The hormonal effect of *Acne vulgaris*

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Abstract

Acne vulgaris is a pilosebaceous gland illness that often affects people from puberty to early adulthood as a result of hormonal changes; however, the specific association of various hormones to acne is unknown**.** The current study aims to discover the relationship between hormonal status and acne vulgaris patients. In cases, one hundred patients with Acne Vulgaris aged 15-30 years were included. Fasting blood samples were taken from patients prior to the start of treatment. After presenting the contents of the study, all individuals in the cases and control groups provided written and informed consent. *Acne vulgaris* patients' levels of Luteinizing Hormone (LH), estrogen, Follicle Stimulating Hormone (FSH), and Testosterone were compared to control groups. The T-test was used for statistical analysis. Conclusion: Levels of LH, Estradiol, and Testosterone can be measured in acne sufferers, however, FSH levels do not need to be measured.

Keywords: Acne Vulgaris, Estradiol, LH, FSH, Testosterone

Introduction

Acne vulgaris is a complex disease characterized by chronic pilosebaceous follicular inflammation. Acne vulgaris is caused primarily by four pathogenic factors: Hyperplasia of the sebaceous glands, with increased sebum production, as well as hyper cornification of the pilosebaceous duct, inflammation, and abnormal colonization, particularly by Propionibacterium granulosum (P. acnes)(Dawson & Dellavalle, 2013)(Acne & Acne, 1997).

Acne is a widespread skin disorder that affects 20-90 percent of all teenagers in their late teens or early twenties, with spontaneous resolution in most cases but can last up to 40 years in certain people.

A side from sebum hyperproduction, other sebaceous gland functions may be implicated in the acne process: skin surface lipid oxidant/antioxidant ratio, modulation of local androgen synthesis, generation of antimicrobial peptides, neuropeptides, and synthesis of particular antimicrobial lipids such as sapienic acid. Acne is not caused by excess hormone levels, but an abnormal reaction to normal levels of these hormones(Bedoyan, N. H et al., 2022). Sebocytes are the major site of cholesterol conversion to DHT and estradiol by 5--reductase and aromatase, respectively. Acne is caused by androgens and their precursor substrates, which increase the size of the sebaceous glands, stimulate sebum production, and improve ductal keratinocyte differentiation and clogging, as well as promoting keratinocyte proliferation in the ductus seboglandularis and acro-infundibulum. Acne arises during adrenarche, when the adrenal gland produces large levels of dehydroepiandrosterone sulfate, a precursor to testosterone(Ju et al., 2017)(Das & Reynolds, 2014). The current study aims to investigate the relationship between hormonal status (luteinizing Hormone (LH), Follicle-stimulating hormone (FSH) ,estradiol and testosterone) and the acne vulgaris in patients.

Material and methods

The case control study was carried out in AL Nasiriyah teaching hospital, Thiqar, Iraq. The current investigation included a case control study with (150) samples:100 (23 male and 77 female) patient samples and 50 (13 male and 37 female) healthy control samples. The research was carried out between February and July of 2023.

Sampling technique & Data collection

A systematic questionnaire was developed specifically to collect information that will aid in the selection of individuals based on the study's selection criteria. Individuals (patients and controls) were also asked to fill out a self-reported questionnaire, which was used to obtain sociodemographic information. Blood samples were collected from the Draw blood facility at Al-Nasiriyah Teaching Hospital. Five milliliters of blood were drawn through venipuncture using 5 milliliter disposable syringes, and the blood was stored at room temperature in a gel tube for fifteen minutes. Serums were separated by centrifuging them at 4000 xg for 10 minutes. Serum samples were frozen at -20°C for further analysis to reduce the number of freezing-thawing cycles. Blood collecting tubes that were disposable, non-pyrogenic, and

non-endotoxin were employed. Estimation of luteinizing hormone (LH), Estrogen , Follicle Stimulating Hormone (FSH) and Testosterone were done by standard technical methods i.e. by commercially available kits (elecsys cobas). All patients underwent a comprehensive clinical history, clinical examination, and relevant laboratory investigations. Acne vulgaris clinical problems were diagnosed using the most recent WHO clinical practice standards. Analyzing laboratory measurements for the clinical assessment of acne vulgaris revealed the kind of acne. Exclusion criteria for patients were those on immunosuppressive therapy such as corticosteroids and hormonal therapy, autoimmunity, pregnancy, PCOS, acute or chronic infections, and acute or chronic inflammatory illnesses. The duration of this study was one year, and institutional ethical committee approval was obtained well in advance of the study's start. IBM SPSS Statistics 23.0 program was utilized. Constant data was showed as mean ± standard deviation . Independent samples T test was utilized. $p < 0.05$ was admitted statistically significant.

Result

There were 150 people who met both inclusion and exclusion criteria, divided into 100 subjects with inflammatory acne vulgaris as the case group and 50 subjects without acne vulgaris as the control group, matched by age and gender (Tables 1 and 2).

Table 1. The basic characteristics of descriptively analyzed study samples for female

Parameters	Group	N	Mean ± S.D	T-value	P-value
FSH (m U/ml)	Patient	77	6.09± 1.94	0.41	0.67
	Control	37	6.26 ±2.33		
LH (m U/ml)	Patient	77	9.36 ±4.86	3.78	0.001
	Control	37	6.08 ±2.97		
Testosterone (ng/ml)	Patient	77	2.60 ±2.05	4.76	0.003
	Control	37	0.82 ±1.43		
Estradiol (pg/ml)	Patient	77	36.59 ±12.43	20.50	0.001
	Control	37	105.79 ±24.09		

P-value ≤ 0.05 consider significant.

The difference in mean LH values between patients of severe acne and controls was found to be substantially higher (P < 0.05).

The difference in mean Follicle Stimulating Hormone (FSH) levels between control and those with acne was not statistically significant. Testosterone levels in the control group were significantly lower ($P<0.05$) than in the study group. estradiol levels was significantly higher in control group than in cases group.

Table 2. The basic characteristics of descriptively analyzed study samples for male are listed

Parameters	Group	N	Mean ± S.D	T-value	P-value
FSH (m U/ ml)	patient	23	4.92 ± 0.80	0.60	0.55
	Control	13	4.69 ± 1.38		
LH (m U/ml)	patient	23	5.16 ± 1.65	0.92	0.36
	Control	13	4.56 ± 2.09		
Testosterone (ng/ml)	patient	23	12.66 ± 3.93	4.79	0.002
	Control	13	7.06 ± 1.13		
Estradiol (pg/ml)	patient	23	6.52 ± 2.41	0.53	0.56
	Control	13	6.91 ± 1.02		

P-value ≤ 0.05 consider significant.

The difference in mean levels of serum testosterone was statistically significant in male acne patients ($p <0.05$) and was higher in patient (12.66 ng/ml) as compared to control group (7.06 ng/ml) , while follicle-stimulating hormone, luteinizing hormone and estradiol were not statistically significant as ($p >0.05$).

Discussion

Acne appears to be most common in the 15-21 year age range in the current study. Increased LH is caused by hypothalamic pulsatile secretion and a high estrogen environment at the pituitary level in the body (Kubota, 2013)(Singh et al., 2018). Under the influence of LH, theca lutein cells of the ovarian follicle produce androgens in a progressive manner until desensitization. The reduction in mean estradiol value in severe cases may be assigned to the fact that Estrogen, in high dosages, influences the size of the sebaceous gland and sebum production by reducing endogenous androgen production via a negative feedback impact on the pituitary gonadal axis (MACDONALD et al., 1967)(SAIHAN & BURTON, 1980).

The levels of testosterone show an important connection between control and cases, indicating that it does not contribute to the severity of the condition, but rather the sensitivity of androgen receptors found in the sebaceous glands to androgen. The increase in testosterone can be assigned to an increase in the amount of dead skin cells accumulated in the skin's hair follicles, which feeds bacteria and promotes skin openings to get clogged, causing the growth of pimples(Singh et al., 2018).In the present study, Hormonal levels of testosterone and LH in female patients increased with increased acne severity. In the present study, we demonstrated that, in comparison to female   controls, female acne patients may have lower serum EST levels.   In male acne patients only testeosterone level show significant differences between cases and control groups.   FSH level show no significant changes in both female and male acne patients . As compared to women, it has been reported that the incidence of acne in men is slightly lower, which may attribute to the fact that women place more importance on appearance than men, as acne is considered a non-lethal disease that is often overlooked by male patients in its mild stages .Women tend to experience more hormone fluctuations compared to men due to puberty, menstruation cycles, pregnancy and menopause.

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