient clinics of Dermatology, Venereology and Andrology Departments, Faculty of Medicine, Sohag University Hospitals. The study was agreed upon by the Local Ethics Committee of the university. Informed consent was taken from each patient.

All of the acne patients had comedones; In this study, the following patients Excluded: patients without comedone, patients < 18 years old, menstrual disturbances, acne caused by a drug, cosmetic acne, presence of any chronic disease, taking topical or systemic steroids, topical acaricide, or immunosuppressive drugs.

The healthy group was ≥ 18 years old, had no skin disease on either the face or the body, had no itching, and not using topical steroids, systemic steroids, or immunosuppressive drugs.

Grading of acne severity

The acne severity was graded from 1 to 4 according to the Global Acne Severity Scale (GASS) proposed by (6). Forehead, each cheek, nose, chin, chest, and upper back are sites to be examined and available for scrapping.

Collection and examination of samples

One sample was obtained from the lesion using skin scraping with potassium hydroxide preparation. patients cleaned their faces with a gentle cleanser and water before the test. After the skin dried, a sterile sharp blade was scraped on a one-square centimeter area of the right cheek.

The accumulated debris or scale was collected, a drop of 20% potassium hydroxide was added according to(7) and the sample was covered and examined for *Demodex* by light microscopy as shown in figures 1,2. The parasites on each slide were calculated to evalu-

ate *Demodex* density and its correlation with *Demodex* severity. patients were informed about the steps of skin scraping. In the acne group, skin scraping was obtained from different acne lesions. In the control group, Skin scraping was taken from the chin or forehead.

IV. Statistical analysis:

Data were studied utilizing a Statistical Program for Social Science (SPSS) version 18.0. Quantitative data were evinced as mean \pm standard deviation (M \pm SD) while qualitative data were evinced as frequency and percentage No(%). Chi-square test: was utilized in comparison of non-parametric data. A one-way analysis of variance (ANOVA), utilized in comparison of more than two means. P-values were established statistically significant at $P < 0.05$.

Results:

Demographic data of the patients and controls are present in Table 1. This table shows no statistically significant difference (**p-value >0.05**) between studied groups as regard age and sex. In the patient's group, there were 28% males and 72% females while in the control group there were 40% males and 60% females. The mean age of the patient group was 23.7 ± 4.3 years while the mean age of the control group was 27.8 ± 6.7 years.

Table 1 shows no statistically significant difference (p-value =0.111) between studied groups as regard presence of animal at home (22% Vs 32%). As regards the degree of acne in the patient's group, our study shows 52% of a mild degree, 26% of moderate degree, and 22% of a severe degree of acne.

The incidence and density of *Demodex* mites:

Table 2 shows a highly statistically significant difference (**p-value < 0.001**) between studied groups as regards the

positivity of *Demodex*. In the patient's group, there were 44% of patients positive for *Demodex* & 56% of patients negative, while in the control group there were 16% positive & 84% negative.

Table 3 shows the density of *Demodex* mites in the patients. patients with severe acne had more *Demodex* mites than patients with mild and moderate acne

with statistically significant differences between them.

Table 4 shows no relationship between age, sex, family history, presence of animal at home, or severity of acne and the incidence of *Demodex* mites (**p-value for all > 0.05**). This means that the positivity of *Demodex* acts as an independent risk factor for acne disease.

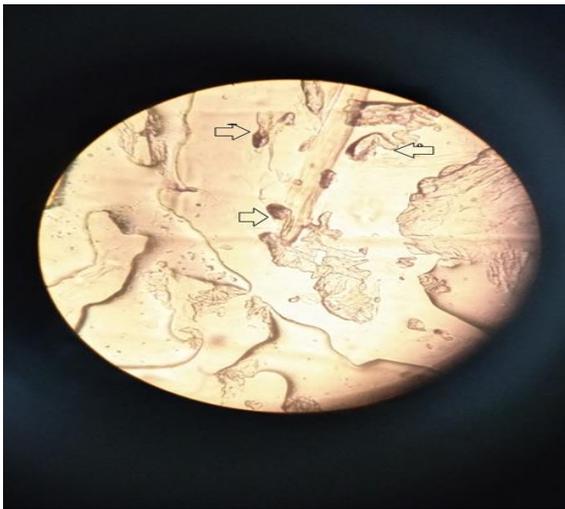


Figure 1. Species infection: *Demodex folliculorum* from skin scrap by wet mount (100x).

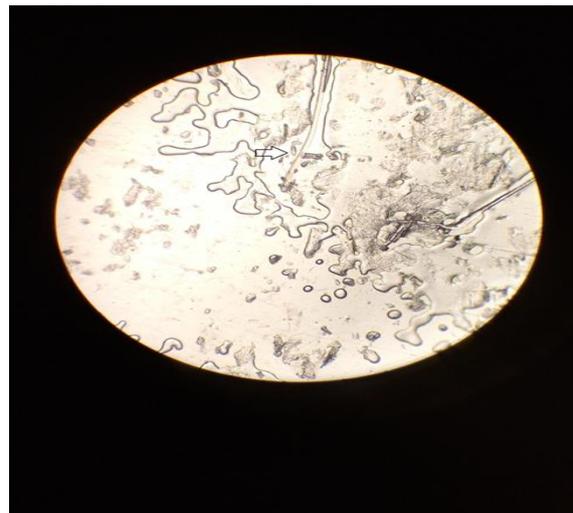


Figure 2. Species infection: *Demodex folliculorum* from skin scrap by wet mount (40x).

		Patients (N=100)		Control (N = 100)		P-value
Age (years)	Mean ±SD	25.6		27.8		0.051 NS
		± 4.06		± 6.7		
Sex	Male	28	28%	40	40%	0.073 NS
	Female	72	72%	60	60%	
Presence of animal at home	Yes	22	22%	32	32%	0.111 NS
	No	78	78%	68	68%	

Table 1. Description of demographic data in studied groups

No statistically significant difference was found on this table (**p-value > 0.05**) between groups as regard age, sex, and presence of animals at home.

		Patients (N=100)	Control(N=100)	P-value
Demodex	Positive	44%	16%	< 0.001 HS
	Negative	56%	84%	

Table 2. Prevalence of *Demodex* infection in studied groups

This table shows a highly statistically significant difference (**p-value < 0.001**) between studied groups as regards the Prevalence of *Demodex* infection.

		Patients (N = 44)		Control (N = 16)		P-value
Number of <i>Demodex</i> / cm	I	12	27.3%	13	81.2%	0.001 S
	II	12	27.3%	3	18.7%	
	III	10	22.7%	0	0%	
	IV	10	22.7%	0	0%	

Table3. Comparison between groups as regard density of *Demodex* mites

This table shows a statistically significant difference (**p-value=0.001**) between studied groups as regards the number of *Demodex* / cm.

Patients group		<i>Demodex</i>				P-value
		Positive (N = 44)		Negative (N = 56)		
Age (years)	Mean ±SD	23.4 ± 3.3		23.9 ± 4.9		0.834 NS
Sex	Male	12	27.3%	16	28.6%	0.886 NS
	Female	32	72.7%	40	71.4%	
Family history	Yes	20	45.5%	34	60.7%	0.129 NS
	No	24	54.5%	22	39.3%	
Animal at home	Yes	10	22.7%	12	21.4%	0.876 NS
	No	34	77.3%	44	78.6%	
Degree of acne	Mild	24	54.5%	28	50.0%	0.802 NS
	Moderate	10	22.7%	16	28.6%	
	Severe	10	22.7%	12	21.4%	

Table4. Comparison between infected and noninfected patients as regards demographic data.

This **table** shows no statistically significant differences (**p-value < 0.05**) between studied groups as regard age, sex, family history, presence of animal at home, and severity of acne.

Discussion:

In the current study, we found that *Demodex* mite positive (≥ 5 mites/cm²) in 44% of the patients and 16 % of the controls. The prevalence of *Demodex* infection was found to be higher in the patients compared to the controls with a statistically significant difference between them (**p-value < 0.001**).

The results of our study were supported by a previous study (8). In which 210 patients with acne and 150 healthy controls without any skin diseases were enrolled. They observed that *Demodex* mite positivity was found to be 62.4% in

the patients and 16.7% in the controls (9). Comparative studies were done to determine this relationship and showed that *Demodex* positivity was 11.8% in 101 patients (9). another study was done also and positive samples were 15.38% of 78 patients. a meta-analysis was carried on the same issue in which 63 articles were evaluated and 48 found a positive association (10).

The higher number of *Demodex* mites found in 54.85% of patients; it was 31.54% higher than in the controls (**OR = 2.80; 95% CI: 2.34–3.36**) (11).

However, other authors didn't find a correlation and concluded that the *Demodex* mites were not correlated with acne vulgaris(12).

Also, there was no statistically significant relation (**p-value= 0.802**) between *Demodex* positivity and the degree of acne patients group in our study. There were 52% of mild degrees, 26% of moderate degrees, and 22% of severe degrees of acne in the patient's group. Another study found the same result (13).

In our study, no statistically significant relation (**p-value =0.834 for age and 0.886**) between *Demodex* positivity in the patient's group in terms of age and sex. Another study also found no correlation between gender and *Demodex* infestation, also there was no statistically significant relation (**p-value = 0.006**) between *Demodex* positivity and sex in the control group(14).

A new finding in this work that there was no statistically significant difference (**p-value =0.092**) between groups concern with the presence of animals at home. In the patient's group, there were 22% of patients had animals in their home while in the control group there were 32% had animals in their home. This was consistent with a study carried on the same issue(13)

Also, there was no statistically significant relation (**p-value =0.802**) between *Demodex* positivity and the degree of acne patients group in our study. There were 52% of a mild degree, 26% of moderate degree, and 22% of a severe degree of acne in the patient's group which was the same finding in another study(13).

On the other hand, there was no statistically significant relation (**p-value =0.129**) between *Demodex* positivity and family history of acne in our study despite that the study found that *the Demodex* positivity was higher in patients with a family history of acne this may

be due to these study found that the most significant family member with acne history was the mother, followed by the father, but other relatives showed no association in **p-value**. in our study, we didn't classify them.

Conclusion:

Acne vulgaris is significantly related to *Demodex* infestation. Examination and therapy for *Demodex* mites should be considered when regular treatment options for acne vulgaris are ineffective.

Conflict of Interest:

The authors of the study have no conflict of interest related to this publication.

References:

1. Rusiecka Ziolkowska J, Nokiell M, Fleischer M. Demodex --- an oldpathogen or a new one? Adv Clin Exp Med. 2014;23:295---8.
2. Aktas, Karabay E, Aksu C,erman A. Demodex folliculorum infestations in common facial dermatoses: acne vulgaris, rosacea, seborrheic dermatitis. A Bras Dermatol. 2020;95:187---93.
3. Aytekin S, Ş Y, Göktay F. 2017. Demodex infestations. Turkiye Klinikleri Journal of Dermatology-Special Topics. 10:169-174.
4. Tilki E, Zeytun E, Doğan S. 2017. Prevalence and density of Demodex folliculorum and Demodex brevis (Acari: Demodicidae) in Erzincan province. Acta Parasitologica Turcica. 41:80-86.
5. Tan JKL, Bhate K. 2015. A global perspective on the epidemiology of acne. British Journal of Dermatology. 172:3-12.
6. Doshi A, Zaheer A, Stiller MJ. A comparison of current acne grading systems and proposal of a novel system. International journal of dermatology. 1997 Jun;36(6):416-8.
7. Bunyaratavej S, Rujitharanawong C, Kasemsarn P, Boonchai W, Muanprasert C, Mattapan L,

- Leeyaphan C.* Skin scrapings versus standardized skin surface biopsy to detect Demodex mites in patients with facial erythema of uncertain cause – a comparative study. *Indian J Dermatol Venereol Leprol* 2016;82:519-22.
8. **Zeytun E and Yazıcıb M.** Incidence and density of Demodex folliculorum and Demodex Brevis (Acari: Demodicidae) in patients with acne in the province of Erzincan, Turkey. *INTERNATIONAL JOURNAL OF ACAROLOGY* 2019; 45(3):108-112.
9. **Baysal V, Aydemir M, Yorgancıgil B, Yıldırım M.** Akne vulgaris etyopatogenezinde D. folliculorum'ların rolünün araştırılması. *Türkiye Parazitol Derg* 1997; 21: 265-8.
10. **Polat E, Aygün G, Ergin R, Aslan M, Kutlubay Z, Altas K.** The role of Demodex folliculorum and Propionibacterium acnes in the pathogenesis of acne vulgaris. *Türkiye Parazitol Derg.* 2003;27:148-51.
11. **Zhao YE, Hu L, Wu LP, Ma XJ.** A meta-analysis of the association between acne vulgaris A. Demodex infestation. *J Zhejiang Univ-Sci B.* 2012;13:192---202.32
12. **Okçay P, Ertabaklar H, Save E, Erfug S.** Prevalence of *Demodex folliculorum* in young adults: relation with sociodemographic/hygienic factors and acne vulgaris. *J Eur Acad Dermatol Venereol* 2006; 20: 474-6.
13. **Akçınar UG, Ünal E, Al FD.** Demodex spp. as a possible etiopathogenic factor of acne and relation with acne severity and type. *Advances in Dermatology and Allergology/Postępy Dermatologii i Alergologii.* 2018 Apr;35(2):174.
14. **Dokuyucu R, Kaya OA, Yula E, Ustun I, Bayram F, Gokce C.** The presence of *Demodex folliculorum* in various obese groups according to BMI levels. *Arch Iran Med* 2016; 19: 210-4