Lipid Profile Among Acne Patients Attending Al-Fayhaa Teaching Hospital in Basrah, Iraq

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***Abstract* :** Acne vulgaris is a chronic pilosebaceous inflammatory condition affecting mainly the adolescent age group. Currently, it is understood that acne vulgaris is associated with an altered blood lipoprotein level. A case-control study was conducted in Basrah at Al-Fayhaa Teaching Hospital for 4 months from December 2021 to April 2022 to assess the changes in the lipid profile among patients with acne vulgaris. The lipid profile of 188 patients with acne vulgaris was assessed and compared with 203 aged and sex-matched controls. The study concludes that there is derangement in all parameters of the lipid profile among acne patients, notably males, those over the age of puberty, and those with severe grades, especially for the high LDL and triglyceride levels, and this is correlated with the severity of acne vulgaris positively.

***Index Terms* :** Acne vulgaris, Basrah, Lipid Profile, Cholesterol, Triglyceride, HDL, LDL

I. INTRODUCTION

Acne vulgaris is a chronic, self-limiting, inflammatory disorder of the pilosebaceous unit. It is a common skin disorder that presents as inflammatory and non-inflammatory lesions on the face, upper arms, chest, and back [1]. Manifestations include seborrhoea, open and closed comedones, erythematous papules and pustules, and, in more severe instances, nodules, deep pustules, and pseudocysts. Scarring is probable in many instances [2]. Acne vulgaris affects approximately 85% of 12-to 24-year-olds, with a peak occurrence during adolescence [3].

Acne vulgaris has been linked to a number of pathogenetic variables. In spite of this, four important factors have been found as major contributors to its occurrence: increased sebum production, pilosebaceous duct hyper-cornification, microbial flora abnormalities, including *Propionibacterium acnes* invasion, and inflammation [4]. In addition, a range of genetic and environmental factors, including nutrition, menstruation, emotional stress, and cosmetics, can promote acne [5].

It is recognised that acne vulgaris is connected with an altered proportion of blood lipoprotein. The rise in cholesterol levels causes an increase in testosterone levels, which promotes sebum and keratinocyte hyperproliferation in people with acne vulgaris [6,7].

There are few publications on the association between blood lipids and acne vulgaris. The aim of this study intends to examine the relationship between lipid profile and the development of acne vulgaris.

II. METHODS

A hospital-based case-control study was conducted at the dermatology outpatient clinic of Al-Fayhaa teaching hospital in Basrah City, southern Iraq, from the first of December 2021 to the first of April 2022. All the acne cases who fulfilled the criteria were included in this study. The inclusion criteria included: patients who accepted to participate in the study and those who agreed to collect blood samples for laboratory tests. The exclusion criteria were: pregnant and nursing women, Patients suffering from certain skin conditions such as seborrheic dermatitis,

psoriasis, rosacea, or atopic dermatitis, which could affect sebum and serum lipids, Patients who were on systemic and topical medications for acne vulgaris, using hormonal and estrogen contraceptives, and patients who were on antihyperlipidemic drug therapy. Those who fulfilled the inclusion criteria were 188 patients matched for age and sex with 203 controls from the ENT outpatient clinics.

All the cases and controls filled out a special questionnaire prepared for the purpose of the study, which included the socio-demographic characteristics: the age of the subject, gender, and place of residence. Examination of the lesion in respect to its distribution, type of acne lesion, and severity is also considered. The researcher used a specific scoring system for the assessment of severity called the Global Acne Grading System (GAGS). It is a quantitative scoring system to assess acne severity. According to this score, acne was graded as mild, moderate, severe, and very severe [8].

The lipid profile measurements were done for all of the cases and controls. The researcher collected five millilitres of venous blood from the patient into a serum gel tube, then centrifuged at 2500 rpm for 10 minutes. The serum was then separated carefully using a Pasteur pipette and subjected to the lipid profile testing on the same day. The lipid profile was measured by Roche Cobas Integra 400 plus. The Cobas b 101 system uses an enzymatic method to measure total cholesterol, triglycerides (TG), and HDL-cholesterol. When the concentration of triglycerides is less than 400 mg/dL, the Friedewald formula is used to calculate LDL cholesterol: LDL = Total cholesterol-HDL-TG/5 (in milligrammes per deciliter) [9].

The dataset was coded and analysed using the Statistical Package for the Social Sciences (SPSS) version 22. The numerical data was tabulated as mean and standard deviation (SD). The independent sample student t-test was used to compare the two groups, and ANOVA analysis with post-hoc Bonferroni correction was used to compare the means of more than three groups. The qualitative data was tallied as a percentage and analysed using the Chi-square or Fisher exact test. The multivariate binary logistic regression analysis was carried out to find an independent association between the lipid profile parameters and the development of acne vulgaris. A P-value of 0.05 or less is considered statistically significant.

III. RESULTS

A total of 188 acne patients were matched for age and sex with the control group. The age of the study groups ranged from 12–30 years old, most of them lived in the city centre. Among cases, females constituted 136 (72.3%) and 144 (70.9%) of controls, while males were only 52 (27.7 %) and 59 (29.1%) of acne cases and control groups, respectively, no significant difference was found between them (P = 0.208).

Considering the site of acne lesions, nearly all patients 187 (99.5%) had at least a single lesion on their faces, followed by the back and chest 125 (66.5%) and 105 (55.9%), respectively. Most of the patients 123 (65.4%) were found to have a combination of lesions of comedones, papules, and pustules. According to GAGS score, 63.3% of acne cases were of moderate severity.

The mean values of total cholesterol, triglycerides, HDL, and LDL are shown in Table (1). There were significant differences between the cases and controls regarding triglycerides and LDL ($P < 0.05$). Although higher values of total cholesterol and lower values of HDL were reported among cases, they were not significant ($P > 0.05$).

In order to determine the effects of lipid profile parameters (independent variables) on the development of acne vulgaris (dependent variable), binary logistic regression analysis was carried out and shows that the acne vulgaris occurrence was significantly and independently affected by the triglyceride (P-value = 0.002) and LDL levels (P-value = 0.012), but HDL and total cholesterol did not significantly affect the risk of developing acne vulgaris (Table 2).

Table (1): The Lipid Profile Among Cases and Controls

Lipid profile parameter (mean ± SD)	Case (n = 188)	Control (n = 203)	P-value *
Total cholesterol	142.3 ± 33.6	141.3 ± 39.3	0.793
TG	101.6 ± 36.9	91.7 ± 26.8	0.002
HDL	45.6 ± 11.7	46.5 ± 10.1	0.432
LDL	96.6 ± 29.3	90.9 ± 20.9	0.026

* Independent-Samples T Test
SD: Standard deviation, **TG:** Triglyceride, **HDL:** High density lipoprotein, **LDL:** Low density lipoprotein

Table (2): The Logistic Regression Model for the Predictors of Acne Vulgaris

Lipid profile parameter	Coefficient (B)	Odds Ratio Exp (B)	P-value *	95% Confidence Interval	
				Lower	Upper
Total cholesterol	0.001	1.001	0.625	0.996	1.007
TG	0.011	1.012	0.002	1.004	1.019
HDL	-0.001	0.999	0.987	0.978	1.021
LDL	0.013	1.013	0.012	1.002	1.023

* Binary logistic regression
TG: Triglyceride, **HDL:** High density lipoprotein, **LDL:** Low density lipoprotein

In terms of the relationship between sex and the levels of lipid profile parameters, Table (3) shows that female acne patients have significantly higher levels of triglycerides and LDL as well as lower HDL than controls (P-value < 0.05), but cholesterol did not show a significant difference between them, although it was higher among cases. None of the males' cases showed a significant difference between the study parameters.

Table (3): The Association Between Gender of Patients and Lipid Profile

Lipid profile parameter	Male		P-value *	Female		P-value *
	Case (n = 52)	Control (n = 59)		Case (n = 136)	Control (n = 144)	
Total cholesterol	150.3 ± 33.7	134.1 ± 41.1	0.389	144.1 ± 38.3	138.9 ± 33.1	0.160
TG	101.5 ± 35.1	100.8 ± 31.9	0.898	101.9 ± 38.7	87.6 ± 21.4	0.001
HDL	41.5 ± 9.5	48.5 ± 10.8	0.170	45.6 ± 9.7	47.1 ± 12.1	0.008
LDL	94.7 ± 23.9	91.9 ± 26.8	0.308	98.4 ± 30.1	89.3 ± 19.4	0.001

* Independent-Samples T Test
TG: Triglyceride, **HDL:** High density lipoprotein, **LDL:** Low density lipoprotein

Concerning the association between age and lipid profile (Table 4), a significant association was found between age cases and control with the level of both total cholesterol, TG, HDL, and LDL (P-value < 0.05) among those younger than 20 years. Although LDL levels also have an association of statistical significance (P-value < 0.05) among acne cases for those older than 20 years, the other parameters showed no statistical significance.

Table (4): The Association Between Age of Patients and Lipid Profile

Lipid profile parameter	Age < 20		P-value *	Age ≥ 20		P-value *
	Case (n = 130)	Control (n = 122)		Case (n = 58)	Control (n = 81)	
Total cholesterol	137.5 ± 39.2	134.3 ± 31.2	0.067	154.1 ± 33.6	149.8 ± 38.4	0.524
TG	98.6 ± 35.4	88.2 ± 21.8	0.001	108.3 ± 39.5	99.9 ± 31.2	0.289
HDL	44.7 ± 9.3	45.7 ± 11.7	0.002	45.2 ± 11.4	49.0 ± 10.7	0.732
LDL	92.8 ± 29.2	87.0 ± 20.7	0.002	104.9 ± 27.8	96.7 ± 19.8	0.031

* Independent-Samples T Test
TG: Triglyceride, **HDL:** High density lipoprotein, **LDL:** Low density lipoprotein

The association between the severity of acne and lipid profile, which is illustrated in Table (5), there was a significant association between total cholesterol level with the severity of acne as higher values were detected in the severe group of acne cases (P = 0.027). Still, none of the other laboratory parameters showed a statistically significant relationship with the severity of acne (P-value > 0.05).

Table (5): The Association Between Acne Severity and Lipid Profile

Lipid profile parameter	Mild (n = 51)	Moderate (n = 119)	Sever (n = 18)	P-value *
Total cholesterol	138.5 ± 33.1	138.9 ± 33.1	164.9 ± 50.9	0.027
TG	97.1 ± 37.6	101.2 ±35.8	117.2 ± 41.2	0.137
HDL	48.1 ± 10.9	46.0 ± 13.4	42.2 ± 10.9	0.419
LDL	91.3 ± 22.2	97.7 ± 30.7	104.8 ± 36.3	0.197

*ANOVA analysis with post-hoc Bonferroni correction
TG: Triglyceride, **HDL:** High density lipoprotein, **LDL:** Low density lipoprotein

IV. DISCUSSION

Acne is an inflammatory illness caused by interference with the sebaceous follicles' normal cycle. Increased sebum production and altered sebum lipid quality play a significant influence in acne aetiology. Because adrenal and gonadal androgens are generated from cholesterol released from plasma, total cholesterol levels may influence the development of acne vulgaris [10].

Collier and Colleagues (2008) found that adult women have a significantly greater prevalence of acne than adult men across all age groups [11]. Also, this finding is consistent with a local study from Basrah that found higher rates of acne in females (about 65%) compared to males [12]. However, it has a difference with a

meta-analysis that was conducted in China and indicated that males have a higher prevalence of acne than females [13]. In some other trials, there was no discernible gender difference, and both men and women were affected similarly [14, 15].

Regarding clinical presentation, the face has been identified as the most frequently reported site of acne development in the current study. This finding is consistent with what has been reported in the literature, which states that acne most frequently affects the face [16]. The most frequent acne-related presenting signs were a combination of comedones, papules, and pustules. This is congruent with research conducted in India, which found that all of the patients included in the study had comedones, papules, and pustules [5]. In a similar pattern, a study from Iraq [17] showed that papules and comedones were the most noticeable acne lesions.

In this study, we observed elevated levels of cholesterol, triglycerides, and low-density lipoprotein (LDL) and decreased levels of high-density lipoprotein (HDL) in acne patients, particularly females and those younger than 20 years. However, the difference was only statistically significant for triglyceride and LDL, and high triglyceride is the only parameter that can be considered an independent risk factor for the development of acne vulgaris. Other research concurs with these findings to a degree. El-Akawi et al. discovered in Jordan that acne sufferers had considerably low HDL levels. Moreover, triglyceride and LDL levels were considerably higher in individuals with acne than in healthy individuals [18]. In Iran, research revealed that acne patients, particularly males, had significantly higher cholesterol levels than controls. However, other plasma lipids, including triglyceride, LDL, and HDL, were higher in both male and female acne patients, but this was not statistically significant [19]. According to a case-control study of female acne patients, acne vulgaris is significantly associated with lipid changes, as total cholesterol, triglyceride, and LDL levels in the acne group were significantly higher than in the control group. Also, the HDL level in the acne group was significantly lower than in the control group [20]. Additionally, Cunha et al. did a retrospective cross-sectional study in Brazil and discovered that acne patients had increased levels of total cholesterol and LDL [21].

Several studies have identified lipid profile abnormalities in acne patients [18, 19, 20, 21]. Nevertheless, a small number of studies have demonstrated equivalent values for lipid profile parameters in patients and controls. Ekiz et al. (2015) found no association between acne and total cholesterol, triglyceride, or LDL [22]. Also, Nasution et al. (2018) found no link between lipid profiles and acne in a cross-sectional study of patients with acne vulgaris in comparison with people without acne [23].

In present study, a substantial association was identified between the amount of LDL and the acne severity score. This result is comparable to that of a case-control study done in China, which found that individuals with severe acne had higher total cholesterol and LDL levels than those with mild and moderate acne [24]. In addition, it has been established that serum cholesterol levels may influence acne severity by raising sebum lipids and lipid peroxides, thereby causing follicular epidermal and sebaceous gland hyperproliferation and inflammation [6]. In contrast, Da Chuna et al. (2015) and Sobhan et al. (2020) reported that there was no significant relationship between acne severity and the lipid profile of patients, which contradicts our findings [19, 21].

V. CONCLUSIONS

This study documents an obvious deviation in all parameters of the lipid profile among acne patients, notably females, those younger than the age of puberty, and those with severe grades, especially for the high LDL and triglyceride levels.

VI. RECOMMENDATIONS

These findings imply that serum lipid levels should be measured throughout acne therapies and that a diet high in saturated fat should be avoided during acne therapy. Further studies are needed to illustrate the association between a high fatty diet and acne vulgaris.

VII. STUDY LIMITATIONS

The possible constrictions of this study are the limited sample size and the single-center survey, in addition to the lack of correlation with the dietary pattern of the patients.

VIII. ETHICAL APPROVAL

Ethical approval was granted from the Ministry of Higher Education, University of Basrah, College of Medicine, Research Ethics Committee (No. 8/39/331 dated on 23/1/2022) and the Ministry of Health and Environment, Basrah Health Directorate, Training, and human resources center – research unit (No. 910 dated on 13/12/2021). Written consent was obtained from the patients in both cases and controls to participate in the study.

IX. DECLARATION

This study is part of a master's dissertation in the speciality of community medicine at the College of Medicine – University of Basrah.

X. FUNDING AND FINANCIAL SUPPORT

The study will be funded mainly by the researchers

XI. DATA CONFIDENTIALITY

The data will be processed with a higher degree of confidentiality and privacy.

XII. CONFLICTS OF INTEREST

The researchers did not report any conflicts of interest at the current time.

XIII. ACKNOWLEDGMENTS

We would like to express our deep thanks and gratitude to all the patients who participated in the study and to all the workers in the dermatology outpatient clinic and laboratory.

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