

Demodex folliculorum in polycystic ovary syndrome patients

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Abstract. – OBJECTIVE: In this study, we aimed to investigate frequency of *Demodex (D.) folliculorum* infestation in Polycystic Ovary Syndrome patients.

PATIENTS AND METHODS: The study population consisted of 30 PCOS patients and 30 matched healthy control subjects admitted to the Hospital of Mustafa Kemal University, Gynecology and Obstetrics Clinic between March 2013 and January 2014. The demographic characteristics of the patients were recorded. Samples from the face region of the subjects were taken by standard method of superficial skin biopsy and evaluated by microscopy. Presence of five or more *D. species* in a cm² was considered as positive.

RESULTS: There were no significant differences in age, body mass index, diabetes mellitus incidence between PCOS patients and the control group. However, *D. folliculorum* infestation was found to increased in PCOS patients (n = 9; 30%) when compared to the control group (n = 2; 6, 7%) (p: 0.04).

CONCLUSIONS: Our study results revealed that *Demodex folliculorum* appearance increased in PCOS patients.

Key Words:

Demodex folliculorum, Polycystic ovary syndrome.

and metabolic abnormalities. Central obesity appears as an important factor to increase the risk of metabolic abnormalities^{3,4}. PCOS patients usually have hirsutism, acne vulgaris, anovulation and infertility^{1,5}.

Demodex (D.) lives on mammals and is a tiny spindle-shaped mite 0.3-0.4 mm long. Although there are numerous species of *Demodex*, only *Demodex folliculorum* and *Demodex brevis* live on the human body. It was revealed that *D. infestation* is transmitted via close skin contact⁶⁻⁹. These mites are found most frequently on the face (forehead, nose, cheek, nasolabial fold, and eyelids) where there is more sebum and less frequently on scalp and chest. It is shown that immunosuppression could increase *D. infestation* incidence. Increase in the number of *D. folliculorum* infestation in leukemic children receiving chemotherapy or in acquired immunodeficiency syndrome (AIDS) patients also support this theory^{8,9}. Also it has been recently shown that *D. folliculorum* infestation is increased in diabetic patients especially with uncontrolled glucose levels and associated with pruritus and itching¹⁰.

The aim of the current study is to investigate the existence of *Demodex folliculorum* mite in PCOS patients.

Introduction

Polycystic ovary syndrome (PCOS), first described by Stein and Leventhal in 1935, is a common endocrinologic disorder characterized by insulin resistance, chronic anovulation and hyperandrogenism^{1,2}. It is observed in women of reproductive age and associated with some hormonal

Patients and Methods

The study population consisted of 30 PCOS patients and 30 matched healthy control subjects admitted to the Hospital of Mustafa Kemal University, Gynecology and Obstetrics Clinic between March 2013 and January 2014. Local

Ethics Committee approved the study, and written informed consent was obtained from all patients and controls. The study population was chosen consecutively. All of the women were recruited from our clinic with a chief complaint of irregular menstrual cycles and/or clinical hyperandrogenism; none of the women had been prescribed any medications before enrollment. According to Rotterdam criteria the diagnosis of PCOS was made as the presence of at least two of the following three criteria, (1) amenorrhea or oligomenorrhea (< 8 spontaneous menstrual cycles per year for at least 3 years before enrollment) (2) biochemical hyperandrogenemia (serum total testosterone level e'' 2.78 nmol/l) and (3) polycystic ovaries (> 12 follicles of 2-9-mm diameter per ovary by transvaginal ultrasonography)¹¹. Blood samples were obtained in the follicular phase of menstruation. Levels of hemoglobin (Hb), platelet (plt), thyroid stimulating hormone (TSH), follicle stimulating hormone (FSH), luteinizing hormone (LH), prolactin (PRL) and estradiol (E2) were determined.

All the study population was examined for dermatological lesions and symptoms such as pruritus, redness, scaling, telangiectasia, pustules and papules on the face. *D. folliculorum* was examined by a noninvasive method called standardized skin surface biopsies (SSSB). Five samples of standardized SSSBs of the same location were taken from the forehead, cheeks, jaw and nose of the patient of included in the study. The skin was cleared by ether to improve adherence. After placing a drop of cyano-acrylic adhesive on the other side, it was applied to the skin for 45-60 s until it was firmly attached^{7-9,12}. It was then gently removed and clarified with 2-3 drops of glycerine and covered with a coverslip. Following this, samples were studied microscopically at a magnification of $\times 10$ and $\times 40$. The examination was performed within 1 h of sampling. The number of mites counted on a surface area of 1 cm²

was accepted as the density of *D. folliculorum*. Infestation was defined as e'' 5 living parasites/cm² of skin¹³.

Statistical Analysis

All statistical analyses were performed using the SPSS software package, version 13.0 (SPSS Inc., Chicago, IL, USA) for Windows. Continuous variables were analyzed using the Kolmogorov-Smirnov test in terms of their normal distribution. Relationships between nominal variables were calculated using, χ^2 -test and Fisher's Exact test. For continuous variables, Student's *t*-test and Mann-Whitney U-test were used. A *p*-value < 0.05 was considered statistically significant.

Results

There was no significant difference between PCOS patients (22.90 \pm 4.25) and the control group (23.50 \pm 3.75) regarding to age (*p*: 0.56).

While *D. folliculorum* infestation was present in 9 (30%) of PCOS patient and only 2 (6.7%) of control subjects which was statistically significant (*p*: 0.04) (Table I).

When the PCOS patients were divided in two groups according to presence of *D. folliculorum* infestation, there were no significant differences between groups regarding to age, hemoglobin, platelet, FSH, LH and E2 (Table II).

Discussion

The current study demonstrated that PCOS patients have increased *D. folliculorum* infestation when compared to healthy control subjects.

PCOS is the most frequent hormonal disease of women in reproductive age. PCOS usually associated with hirsutism, obesity, menstrual disturbances, acne vulgaris, recurrent abortion and

Table I. Demodex Folliculorum counts in patient and control groups.

	PCOS (n=30)	Control (n=30)	<i>p</i>
Demodex n (%)			
Positive	9 (30.0%)	2 (6.7%)	0.042*
Negative	21 (70.0%)	28 (93.3%)	
Age (mean)	22.90 \pm 4.25	23.50 \pm 3.75	0.565**

Fisher's exact test, **Student's *t* test.

Table II. The relationship between the presence of a *Demodex folliculorum* infestation and the age, hemoglobin, platelet, FSH, LH and E2 level in patients with PCOS.

	Demodex		p*
	Negative (n = 21)	Positive (n = 9)	
Yas Med (min-max)	22 (15-31)	21 (15-27)	0.362
Hb Med (min-max)	12.7 (10.2-14.3)	12.4 (11.6-15.0)	0.751
Plt Med (min-max)	287 (213-444)	282 (201-310)	0.482
Fsh Med (min-max)	5.4 (2.1-7.9)	6.2 (5.0-6.4)	0.197
Lh Med (min-max)	8.8 (3.6-32.5)	13.9 (5.7-14.7)	0.197
E2 Med (min-max)	56.1 (18-179.4)	54.4 (26.4-498.3)	0.497

*Mann-Whitney U test.

infertility^{14,15}. Most of these patients have clinical features of the syndrome that consists of hirsutism, infertility and irregular menstruation¹⁵. PCOS patients especially obese ones have a cluster of metabolic and inflammatory changes when compared with age and weight-matched controls. Increased serum levels of hs-CRP, interleukin-6 and leptin, proinflammatory molecules that mainly produced by adipose tissue, have been shown in PCOS patients¹⁶⁻¹⁹.

D. folliculorum is a saprophytic mite located at the human pilosebaceous glands with a preference for facial skin and eyelashes. Although infestation is usually asymptomatic, suppurative or granulomatous inflammation may be seen with a high mite density. Some dermatological disorders such as rosacea, *pityriasis folliculorum* and blepharitis have been referred to *D. infestation*²⁰⁻²⁴. Some authors believe that there is a control mechanism limiting the *D. infestation*, and local and systemic factors might affect the incidence of infestation. Besides, immunosuppression has been shown to increase Demodex infestation via favoring an inflammatory reaction, or it may cause an impaired immunological response in the skin to the mite infestation²⁵.

Akdeniz et al²⁶ reported increased *D. folliculorum* infestation especially on the cheek area in diabetes mellitus patients. They also found that the parasite mean diameter was statistically significant larger in diabetic patients than in the controls. Studies about *D. folliculorum* prevalence in patients using systemic and topical steroids have conflicting results. Bonnar et al²⁷ reported that it markedly increased in patients taking topical corticosteroids. In another study it was shown that *D. folliculorum* prevalence in the nasal area decreased with systemic steroid use, but its occurrence in the ciliary area increased²⁸.

Zhao et al²⁹ revealed that mite prevalence is high after 18 years old in the student population but the inception rate of Demodex infested patients is low. This results indicated that the increase in the number of mites favors an inflammatory process, or may cause an impaired cutaneous immunological response to the parasites. Although some people with severely infested by *D. folliculorum*, they did not show a dramatic clinical presentation. Therefore, further investigation is needed to explain D. mite count in facial dermatosis²⁹. Mumcuoglu et al³⁰ reported an increased demodicosis incidence in patients with human leucocyte antigen (HLA) Cw2 and Cw4 alleles due to a decrease in natural killer cells. Thus, HLA alleles might play a role in susceptibility to demodicosis by regulating the end phase of the immune response.

Although Okyay et al³¹ concluded that there was no connection between Demodex infestation and acne vulgaris, Sun et al³² and Wang et al³³ revealed a significant connection between the infestation and acne vulgaris. Besides, Zhao et al²⁹ reported that the inception rate of acne vulgaris and amount of infested mites were positively correlated. The students with acne vulgaris had higher number of Demodex mites. As a result, acne vulgaris might be associated with excessive Demodex infestation, but the association between acne vulgaris and Demodex density needs to be investigated further.

Accordingly, although the exact mechanism is not known, acne vulgaris, skin changes related to hyperandrogenism, central obesity, abnormal inflammatory response, abnormal cytokine discharge and a tendency to chronic disease like diabetes mellitus might explain increased *D. folliculorum* infestation in PCOS patients.

Conclusions

PCOS patients have increased *D. folliculorum* infestation when compared to the healthy control subjects. Accordingly, physicians should keep in mind the increased parasitic infestation in PCOS patients. Further large scale studies are needed to exact pathogenesis of increased *D.* infestation in PCOS patients.

Conflict of Interest

The Authors declare that there are no conflicts of interest.

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