

## CORRELATION BETWEEN DEMODEX FOLLICULORUM AND ACNE VULGARIS AMONG ACNE PATIENTS IN BENI-SUEIF GOVERNORATE, EGYPT

By

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### Abstract

Acne is one of the common skin disorders, with multifactorial chronic inflammatory disease of pilosebaceous units. *Demodex folliculorum* is an obligate parasite of pilosebaceous units, infested healthy individuals. The study detected *D. folliculorum* mites in acne patients and discussed its role in acne. The study was conducted on 500 acne patients attending outpatient clinic of Dermatology Department, University Hospitals. Superficial skin surface sampling or sometimes skin scrapings were taken from patients (290 females & 210 males). They were children 244 (48.4%), adolescent 206 (41%) and elder 50(10%), with ages ranged from 13 to 35years (18.36 ±3.9), rural residents (323), and (177) urban ones. Mites in acne patients were detected in 8/500 (1.6%), significantly more detected among adolescents and cases with severe clinical disease (P = 0.027 & 0.001 respectively). *D. folliculorum* in acne patients didn't show significance difference as to sex, residence or treatment history (P > 0.05).

**Keywords:** Beni-Suef, Patients, Acne, *Demodex folliculorum*

### Introduction

Acne is a chronic inflammatory disorder of pilosebaceous units (Degitz *et al*, 2007). Lesions are usually categorized as either non-inflammatory (comedones open & closed) or inflammatory (papules and pustules). A degree of acne affects almost all people aged 15-17 & 15-20% (Law *et al*, 2010).

In youths, acne is a common disease, but very little is understood about its epidemiology. Epidemiology not only defines the burden of disease in terms of occurrence, prevalence and heterogeneity by age, sex, social class, and geography, but also has the ability to identify specific risk factors for disease development or progression. Detection of risk factors or causes of chronic diseases may contribute to suitable preventive measures and therapies that could reduce time-waste for relatively ineffective treatments (Bhate and Williams, 2013).

*Demodex folliculorum* is a microscopic mite that can only survive on human skin of most people and was considered as commensal rather than parasite, adapted to live inside hair follicles, so is thin and worm-like, with short legs (Lacey *et al*, 2009). They inhabit sebaceous gland deeply, generally in greater numbers around the cheeks, nose,

forehead, face, eyelids, and ears (Marcinowska *et al*, 2013), also, other parts, such as chest and buttocks (Monsel *et al*, 2016)

*Demodex* species were reported in rosacea or manifesting rosacea like dermatitis in Egypt (El Shazly *et al*, 2001), in Greece (Georgala *et al*, 2001), in Turkey (Yücel and Yilmaz, 2013) and in Taiwan (Chang and Huang, 2017), or genetic alopecia in Iran (Zari *et al*, 2008). Pathogenicity is mainly inflammatory reaction to mite's components (Tchernev *et al*, 2011). Increased infestations caused peri-oral dermatitis, blepharo-conjunctivitis, eosinophilic folliculitis, papulovesicular facial, papulopustular scalp eruptions, pustular folliculitis, abscess, and demodicosis gravis (Akilov *et al*, 2004). Besides, Murphy *et al*. (2019) in Ireland reported a strong association between *D. folliculorum* prevalence and ocular symptoms, mainly itchy eyes. Consequently, *Demodex* species become an increasingly public health problem (Akçınar *et al*, 2018).

This study aimed to evaluate the *Demodex folliculorum* infestations among acne patients in Beni-Sueif University Hospitals.

### Materials and methods

Study design: A Cross section study was conducted on 500 patients suffering from

acne symptoms attending outpatient clinic of Dermatology Department of Beni-Suef University Hospitals. The study was carried out from March, 2019 till December, 2019.

**Inclusion criteria:** All males and females acne patients aged 13-35 years. They were classified as children (13-17), adolescent (18-25 years old) and elder (25-35 years old).

**Exclusion criteria:** patients less than 13 or more than 35 years old. All were dermatologically examined and designed questionnaire was filled out on each as socio-demography, clinical manifestations and risk factors for acne. Examination for clinical signs and degrees of acne was done to all patients.

**Superficial skin surface sampling:** A non-invasive sampling method was done. Patients cleaned their faces with water before the test. After drying, a drop of cyanoacrylate glue was applied to an area of 1 cm<sup>2</sup> at one end of a clean slide and glue was spread out to a homogeneous thickness and slide was put against right cheek for about 5 minutes until the cyanoacrylate changed in consistency and then gently removed. The collected samples were clarified with 1 or 2 drops of oil immersion; cover slip was added and examined for mites by light microscopy at low & high power magnifications (Bunyaratavej *et al*, 2016). It facilitates to obtain the outermost part of stratum corneum layer and components of pilosebaceous follicle (Rathner and Hassan 2014).

**Skin scraping with potassium hydroxide preparation:** Before the test, patients washed

their faces with water. After drying, a one square-centimeter region of cheek was gently scraped with a sterile sharp blade. Accumulated debris from each sample was collected on a glass slide, a drop of 20% potassium hydroxide was added, covered and examined by light microscopy at low, high and oil immersion (Bunyaratavej *et al*, 2016).

**Ethical considerations:** The study was approved by the Research Ethical Committee of Beni-Suef University, and after Helsinki (2000) as human experimentation developed originally in 1964 for the medical community. An informed consent was taken from all patients prior to specimen collection and all the ethical considerations were fulfilled.

**Statistical analysis:** Data was collected and analyzed using Microsoft Office Excel 2010 and Statistical Package for Social Sciences (SPSS). Quantitative data described mean and standard deviation; while qualitative variables described frequency and percentage. Chi-square test was used to test level of significance where p-value <0.05 was considered statistically significant.

### Results

Patients were (290 females & 210 males), with ages were ranged from 13 to 35 years (18.36±3.9). Children were 244(48.4%), adolescent 206(41%) and elder 50(10%). They were rural residents (323) and urban ones (177).

Details were given in tables (1, 2, & 3) and figures (1, 2, 3, & 4)

Table 1: Socio-demographic data of patients:

Variations	Descriptive statistics
Age; years	13- 35(18.36 ±3.9)
Children (13-17 years)	244 (48.80)
Adolescent (18–25 years)	206 (41.20)
Elder (> 25 years old)	50 (10.00)
Sex: Female	290 (58.00)
Male	210 (42.00)
Residence: Rural	323 (64.60)
Urban	177 (35.40)

Table 2: Association between residence and *D. folliculorum* mites:

Residence	<i>D. folliculorum</i> mites N (%)		P-value
	No (N= 492)	Yes (N= 8)	
Rural	316 (64.2)	7 (87.50)	0.161
Urban	176 (35.8)	1 (12.50)	

Largest acne cases were (43.8%) had mild disease (219/500) followed by moderate disease among (37.2%) while (85 cases); (17%) had severe form of the disease and only 10 cases (2%) had very severe form of the disease.

*D. folliculorum* mites in acne patients were detected in 8(1.6%) cases. Mites in acne patients were significantly more in adolescent cases compared to other groups ( $P= 0.027$ ). The mites in acne patients were nearly equally distributed among patients regarding their sex and/or residents without significant difference ( $P> 0.05$ ). *D. folliculorum* in acne patients were significantly highest among severe cases as compared with less severity ( $P= 0.001$ ). However, mites in acne patients didn't show significant difference with history of previous treatment ( $P> 0.05$ )

### Discussion

Generally speaking, the pathogenesis of acne vulgaris involves the interaction of multiple factors that result in the formation of comedones and development of inflammation. Causes of acne include the following: a- Use of medications like lithium, steroids, and anticonvulsants, b- Exposure to excess sunlight, c- Use of occlusive wear like shoulder pads, headbands backpacks, and underwire brassieres, d- Endocrine disorders like polycystic ovarian syndrome and even pregnancy, and e-Genetic factors affect the percentage of branched fatty acids in sebum. Heritability estimates range from 50-90% (Motosko *et al*, 2019). Besides, Genus *Demodex* is ectoparasites of many mammals, including humans. There are over 100 *Demodex* species, which demonstrate strong specificity in host selection, common in humans up to 60% of adults were infected, but in most cases asymptomatic. *Demodex* multiplication inside sebaceous glands and hair follicles can lead to skin disease in both humans and animals. In humans, the main problem is ocular demodocosis, which can cause chronic conjunctivitis and blepharitis (El Shazly *et al*, 2004). Besides, *D. canis* causes severe type of mange in dogs and

*Demodex* sp. of hogs and cattle causes skin tubercles (Whitfield, 1979). Besides, Morsy *et al.* (1995) in Egypt reported demodicidosis in a boy and pet dog, but they didn't identify it was *D. canis* or *D. folliculorum*. Morsy *et al.* (2002) treated human facial demodicidosis with camphor oil with or without glycerol. Taşbent and Dik (2018) in Turkey reported that canine and feline demodicosis is a well-known example of severe dermatitis caused by proliferation of *Demodex* mites. They added that it was necessary to keep in mind about *Demodex* spp. infestation in patients with skin complaints and pets. Meanwhile, *Demodex* species infestation was suspected to be one of the triggering factors of carcinogenesis in eyelid basal cell carcinomas (Erbagci *et al*, 2003)

In the present study, acne was more prevalent among children and adolescents females than males. The majority of the cases had mild disease form followed by moderate form and lowest ones suffered from severe infection. This agreed with Li *et al.* (2017) in China who reported that primary and secondary students exhibited higher prevalence rates than undergraduate students; but, males had higher prevalence rates of acne than females. Aksu *et al.* (2012) in Turkey reported that Acne prevalence was high among adolescents but, the rate of consulting doctor was low, and added that acne was related with dietary habits as fat, sugar and fast food consumption was positively correlated with acne prevalence. Kucharska *et al.* (2016) in Poland reported that the relationship between diet and acne showed highly controversial. Several studies during the last decade have led dermatologists to reflect on a potential link between diet and acne. They added that association between diet and acne cannot be neglected, as high glycemic load diets exacerbated acne, and dairy ingestion was weakly associated with acne and the roles of Omega-3 fatty acids, dietary fiber, antioxidants, vitamin A, zinc and iodine remained to be elucidated. Tayel *et al.* (2020) in Egypt reported that acne was a common

health problem among Egyptian school-aged adolescents with higher prevalence and impact in females, which must alert health professionals and school authorities to timely identify, manage, and educate adolescents with acne.

In this study, *Demodex* was detected in 8 acne patients (1.6%) with significantly highest among cases with severe acne type as compared with less severity ( $P=0.001$ ). *Demodex* mites were reported in normal adult population without any symptoms (Rather and Hassan, 2014). Sengbusch and Hauswirth (1986) in USA reported that older people were much more likely to carry mites; about a third of children and young adults, half of adults and two-thirds of elderly people carry them. Morsy *et al.* (2000) in Egypt reported severe pathological lesions in immunocompetent demodicosis infested children. Polat *et al.* (2003) in Turkey reported acne and *Demodex* in 15.38% of 78 patients, but without link between both. But, Akçınar *et al.* (2018) in Turkey reported that *Demodex* infestation must be considered when classical therapies were ineffective especially in post-adolescent acne.

In this study, *D. folliculorum* in acne patients didn't show significant difference as to age and sex ( $P>0.05$ ). This agreed with Zhao *et al.* (2011) and Akçınar *et al.* (2018).

In this study, *D. folliculorum* was higher rural patients as compared with urban ones but without significant difference ( $P>0.05$ ), and acne patients didn't show significant difference with history of previous treatment nor immunity ( $P>0.05$ ). Lacey *et al.* (2016) reported that *Demodex* together with microorganism, must be considered as a pathogenic agents of human skin because of their enhanced irritating action

### Conclusion

The dermatological evaluation of a patient with acne must include a thorough medical history and physical examination. Some clinicians doubt any relationship between *Demodex* infestation and acne vulgaris development, but, when standard acne treatments

fail, *Demodex* mite examination and treatment should be considered.

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#### Explanation of figures

Fig1a & b: Clinical photograph of Patients with mild (left) and moderate acne (right).

Fig. 2: Skin biopsy showed *Demodex folliculorum*.

Fig. 3: Association between Age of studied cases and *D. folliculorum* mites.

Fig. 4: Association between severity of acne and *D. folliculorum* mites



