ORIGINAL ARTICLE

Serum Lipid Profile Among Young Women with Acne Vulgaris: A Case Control Study at A Tertiary Medical College Hospital

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Abstract:

Background: Acne vulgaris is one of the most common skin conditions among young girls and women, resulting from a complex interaction of various physiological factors, including raised serum lipid profile. Present study aims to identify the relation between serum lipid profile and the incidence of acne vulgaris among young women. **Materials and methods:** This is a case control study conducted among 51 girls and women with acne vulgaris between the age of 10 – 24 years as case and age sex matched 51 healthy women without acne as control. Disease severity among acne patients were evaluated using Global Acne Grading System (GAGS). Plasma total cholesterol (TC), low-density lipoprotein cholesterol (LDL), high-density lipoprotein cholesterol (HDL) and triglyceride (TG) levels were estimated from 12 hours fasting venous blood specimens from each participant. **Results:** Mean age was 19.29 ± 3.09 years for case and 18.84 ± 3.08 years for control. Among the 51 acne patients, 20 (39.2%) had moderate disease and 31 (60.8%) had severe disease. Serum TC was significantly ($p < 0.001$) higher among patients with severe acne than patients with moderate acne; 175.27 ± 15.61 mg/dl and 137.90 ± 10.48 mg/dl respectively. Serum HDL, LDL and TG were higher among the patients with severe acne than moderate acne. Compared to control group, serum TC and HDL were significantly ($P < 0.001$ and < 0.05, respectively) higher for acne patients than control. Serum LDL and TG were also higher among acne patients than control, but these differences were not statistically significant. **Conclusion:** Significant alteration in serum lipid profile among patients with acne vulgaris is evident from this study. Therefore, routine screening for lipid profile abnormalities should be considered for the treatment of patients with acne vulgaris.

Keywords: Serum Lipid Profile, Acne Vulgaris, Global Acne Grading System.

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Introduction:

Acne vulgaris is one of the most common skin conditions affecting late adolescents and young adults worldwide.[1,2] Vast majority of late teens and young adults have been reported to suffer from some degree of acne.[3,4] Up to 85% to 90% of all teenagers were reported to have some degree of acne.[5] Studies have shown that, up to 85.1% of the general population had been affected by acne at some point in their life.[6–8] Acne is more prevalent among women and between 30% and 50% of adult women can be diagnosed with acne.[9–12] Although more prevalent among adolescents, prevalence of acne is in the rise among adults.[5] Acne vulgaris is a chronic inflammatory disease of the pilosebaceous unit, resulting from excess sebum production, disturbed keratinization within the

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follicle, colonization of the pilosebaceous duct by Propionibacterium acnes and release of inflammatory mediators into the skin.[13–17] Sebaceous gland is primarily controlled by hormonal stimulation and during puberty, change in hormonal state, alteration of the sebum production, along with psychological factors like stress, irritation and potential dietary factors lead to the development of acne vulgaris.[14,18] Hormonal change is related to the increase in the production of androgens, synthesized from cholesterol at the ovaries and the adrenal glands among females, along with their conversion in peripheral tissues.[19] Androgens can stimulate sebum production through androgen antagonism in the sebaceous glands, through inhibition of female gonadal hormone production or through direct stimulation of lipid production[20], resulting in developing acne among women.[21] Increased plasma cholesterol leads to increased androgen production, which can act as a trigger for development of acne vulgaris.[22] Findings from prior studies have shown increasing evidence that changes in serum lipid profile could be related to the development of acne vulgaris.[22–24] But the studies showed divergent results in terms of correlation between components of serum lipid profile and the prevalence of acne vulgaris. In light of lack of studies and consensus on the relationship between serum lipid profile and acne in the literatures, present study aims to estimate the presence of change in serum lipid profile among acne patients and their relation with healthy control group.

Materials and Methods:

This was a case control study, conducted from July 2020 to June 2021, on patients with acne vulgaris. Only young female patients with acne vulgaris were included in the study. WHO classified women between the age of 10 – 24 years as young.25 As per WHO guideline only young female patients between the age of 10 and 24 years, with moderate to severe acne were selected for the study. Pregnant women, lactating mother, patients on oral contraceptive or hormone therapy, history of taking oral isotretinoin, history of taking any medications that affect lipid metabolism, patients with systemic diseases that affect lipid metabolism, such as uncontrolled diabetes, hypothyroidism, nephrotic syndrome, end-stage renal failure, familial hypercholesterolemia, and metabolic syndrome were excluded from the study. As per the enrollment criteria 51 patients were included in the study. As for control, age matched 51 healthy women without any significant medical illness, not on any lipid-lowering medication, BMI – 18.5–24.9 kg/m^2 (Normal health), as per WHO[26], and willing to give consent for necessary blood investigations, were enrolled. Study procedures were fully described to the participants before taking written informed consent. Parent or legal guardian provided informed written consent for participants under the age of 18 years. A structured questioner was used to collect data from the participants through face-to-face interview. The patients were categorized into 4 groups according to acne severity by Global Acne Grading System (GAGS), which is a quantitative scoring system to assess acne severity [Score: 0 = none; 1–18 = mild; 19–30 = moderate; 31–38 = severe; >39 = very severe].27 For clinical data, 12 hours fasting venous blood specimens were collected from patients and controls. The blood samples were analyzed for lipid profile levels as total cholesterol, high-density lipoprotein, low-density lipoprotein and triglyceride. Statistical analysis was done using the statistical package for the social sciences (SPSS version 25). Independent sample t-test was performed. P values <0.05 was considered statistically significant. The differences in total cholesterol, high-density lipoprotein, low-density lipoprotein and triglyceride levels between the patients and controls were analyzed.

Results:

Mean age of the patients with acne (Case) was 19.29 ± 3.09 years and mean age of age and sex matched control was 18.84 ± 3.08 years (Table 1). No statistical significance was observed at the age difference between case and control. Disease severity was evaluated; 39.2% were found to have moderate disease and 60.8% had severe disease.

Table 1: Descriptive statistics of the study population

Variables	Study Population (n = 102)		P value
	Case (n = 51)	Control (n = 51)	
Age (In years)	19.29±3.09	18.84±3.08	0.463*
Disease severity (GAGS)			
Moderate	20 (39.2%)		
Severe	31 (60.8%)		

Data presented as n (%) or mean±SD.
* Independent sample t-test was done. P values <0.05 was considered statistically significant.
GAGS - Global Acne Grading System

Serum lipid profile was estimated and compared between patients with moderate and severe disease (Table 2). Total cholesterol was 137.90±10.48 mg/dl for patients with moderate disease and 175.27±15.61 mg/dl for severe disease. Total cholesterol was significantly (p <0.001) higher among patients with severe disease than patients with moderate disease. Mean values for high-density lipoprotein, low-density lipoprotein and triglyceride were found to be higher among patients with severe disease, than patients with moderate disease, but these differences weren't statistically significant.

Table 2: Serum lipid profile levels among patients with acne vulgaris (n = 51)

Variables	Disease severity		P value
	Moderate (n = 20)	Severe (n = 31)	
Serum Lipid Profile			
Total cholesterol (mg/dl)	137.90±10.48	175.27±15.61	< 0.001*
High-density lipoprotein (mg/dl)	40.70±7.36	43.60±9.74	0.261*
Low-density lipoprotein (mg/dl)	94.86±25.04	100.57±16.46	0.330*
Triglyceride (mg/dl)	89.47±61.00	111.26±49.63	0.168*

Data presented as mean±SD.
* Independent sample t-test was done. P values < 0.05 was considered statistically significant.

Serum lipid profile was also compared between case and control (Table 3). Patients with acne shows higher mean total cholesterol than control group, 160.62±22.97 mg/dl and 126.31±20.84 mg/dl, respectively, which was highly significant (p < 0.001). high-density lipoprotein was also significantly (p < 0.05) higher among acne patients than control group, 42.47±8.92 mg/dl and 38.47±9.09 mg/dl respectively. Low-density lipoprotein and triglyceride were also found to be higher among patients, but not in significant amount.

Table 3: Serum lipid profile levels between case and control

Variables	Study Population (n = 102)		P value
	Case (n = 51)	Control(n = 51)	
Serum Lipid Profile			
Total cholesterol (mg/dl)	160.62±22.97	126.31±20.84	< 0.001*
High-density lipoprotein (mg/dl)	42.47±8.92	38.47±.09	< 0.05*
Low-density lipoprotein (mg/dl)	98.33±20.22	92.35±19.04	0.127*
Triglyceride (mg/dl)	102.72±54.84	96.05±49.96	0.523*

Data presented as mean±SD.
* Independent sample t-test was done. P values < 0.05 was considered statistically significant.

Discussion:

Patients with severe acne were found to have higher mean TC, HDL and LDL than patients with moderate disease in present study, similar to a 2020 study, showing higher levels of TC, HDL and LDL among severe acne patients than patients with moderate disease.[28,29] Although TG levels were higher among patients with severe acne than moderate acne in present study, which is in contrast to Sobhan 2020 study, where for patients with severe acne, TG levels were lower than patients with moderate acne. This difference could be due to the difference in sample between the study. Present study only included young women as sample, whereas Sobhan 2020 study included both adult men and women. In present study, total cholesterol was found to be significantly higher among case than control. This is consistent with other studies, showing higher cholesterol level in blood increasing androgen production, which, in turn, stimulates the onset of acne vulgaris.[22,23] Similar significantly higher concentration of total cholesterol was observed in a 2020 study.[28] High-density lipoprotein was also found to be significantly higher among case than control, supporting similar findings from Bakry et al., 2014 study.[30] HDL was also found to be higher among patients with acne than control group in other study, although not significantly higher.[28] The statistically significant (p < 0.05)

difference for cholesterol levels and HDL levels between case and control seen in present study is consistent with prior case control studies by other researchers.[30] In a 2010 study, patients with acne had higher levels of LDL when compared with control group, complying with the findings of present study.[22] Other studies have showed an increase in LDL level among acne patients, which corroborate current study findings.[23,28] Positive correlation between higher levels of cholesterol and prevalence of acne was also found in prior studies, which supports present study findings.[24] No significant difference in triglyceride level was seen between case and control in present study, consistent with other case control studies.[22,23,28,31,32] According to another case-control study among female acne patients, acne vulgaris is significantly associated with changes in lipid profile[33], which has also been shown by findings from present study. Results regarding lipid profile obtained from present study showed similarity from other studies conducted at other countries, strongly suggesting the need for assessing serum lipid profile during the management of acne vulgaris.

Strength:

This study compared the acne patients with an age sex matched healthy control group, increasing validity of the findings.

Limitations:

Sample size of this study was relatively small and convenient sampling was used from a single center at a district level. A larger sample selected with random sampling method from a larger geographical area representing a wider and more diverse group of patients would have generated more accurate and reliable results, reflecting the actual population.

Conclusion:

Findings from present study, as well as prior studies on similar patients, have shown the alteration in serum lipid profile among patients with acne vulgaris. Understanding this relation between serum lipid profile and acne vulgaris may assist in better understanding the pathophysiology of developing acne, which in turn can help in better management of acne vulgaris.

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