

RESEARCH ON THE PREVALENCE, CLINICAL CHARACTERISTICS, AND RELATED FACTORS IN ACNE VULGARIS PATIENTS WITH DEMODEX INFECTION IN CAN THO CITY FROM 2021 TO 2023

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ABSTRACT

Background: Acne is a common disorder, associated with inflammation of the sebaceous and bacterial hair follicle units and has diverse clinical manifestations. The most commonly mentioned causes and factors associated with the onset of acne in adulthood are hormones, antibiotic-resistant bacteria, and the use of drugs and cosmetics. In particular, the increase in the number of Demodex mites due to the habit of using cosmetics of unknown origin, has caused complicated clinical symptoms and difficulties in the treatment of acne today. **Objectives:** To determine the prevalence, clinical characteristics and some related factors in patients with acne vulgaris superinfected with Demodex. **Materials and methods:** A cross-sectional descriptive study with analysis was conducted on 154 acne vulgaris patients visiting medical facilities in Can Tho city in 2021-2023. **Results:** The study included 154 acne vulgaris patients with an average age of 22.16 ± 6.739 years old, with males constituting the majority. Among the patients, 29.87% had Demodex infestation, and 9.74% of them had a Demodex density of 5 or more mites. The majority of acne cases were of moderate or higher severity, with the most severe cases accounting for 85.7% of those with Demodex presence. Clinical features observed in patients with Demodex infestation included closed comedones (97.8%), open comedones (93.5%), papules (63%), pustules (60.9%), and cystic nodules (52.2%). Additionally, 93.5% and 91.3% of patients reported symptoms of peeling skin, but only 50% reported a feeling of ants, which appeared to be related to Demodex infection in acne patients. Furthermore, habits such as sharing towels, makeup, and wearing masks for more than 8 hours were identified as risk factors for Demodex infection. **Conclusions:** The presence of Demodex in acne patients is associated with a variety of clinical manifestations, including acne accompanied by skin peeling, scaling, and itching sensation. The relationship between Demodex infestation and the sensation of ants requires further investigation. Additionally, papules, pustules, and crawling sensations were also found to be related to Demodex infection. Moreover, certain habits, such as sharing towels, using makeup, and wearing masks for prolonged periods, appear to be risk factors for Demodex infection in acne patients.

Keywords: Demodex, acne vulgaris, isotretinoin.

I. INTRODUCTION

Acne vulgaris is a chronic inflammatory disorder of the sebaceous follicular units, with diverse clinical manifestations and is difficult to treat. This is a common skin disease in adolescents, affecting approximately 81.8% of this population. The lesions of the disease are caused by abnormal sebaceous gland hyperplasia, abnormal follicular keratinization, bacteria and inflammation. Additionally, the disease is also influenced by various factors such as: age, sex, genetics, endocrine, climate, psychology, habit of using cosmetics. The most commonly mentioned causes and factors related to the onset of acne in adulthood include hormones, drug-resistant bacteria, and the use of drugs and cosmetics. In particular, the relevance of Demodex mites in acne patients is still not well understood, and this

remains an area of interest for scientists, especially in cases of persistent and difficult-to-treat acne. To address these practical problems and aid in early detection of superinfection and treatment for patients, we conducted the topic: "Research on the prevalence, clinical characteristics, and some related factors in Demodex-infested acne vulgaris in patients at health facilities in Can Tho City from 2021 to 2023 with the following objectives: Determining the prevalence, clinical characteristics and some related factors in patients with acne vulgaris superinfection with Demodex [1].

II. MATERIALS AND METHODS

2.1. Study population

All patients diagnosed with acne were examined at medical facilities in Can Tho city.

2.1.1. Standards for selection

Patients >12 years old diagnosed with acne who sought medical facilities for examination and treatment in Can Tho city from 2021-2023 and consented to participate in the study were included.

2.1.2. Standards for elimination: Patients with other skin diseases presenting similar lesions on the face, chest, and back.

2.2. Study methods

2.2.1. Study methods: A cross-sectional descriptive study.

2.2.2. Sample size

$$n = \frac{Z^2 \cdot \frac{\alpha}{2} \cdot p(1-p)}{d^2}$$

In which:

n: is the smallest sample size

Z = 95%

Z_{1-α/2} = 1,96

p: Estimated proportion of Demodex presence in acne patients (p = 0.175 based on Nguyen Ngoc Anh 2020) [2].

d: is the tolerance allowed in the study 0,06.

Thus n = 154

The estimated sample size was 154 patients.

2.2.3. Study contents: convenience sampling

2.2.4. Statistical analysis

Data were analyzed using SPSS 20.0. Descriptive statistics were used to summarize the data, and to compare proportions, Chi-squared or Fisher's test was applied. A p-value < 0.05 was considered statistically significant.

III. RESULTS

3.1. Demodex presence rate in acne patients

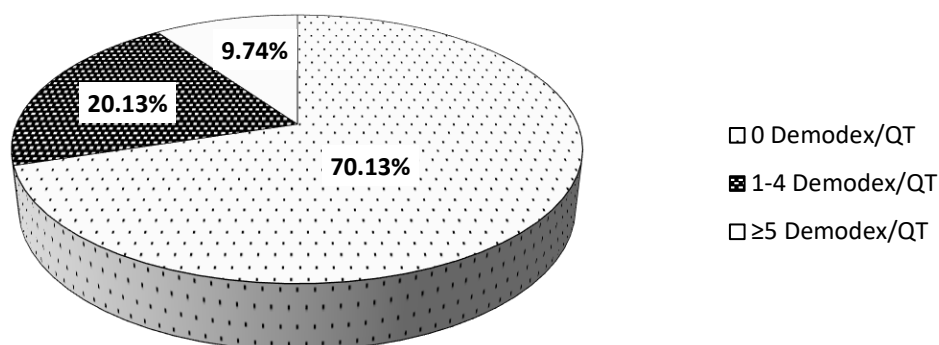


Figure 1. Demodex presence rate in acne patients

Demodex presence rate in acne patients accounted for 29.87%, of which the density ≥ 5 individuals/field accounted for 9.74%.

Table 1. Proportion of acne patients with Demodex presence by gender

Demodex Gender	Demodex						Chi-square
	Absent		Present		Total		
	n	%	n	%	n	%	
Male	65	83.3	13	16.7	78	100	<0.001
Female	43	56.6	33	43.4	76	100	

There are 43.4% female acne patients with Demodex presence, which is statistically significantly higher than the proportion of male acne patients with Demodex presence ($p < 0.001$).

3.2. Clinical characteristics of patients with Demodex-infected acne

Table 2. The severity of acne with Demodex presence

Demodex Severity of acne	Demodex						Chi- square
	Absent		Present		Total		
	n	%	n	%	n	%	
Mild-Medium	103	86.6	16	13.4	119	100	<0.001
Severe	5	14.3	30	85.7	35	100	

Most of the acne patients with Demodex infestation had moderate severity, while a minority had mild severity. Among them, patients with severe-very severe disease accounted for 85.7%, which was significantly higher than those with mild-moderate disease (13.4%) ($p < 0.001$).

Table 3. Clinical characteristics of acne patients with Demodex

Clinical	Demodex	Demodex			
		Absent		Present	
		n	%	n	%
Close comedone		92	85.2	45	97.8
Opened comedone		76	70.4	43	93.5
Papules		67	62	29	63
Pustules		45	41.7	28	60.9
Follicle		5	4.6	24	52.2

In our study, acne patients with Demodex infestation presented with the following clinical symptoms: closed comedones (97.8%), open comedones (93.5%), papules (63%), pustules (60.9%), and cystic nodules (52.5%).

Table 4. Physical symptoms

Symptoms	Demodex	Demodex			
		Absent		Present	
		n	%	n	%
Itchy		20	18.5	42	91.3
The feeling of ants crawling		4	3.7	23	50
Painful		24	22.2	20	43.5
Burning		16	14.8	11	23.9

In the group of acne patients with the presence of Demodex, most of them have symptoms of itching, accounting for 91.3%, followed by a feeling of crawling, which accounts for 50%.

3.3. Some related factors

Table 5. Proportion of acne patients with Demodex presence according to habits

Demodex Habits		Demodex						Chi-square
		Absent		Present		Total		
		n	%	n	%	n	%	
Cleanser	Yes	82	75.9	26	24.1	108	100	0.016
	No	26	56.5	20	43.5	26	100	
Sharing towels	Yes	31	59.6	21	40.4	52	100	0.042
	No	77	75.5	25	24.5	102	100	
Wearing the mask	Yes	51	83.6	10	16.4	61	100	0.003
	No	57	61.3	36	38.7	93	100	
Demodex Habits		Absent		Present		Total		Chi-square
		n	%	n	n	%	n	
Make up	Yes	16	44.4	20	55.6	36	100	<0.001
	No	92	78	26	22	118	100	

Patients with a habit of not washing their face with facial cleanser had a higher presence of Demodex, accounting for 43.5%, which is two times higher than patients who used facial cleanser. In addition, the habit of sharing towels with others with Demodex presence accounted for 40.4% of cases. Among acne patients who wore masks for 8 hours or more, 38.7% showed results indicating the presence of Demodex. Furthermore, 55.6%

of patients with regular makeup habits had results suggesting the presence of Demodex. These habits appear to affect the likelihood of Demodex infection.

IV. DISCUSSION

The presence of Demodex in acne patients was detected in 29.87% of cases through skin scraping. Among them, the density of Demodex ≥ 5 individuals/field accounted for 9.74%, and the density of 1-4 Demodex/field accounted for 20.13%. . Similar to the study of author Khuu Bach Xuyen conducted in 2013 on 200 acne patients who came to Can Tho Dermatology Hospital, the percentage of Demodex presence in acne patients was report as 32% [3]. Huynh Bach Cuc's research in 2015 showed that 26.1% of acne patients had Demodex presence, with a density of ≥ 5 Demodex per microscopic field accounting for 6.5% [4]. In an overseas study by Ulviye et al, conducted in Turkey in 2018 on 108 acne patients, 42.6% of patients found Demodex [5]. In another study by Aktas Karabay. E, et al on 43 acne patients 27.9% of patients had density ≥ 5 Demodex/photofield [1]. Which is higher than our study, possibly because the test method of the author and colleagues used in the study is the method of skin surface biopsy (SSSB) for Demodex, while we show the method of fresh skin scraping under the microscope.

Demodex infection rate by gender: our study results showed that 43.4% of female acne patients had Demodex presence, which was higher than the proportion of male acne patients with Demodex presence (16.7 %). This result is consistent with the study of author Aktas Karabay. E et al on 43 acne patients in 2020 [1] which reported that the percentage of female acne patients with Demodex presence accounted for 81,4% and this difference was statistically significant with $p < 0.001$. Similarly, the study by Wang. L. M in 2020 recorded that Demodex presence rate in female patients accounted for 21.16%, which was higher than that in male patients with $p < 0.05$ [6]. This can be explained by the fact that female patients often have beauty care needs, leading them to use topical cosmetics from different sources with the desire to improve their skin.

Severity of acne with Demodex presence: most of the patients with Demodex-presence acne had moderate severity and none had mild. In contrast, patients with severe-very severe disease accounted for 65.2%, which was significantly higher than patients without Demodex presence (4.6%) ($p < 0.001$). . Our research results are similar to the study of Badawi Yousif. A et al (2022) on 60 acne patients who reported that all patients with Demodex mites belonged to the moderate to severe acne group, and none had severe acne. This suggests an association of disease severity with the presence of Demodex mites in acne patients [7]. According to author Maldonado-Gómez. W (2022), in a study on 46 severe acne patients and 92 mild-moderate acne patients showed that there was an association between Demodex appearance and acne severity. In this study, 47.8% of patients with Demodex had severe acne, which was 2.3 times higher than the proportion of patients with Demodex in the group of patients with mild-moderate acne.. A meta-study by author Zhao et al (2012), which analyzed 63 articles tracking the characteristics and risk factors of Demodex infection, revealed an association between Demodex in the pathogenesis of acne, leading to aggravated acne lesions with severe acne 3.6 times higher in the Demodex group. Demodex mites are thought to cause acne lesions through a variety of processes, including mechanical occlusion of hair follicles, immunologically due to foreign bodies or hypersensitivity reactions. to the mites involved or the decomposition of their carcasses [8], [9].

Clinical characteristics: in our study, in the group of acne patients with Demodex presence, the clinical symptoms include closed comedones (97.8%), open comedones (93.5%), papules (63%), pustules (60.9%), and cystic nodules (52.5%). The proportion of pustular and cystic lesions was higher in patients with Demodex presence compared to those without Demodex presence. According to a study by Akcinar et al in 2018 on 108 patients, individuals with nodular acne and severe acne had a higher density of Demodex than patients with mild-moderate acne. The results of our study are consistent with the literature, where *D. folliculorum* resides in hair follicles, while *D. brevis* is found mainly in the sebaceous and ciliary glands [5]. Pustular and cystic lesions of patients with Demodex presence were higher than those of patients without Demodex presence. According to a study by author Akcinar et al in 2018 on 108 patients, patients with nodular acne and severe acne had a higher density of Demodex than patients with mild-moderate acne. The results of our study are consistent with the literature, *D. folliculorum* resides in hair follicles, while *D. brevis* is found mainly in the sebaceous and ciliary glands. Demodex mites penetrate skin cells (especially the keratinocytes lining hair follicles) and feed on the substances inside them. Demodex ticks feed on sebum and cellular proteins by protease containing the tick's salivary enzymes. Demodex lipase enzymes are believed to play a role in digesting bacteria or other microorganisms in addition to fat digestion. The enzymatic process leads to degeneration of the hair follicle epithelium, which can lead to peri-follicular inflammation. Demodex mites can cause mechanical blockage of the hair follicle. Furthermore, it is thought that extra-follicular mites can induce granular foreign body reactions via their chitinous exoskeleton. Dying ticks may trigger an immune response in the host by releasing their internal components and exoskeleton with the chitin of the dying tick, followed by inflammatory changes. Demodex ticks are known to inhibit the host's innate immune response, which aids in their survival. It has been shown that the Tn antigen, which is a carbohydrate coating that protects the parasite from immunity, is expressed by Demodex mites. Demodex mites have also been shown to influence the secretion of inflammatory cytokines, such as IL-8 and TNF-alpha and TLR expression, through interaction with cells of the sebaceous hair unit cause inflammatory lesions such as pustules, cystic nodules in acne patients [1].

Functional symptoms: In the group of acne patients, the presence of Demodex accounted for the highest proportion, with 91.3% experiencing itching, followed by 50% reporting a sensation of ants. The least commonly reported symptom was a burning sensation, at 23.9%. In the study by Huynh Bach Cuc, the itching symptom accounted for the highest rate of 83.4% and the feeling of crawling was reported by 35.3% of the patients [4]. Similarly, a study by Pham Thanh Thao in 2022 on 114 acne patients who visited the Dermatology clinic found that the most complaint was itching sensation, accounting for 73.7%, while the least symptoms were pain and burning sensation [10]. Thus, our results are consistent with the findings of these studies. In our study, most of the patients presented with at least one functional symptom or more, with the majority reporting symptoms of itching accompanied by a crawling sensation. The explanation of the functional symptoms observed in patients infected with Demodex in our study may be attributed to the fact that Demodex mites often inhabit sebaceous glands, and hair follicles, where they absorb nutrients and damages cells. After mating, they burrow into the skin, laying eggs, causing dermatitis. During the Demodex's life cycle phase, they destroy the skin to excrete waste, lay eggs, and

die. After they die, their corpses become liquid and decompose inside the skin triggering allergic reactions [11].

V. CONCLUSION

The prevalence of Demodex presence in acne patients, is associated with diverse clinical manifestations, which include skin peeling, scaling, itching sensation, ants crawling. Manifestations such as papules, pustules or crawling sensations may be related to Demodex infection in acne patients. To minimize the potential spread of Demodex mites, it is advisable to limit certain habits such as sharing towels, makeup, or wearing masks for extended periods, especially more than 8 hours.

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