

Dyslipidemia in Patients with Acne Vulgaris: A Clinicobiochemical Study from a Tertiary Care Center

C Leelambika¹, Pushpa Sarkar²

ABSTRACT

Introduction: Acne vulgaris, a common dermatological disorder, is often associated with excess sebum production. Studies indicate acne and serum lipid profile pathophysiology and its association need further exploration. This study was done to evaluate the relationship and association between plasma lipid profile and acne.

Materials and methods: A case-control study with group I containing 100 patients with acne vulgaris and group II containing 100 age- and gender-matched healthy volunteers as the control group. The lipid profile parameters were estimated in the cases and controls.

Results: Serum total cholesterol, triglyceride, HDL, and LDL levels were measured. The predominant acne grade was grade II. Total cholesterol, triglyceride, and LDL levels were statistically higher than in the healthy control (significant with $p < 0.05$), whereas HDL level was insignificant. When lipid profiles between male and female were compared, there were no significant differences in both sexes between acne patients and controls. Total cholesterol, triglyceride, and LDL levels in patients with mild, moderate, and severe acne patients were statistically significant and correlated with the severity of acne.

Conclusion: Acne patients are more frequently associated with altered lipid profile parameters, particularly with both moderate and severe acne. This deranged lipid parameters provide a new route for further exploration in the pathogenesis and also treatment aspects of acne vulgaris.

Keywords: Clinical biochemistry, Dyslipidemia, Triglyceride.

Indian Journal of Medical Biochemistry (2019); 10.5005/jp-journals-10054-0112

INTRODUCTION

Acne vulgaris is a common disorder of pilosebaceous follicle mainly affecting adolescents and young adults. It presents with characteristic lesions including comedones, papules, pustules, and nodules, in some cases accompanied by scarring. It is an inflammatory disease and its consequent hyperpigmentation and scarring amounts to cause a great distress both psychologically and socially.¹ Despite its prevalence and its effects on scarring and psychological impact, very little is known about the natural history of acne. Acne appears early in puberty and it is difficult to predict which individuals are prone to severe acne.² Acne is affected by many factors like increased sebum secretion, altered quality of sebum lipids, follicular hyperkeratinization and proliferation of *Propionibacterium acnes*.³ Sebum is comprised mainly of triglycerides, wax esters, and squalene with some cholesterol and its esters.⁴ Excess sebum provides an anaerobic environment for *P. acnes*. Lipases from bacteria hydrolyses triglycerides into free fatty acids which are comedogenic and proinflammatory.⁵

The relationship between lipid profile or lipid ratios and acne is not widely reported. Little is known about the relationship between lipoproteins and skin diseases. There are very few studies on lipid profile and acne. The study done by Vergani et al. showed a significant reduction in HDL in their population.⁶ Studies on the relation between dyslipidemia and the onset of acne have divergent results, and therefore they are not clearly related in the literature. Some of them reveal that the lipid profile in adult women with acne shows an increase of total cholesterol (TC) and low-density lipoprotein (LDL) and a decrease in HDL.⁷ There are very few studies to reveal the role or effect of lipid profile in acne. In view of the lack of studies, the present study was designed to evaluate the lipid profile in acne, and their relationship in acne patients. The aim of

¹Department of Biochemistry, Bengaluru Medical College and Research Institute, Bengaluru, Karnataka, India

²Department of Biochemistry, Mandya Institute of Medical Sciences, Bengaluru, Karnataka, India

Corresponding Author: C Leelambika, Department of Biochemistry, Bengaluru Medical College and Research Institute, Bengaluru, Karnataka, India, Phone: +91 9986062264, e-mail: leelamims@gmail.com

How to cite this article: Leelambika C, Sarkar P. Dyslipidemia in Patients with Acne Vulgaris: A Clinicobiochemical Study from a Tertiary Care Center. *Indian J Med Biochem* 2019;23(3):320–323.

Source of support: MIMS, Mandya

Conflict of interest: None

the study was to evaluate the lipid profile in acne and to know their relationship in acne patients.

MATERIALS AND METHODS

Persons between the age group of 15 years and 45 years, reporting to the department of dermatology, MIMS, who are diagnosed as having moderate to severe acne according to the Indian Acne Grading system were enrolled as subjects after obtaining written consent.

The subjects chosen were interviewed. Questionnaire form that contained information about age, sex, weight, and personal and family history of acne was used in the language known to the patient, before the sample collection. In case of minors, subject assent and parent's consent was obtained. The controls were selected from the general population as well as from the attendants of the patients with acne.

The patients were examined under good illumination and were finally graded as mild, moderate, or severe on the basis of severity as described below.⁸

- Mild disease: few to several papules/pustules with no nodules
- Moderate disease: several to many papules/pustules with few to several nodules
- Severe disease: numerous and/or extensive papules/pustules with many nodules.

Inclusion Criteria

The subjects were diagnosed according to the acne grading system.

Exclusion Criteria

The subjects with one or more of the following was excluded: hypertension, diabetes, any liver or kidney diseases, or any neuro-endocrinal disorder. Known history of lipid metabolic disorder or intake of drugs that affect the lipid metabolism was excluded. Oral contraceptive pills intake or any form of hormonal therapy were excluded as well. Both the patients and controls had no history of any topical or systemic drug therapy including vitamins.

Studied Population

This study is a case-control one that was conducted on two groups.

Group I

A total of 100 patients with acne vulgaris were included in the study. Patients included 50 cases with moderate acne and 50 cases with severe acne.

Group II

One hundred acne patients and age sex matched 100 healthy controls were included in this study, of whom 56 (56%) were male patients and 44 (44%) were female patients. Most of the patients were adolescents and young adults; 80 (80%) patients belonged to the age group of 15–24 years, while 18 (18%) patients belonged to the age group of 25–34 years; only three (3.1%) patients were older than 30 years.

Dyslipidemia Criteria

Analysis of TG, TC, LDL, and HDL levels was based on the National Cholesterol Education program guidelines. Triglyceride levels were classified as normal (<150 mg/dL), borderline high (150–199 mg/dL), high (200–499 mg/dL), and very high (>500 mg/dL). Total cholesterol was classified as desirable (<200 mg/dL), borderline high (200–239 mg/dL), and high (>240 mg/dL). LDL was classified as optimal (<100 mg/dL), above optimal (100–129 mg/dL), borderline high (130–159 mg/dL), high (160–189 mg/dL), and very high (\geq 190 mg/dL). High density lipoprotein levels were classified as low (<40 mg/dL), normal (40–59 mg/dL), and high (\geq 60 mg/dL).⁹

Method of Collection of Data

Following selection of subjects and after obtaining written consent for the proposed study, about 3–5 mL of fasting venous blood was obtained by venepuncture under aseptic conditions in a non-vacuum tube with clot activator. The tubes were then centrifuged at 3,500 rpm for 15 min. The separated serum was then used for estimation of parameters required for the study. Estimation of cholesterol was carried out by using dynamic extended stability CHOD-POD end point method, with a lipid clearing agent, triglycerides by the GPO-PAP end point method, HDL by the immunoinhibition method, by ERBA Mannheim analyzer, and LDL by Friedwald's calculation.

Statistical Analysis

The collected data were entered in the MS Excel worksheet and analyzed using Epi-info/SPSS software and descriptive statistics, chi-squared test, *t* test, ANOVA, and other applicable statistical tests as applicable.

RESULTS

One hundred acne patients and age and sex matched 100 healthy controls were included in this study. The age of acne patients and controls ranged from 15 years to 45 years. The mean age of acne patients and controls were 22.04 ± 3.59 and 21.19 ± 3.95 respectively. Of the acne patients, ten (10%) had mild acne, forty-eight (48%) had moderate acne, and forty-two (42%) had a severe grade of acne. The moderate and severe acne were shown to be more common than the mild grade among the acne patients. The predominant clinical grade was papule-pustule acne (grade II) with 100 patients (71%), followed by grades I and III, with 38 (10%) and 25 (42%) patients, respectively Table 1.

Facial acne was the most common and was found in 85 patients, Truncal in 2 patient and both facial and Truncal in 13 patients (Table 2).

Out of the total number of 100 patients, there was an overall female preponderance.

Serum cholesterol analysis showed that there was a significant difference between acne patients and controls. Similarly triglycerides analysis and LDL levels showed a significant difference when compared with the *p* value <0.001. Total cholesterol, triglyceride, and LDL levels were statistically significant, whereas HDL level was insignificant. When lipid profiles between male and female participants were compared, there was no significant difference in both sexes between acne patients and controls (Tables 3 and 4).

DISCUSSION

In the present study we compared the serum lipid profile level of moderate-severe acne patients with the normal subject. Our results given in Table 5 show an association between acne and dyslipidemia. Significant association between serum lipid levels and acne vulgaris is noted and it is evident that the mean total

Table 1: Grade of acne

Grade of acne	Week 0 (%)
1	10
2	48
3	42

Table 2: Site of acne

Site of acne	Number of patients
Facial	85
Truncal	2
Both	13

Table 3: Distribution according to sex and among study subjects

	Male	Female
Cases	47	62
Controls	38	53
Total	85	115

Table 4: Serum Lipid profile in male and female, acne cases and control

Parameter	Male		Female		p value
	Cases average \pm SD	Control average \pm SD	Cases average \pm SD	Control average \pm SD	
T. cholesterol	150.87 \pm 25.99	119.60 \pm 31.61	151.90 \pm 19.29	117.47 \pm 35.85	0.808
Triglyceride	127.00 \pm 48.54	95.40 \pm 28.37	113.50 \pm 36.48	92.67 \pm 39.16	0.811
HDL	42.03 \pm 8.59	45.00 \pm 9.98	42.37 \pm 10.24	45.37 \pm 12.59	0.804

Table 5: Serum Lipid profile in acne cases and control

	Cases average \pm SD	Controls average \pm SD	t test value	p value
Age	22.04 \pm 3.59	21.19 \pm 3.95	1.591	0.113
T. cholesterol	156.72 \pm 21.34	106.19 \pm 20.53	17.06	<0.001
Triglyceride	116.38 \pm 60.39	87.27 \pm 29.46	4.33	<0.001
HDL	42.19 \pm 12.13	39.15 \pm 11.62	1.81	0.072
LDL	90.87 \pm 24.92	49.87 \pm 21.76	12.36	<0.001

cholesterol and triglycerides is increased in acne patients of the study subjects as compared to normal control and is statistically significant. Similarly the change in mean serum triglyceride and LDL levels was significant as compared to the respective values in the control group ($p < 0.001$). Thus it can be seen that in our study serum lipid parameters are significantly higher in newly diagnosed acne patients as compared to healthy controls. The plasma lipid profile of acne patients in our study was similar to that reported by El-Akawi et al., but with some differences.¹⁰ Studies on the relation between dyslipidemia and the onset of acne have divergent results and not clearly related in the literature. Another study revealed TC as well as TG in acne patients with acne not being significantly different and alteration restricted to HDL and LDL.⁶ The results are in agreement with the other studies which showed that the serum cholesterol and triglyceride levels are higher in this disorder.¹¹ Factors like alcohol consumption, smoking, dietary intake, genetic and environmental factor influence serum lipid concentration.¹² Different races and ethnic group have differences in the lipid profile.¹³

Measuring plasma total cholesterol, triglyceride, HDL, and LDL levels in acne patients, we demonstrated that male patients and female patients were found not to be significantly different as shown in Table 4. Cholesterol ester transfer protein might contribute to increased LDL-C and decreased HDL-C levels.

Similar results were observed in a study in acne patients where significant elevations were seen in total cholesterol, triglycerides, LDL, HDL, and VLDL along with MDA as compared to controls.¹⁴ Also supporting our findings is a study by Vergani et al. who showed a significant reduction in HDL and Apoprotein A1 in female patients suffering from severe cystic acne.⁵ Another study in female acne patients during three consecutive menstrual cycles during luteal phase (19th to 21st day) demonstrated that total cholesterol (TC), LDL-C, testosterone, and progesterone levels were higher while estrogen and HDL-C levels were decreased in such patients.⁷ An association between diet and acne has been postulated by some studies that indicate that diets high in carbohydrates and fat worsen acne.¹⁵

Another study showed similar results with total cholesterol, LDL-C, and LP-a levels to be significant in acne patients when compared with healthy controls.¹⁶ The lipid profile of women with grade II and III acne when compared, there was no significant alterations in the lipid profile.¹⁷ Another study showed an association with low high density lipoprotein cholesterol levels and post adolescent acne.¹⁸

CONCLUSION

Acne patients have some abnormality in the lipid profile. The abnormality in this study might be due to the different factors that must be considered for the alteration in the biochemical parameters as well as in the treatment of acne patients. Multifactorial causes, which need to be taken care of while treating such patients. The conclusion is that patients with grades II and III acne are more likely to have TC and LDL elevated regardless of their family history.

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