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ISSN: 2617-0817 E-ISSN: 2789-5912

Original Article

Correlation between Acne Vulgaris Severity and Lipid Profile of the Patients Attending in a Tertiary Centre

DOI: dx.doi.org

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Received: 24 Jan 2024
Accepted: 26 Jan 2024
Published: 28 Feb 2024

Published by:
Sher-E-Bangla Medical College, Barishal, Bangladesh

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ABSTRACT

Background: *Acne vulgaris (AV) is a common inflammatory skin disorder affecting adolescents and adults. Recent studies suggest a possible correlation between lipid metabolism abnormalities and acne severity. Dyslipidemia, characterized by imbalances in triglycerides, cholesterol, and lipoproteins, may contribute to acne pathogenesis. This study aims to explore the relationship between acne severity and lipid profile in patients attending a tertiary care center.* ***Objective:*** *To evaluate the correlation between the severity of acne vulgaris and lipid profile parameters, including total cholesterol, triglycerides, high-density lipoprotein (HDL), and low-density lipoprotein (LDL).* ***Methods & Materials:*** *This observational cross-sectional study was conducted at the Department of Dermatology and Venereology, Mugda Medical College & Hospital, Dhaka, Bangladesh, from July 2022 to December 2022. A total of 150 clinically diagnosed acne patients, aged 14–49 years were enrolled. Acne severity was assessed using the Global Acne Grading System (GAGS). Blood samples were analyzed for lipid parameters following standard laboratory protocols. Data were processed using Statistical Package for Social Sciences (SPSS) Version -23.0. Pearson's correlation coefficient was applied to determine statistical correlation, with a significance level of p<0.05.* ***Results:*** *The study included 150 patients, predominantly females (94.7%), with the majority (46.7%) aged 14–19 years. Most participants (65.3%) had a normal BMI, while 25.3% were overweight and 2.7% were obese. Acne severity assessment showed that 60% had mild acne, 33.3% had moderate acne, and 6.7% had severe acne. Lipid profile analysis revealed that triglyceride and LDL levels increased with acne severity, while HDL levels showed a slight decline. Triglyceride levels were significantly higher in severe acne cases (206.50 ± 105.03 mg/dL) compared to mild cases (97.78 ± 53.32 mg/dL) (r = 0.405, p < 0.001). Total cholesterol and LDL levels also increased with acne severity (r = 0.227, p = 0.005 and r = 0.198, p = 0.015, respectively). However, HDL levels showed no significant correlation with acne severity (r = -0.063, p = 0.445).* ***Conclusion:*** *The study found a significant correlation between acne severity and elevated triglyceride, total cholesterol, and LDL levels, suggesting a possible link between lipid metabolism and acne progression. Routine lipid profile screening in acne patients may help identify metabolic imbalances early.*

Keywords: *Acne-vulgaris, Severity, Lipid profile.*

(The Planet 2024; 8(1): 207-211)

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INTRODUCTION

Acne vulgaris (AV) is one of the most prevalent dermatological conditions, affecting millions worldwide, particularly adolescents and young adults. It is a chronic inflammatory disorder of the pilosebaceous unit, influenced by multiple factors such as genetics, hormones, diet, and lifestyle.[1] While AV is primarily linked to excess sebum production, hyper keratinization, inflammation, and bacterial colonization, emerging research suggests a potential relationship between lipid metabolism and acne severity.[2] Lipids play a crucial role in skin health, contributing to the formation of sebum, which helps maintain skin hydration and barrier function. However, alterations in lipid metabolism may disrupt this balance, leading to excessive sebum production and increased acne severity[3]. Dyslipidemia, characterized by abnormal levels of cholesterol and triglycerides, has been increasingly studied in acne patients, with findings suggesting that lipid profile abnormalities may contribute to the pathogenesis of AV[4].

ISSN: 2617-0817 E-ISSN: 2789-5912

Some studies indicate that elevated levels of low-density lipoprotein (LDL) and triglycerides, along with reduced high-density lipoprotein (HDL), are more common in acne patients compared to those without acne[5]. This raises the possibility that systemic metabolic changes could be linked to AV progression and severity[6].Hormonal influences, particularly androgens, also play a pivotal role in both lipid metabolism and acne development. Androgens stimulate sebaceous gland activity, leading to increased sebum production, which, in turn, exacerbates acne[7]. Studies have shown that lipid imbalances are more prominent in individuals with severe acne, suggesting that lipid metabolism may be an underlying factor in disease progression[8]. Furthermore, dietary habits, such as high intake of saturated fats and processed foods, have been associated with both dyslipidemia and increased acne severity, further reinforcing this connection[9]. Understanding the correlation between acne severity and lipid profiles is essential for improving treatment strategies. If lipid abnormalities are confirmed as a contributing factor, therapeutic interventions targeting lipid metabolism—such as dietary modifications and lipid-lowering agents—could be integrated into acne management plans[10]. This study aims to evaluate the lipid profile of patients with varying acne severity attending a tertiary care center in Bangladesh. By analyzing their lipid parameters, this research will contribute to a better understanding of acne pathophysiology and potential metabolic influences, paving the way for more comprehensive treatment approaches[11].

METHODS & MATERIALS

This observational cross-sectional study was conducted at the Department of Dermatology and Venereology, Mugda Medical College & Hospital, Dhaka, Bangladesh from July 2022 to December 2022. Written informed consent was obtained, consecutive sampling technique was followed and a total of 150 patients with acne vulgaris attending at the Department of Dermatology and Venereology were enrolled in this study according to selection criteria. All the patients were clinically diagnosed for the identification of acne vulgaris and the severity of acne vulgaris was assessed by Global Acne Grading System (GAGS). Then the blood samples were collected to assess the lipid profile of the patients including total cholesterol, HDL, LDL and Triglycerides. Lipid profile was determined following standard protocol in the central laboratory of Mugda Medical College and Hospital. A pre-structured questionnaire was used to collect socio-demographic and clinical data and a case record form (CRF) was used to collect the laboratory parameters of lipid profile. All data were compiled and edited meticulously. The data were screened and checked for any missing values and discrepancy. All omissions and inconsistencies were corrected and removed methodically. The collected data were analyzed using Statistical Package for Social Sciences (SPSS), Version-23.0. The results were presented in tables and charts as frequency, mean and percentage. Pearson's correlation coefficient tests were performed to assess the correlation between severity of acne vulgaris and lipid profile of the study patients, where $p<0.05$ considered as the level of significance with 95% CI. The ethical clearance of this study was obtained from the Institutional Review Board (IRB) of Mugda Medical College and Hospital, Mugda, Dhaka, Bangladesh

Inclusion criteria:

1. Age: 14 to 49 years
2. Sex: Both
3. Patients with diagnosis of Acne vulgaris
4. Patients who give written informed consent

Exclusion criteria

1. Pregnant women
2. Lactating mother
3. Patient on anti-lipid drug, or patients who are taking oral contraceptives, hormonal therapies or oral isotretinoin
4. Diagnosed case of Diabetes mellitus, renal, hepatic or, thyroid dysfunction
5. Advance malignancy

RESULTS

Table – I: Age distribution of the study subjects (*n*=150)

Age (years)	Frequency	Percent
14-19	70	46.7
20-29	60	40
30-39	19	12.7
40-49	1	0.7

Table I shows the age distribution of the study subjects. Majority of the study subjects 70(46.7%) were 14 – 19 years old followed by 60(40%), 20-29 years, 19(12.7%), 30-39 years and 1(0.7%), 40-49 years.

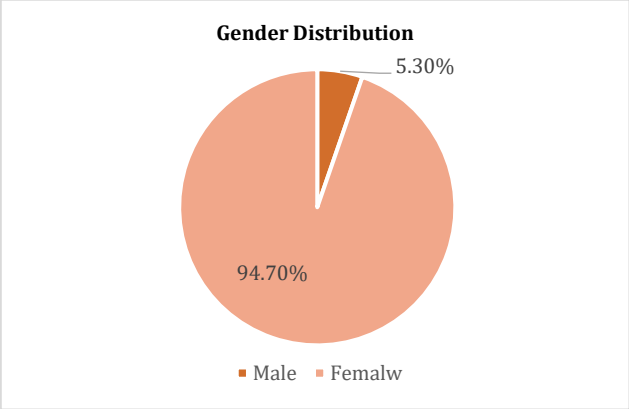

Figure – 1: Gender distribution of the study subjects (*n*=150)

Figure I shows the gender distribution of the study subjects. The females 142 (94.7%) were extremely predominant than males 8(5.3%). Male to female ratio was 1:17.75.

ISSN: 2617-0817 E-ISSN: 2789-5912

Table – II: BMI distribution of the study subjects (*n*=150)

BMI Distribution	Frequency	Percent
Underweight (<18.5)	10	6.7
Normal weight (18.5 - 24.9)	98	65.3
Over weight (25.0 - 29.9)	38	25.3
Obese (>30.0)	4	2.7

Table II shows BMI distribution of the study subjects. Maximum study subjects had normal weight 98 (65.3%) followed by obese 4(2.7%), over weight 38 (25.3%), underweight 10(6.7%).

Table – III: Site and lesion distribution of acne among the study subjects (*n*=150)

Site	Forehead	Left cheek	Right cheek	Chin	Nose	Chest and upper back
Total (%)	146 (97.3)	150 (100)	150 (100)	145 (96.7)	132 (88)	45 (30)
Comedones	50 (33.3)	29 (19.3)	25 (16.7)	65 (43.3)	106(70.7)	22 (14.7)
Papule	60 (40.0)	62 (41.3)	65 (43.3)	43 (28.7)	13 (8.7)	8 (5.3)
Pustule	30 (20.0)	41 (27.3)	35 (23.3)	33 (22)	12 (8)	14 (9.3)
Nodule	6 (4.0)	18 (12.0)	25 (16.7)	4 (2.7)	1 (0.7)	1 (0.7)

Table III shows the site and lesion distribution of acne among the study subjects. Comedones were observed mostly in nose 106(70.7), chin 65(43.3%) and forehead 50(33.3%). Papule was observed mainly in cheeks (5.35) and forehead. (40%) Pustule was found in cheeks (27.3%)), chin 33(22%) and forehead 30(20%).

Table – IV: Distribution of the severity of acne according to GAGS score (*n*=150)

GAGS Score	Frequency	Percent
1-18 (Mild)	90	60
19-30 (Moderate)	50	33.3
31-38 (Severe)	10	6.7

Table IV presents the distribution of GAGS (Global Acne Grading System) scores among the study subjects. The majority of the patients 90(60%) had the mild category (scores 1-18) of acne , 50(33.3%) had moderate acne (scores 19-30) and a small proportion 10(6.7%) patients had severe acne (scores 31-38).

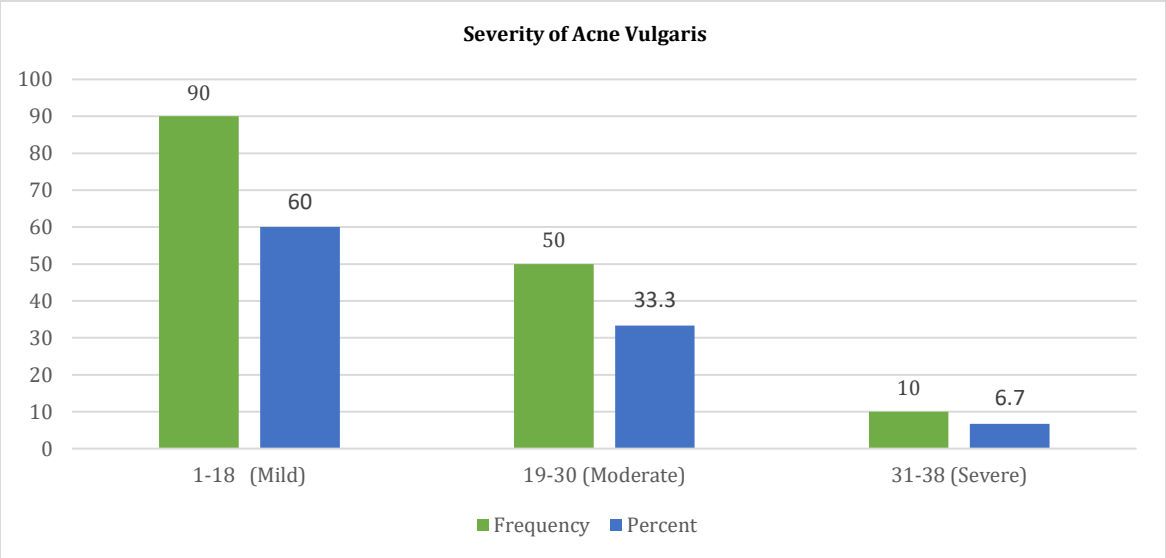

Figure – II: Shows the severity of acne vulgaris among the study subjects (*n*=150)

ISSN: 2617-0817 E-ISSN: 2789-5912

Table – V: Distribution of the severity of acne according to lipid profile (*n*=150)

Lipid Profile	Disease Severity of Acne		
	Mild (Global score 1-18)	Moderate (Global score19-30)	Severe (Global score 31-38)
Triglyceride (mg/dl)	97.78 ± 53.32	145.26 ± 69.72	206.50 ± 105.03
Total cholesterol (mg/dl)	150.38 ± 33.98	166.80 ± 37.78	172.20 ± 35.51
HDL (mg/dl)	42.58 ± 14.68	42.00 ± 9.47	37.71 ± 5.49
LDL (mg/dl)	92.33 ± 27.71	101.71 ± 32.95	114.88 ± 39.32

Table V presents the lipid profile across different acne severity levels: mild, moderate, and severe based on global scores. Triglyceride levels show a clear upward trend, rising from 97.78 ± 53.32 mg/dl in mild acne followed 145.26 ± 69.72 mg/dl in moderate and reaching 206.50 ± 105.03 mg/dl in severe acne. Similarly, total cholesterol levels increase with severity, from 150.38 ± 33.98 mg/dl (mild) followed 166.80 ± 37.78 mg/dl moderate and 172.20 ± 35.51 mg/dl severe. HDL appears to decline as acne worsens, dropping from 42.58 ± 14.68 mg/dl in mild cases followed 42.00 ± 9.47 mg/dl in moderate and 37.71 ± 5.49 mg/dl in severe cases. On the other hand, LDL follows an increasing pattern, with levels of 92.33 ± 27.71 mg/dl in mild acne followed 101.71 ± 32.95 mg/dl in moderate acne, and 114.88 ± 39.32 mg/dl in severe acne.

Table – VI: Correlation of disease severity of acne vulgaris (Global score) with lipid profile (*n*=150)

Lipid profile	r	p-value
Triglyceride	0.405	0.001
Total cholesterol	0.227	0.005
HDL	-0.063	0.445
LDL	0.198	0.015

Table VI highlights the correlation between lipid profile parameters and acne disease severity, with correlation coefficients (r) and corresponding p-values provided. Triglyceride levels show a moderate positive correlation with acne severity ($r = 0.405$) ($p < 0.001$), indicating that higher triglyceride levels are significantly associated with more severe acne. Total cholesterol also exhibits a weak but significant positive correlation ($r = 0.227$) ($p = 0.005$), suggesting a mild increase in cholesterol levels with worsening acne. LDL follows a similar trend, with a weak positive correlation ($r = 0.198$), ($p = 0.015$), implying that elevated LDL levels may be linked to acne severity. In contrast, HDL shows a very weak negative correlation ($r = -0.063$), ($p = 0.445$), which is not statistically significant, suggesting that HDL levels may not have a direct relationship with acne severity.

DISCUSSION

The present study explored the correlation between acne vulgaris severity and lipid profile abnormalities among patients attending a tertiary care center. Our findings revealed a significant positive correlation between triglyceride, total cholesterol, and LDL levels with acne severity, while HDL showed a decreasing trend as acne worsened. These results suggest that lipid metabolism alterations may play a role in acne pathogenesis, particularly in more severe cases. In this study, triglyceride levels exhibited a moderate positive correlation with acne severity ($r = 0.405$, $p < 0.001$), indicating a strong association between higher triglyceride levels and more severe acne. This finding aligns with previous studies, which have reported increased triglyceride levels in acne patients, potentially contributing to sebaceous gland hyperactivity and inflammation.[12] Similarly, total cholesterol levels showed a weak but significant correlation with acne severity ($r = 0.227$, $p = 0.005$), supporting earlier research linking lipid profile disturbances with inflammatory skin conditions.[13] LDL levels also demonstrated a weak positive correlation with acne severity ($r = 0.198$, $p = 0.015$), reinforcing findings from other studies that have observed increased LDL levels in patients with severe acne.[14] In contrast, HDL levels exhibited a very weak negative correlation ($r = -0.063$, $p = 0.445$), which was not statistically significant, suggesting that HDL may not have a direct role in acne pathogenesis.[15] These results are consistent with previous research indicating that while HDL levels may be lower in acne patients, the association remains inconclusive.[16] The demographic characteristics of our study population revealed that most participants were aged 14–19 years (46.7%), with a strong female predominance (94.7%). This finding is in agreement with other studies that highlight the higher prevalence of acne in adolescents and the increased reporting among females, possibly due to hormonal factors and greater healthcare-seeking behavior.[17] BMI distribution showed that the majority of study participants (65.3%) had normal weight, while 25.3% were overweight and 2.7% were obese. These findings align with previous research indicating that while BMI may have an influence on acne development, the relationship remains controversial.[18] Acne lesion distribution revealed that comedones were most frequently observed on the nose (70.7%), while papules and pustules were more prevalent on the cheeks and forehead. This pattern is consistent with prior studies that suggest the central facial region is most affected due to its high density of sebaceous glands.[19] Acne severity classification using the Global Acne Grading System (GAGS) demonstrated that most participants had mild (60%) or moderate (33.3%) acne, while severe cases were less frequent (6.7%). These findings are comparable to previous studies, which report a predominance of mild-to-moderate acne presentations in clinical and community-based settings.[20] Finally, this study supports the hypothesis that lipid profile abnormalities, particularly elevated triglyceride, total cholesterol, and LDL levels, are associated with increased acne severity.[21-23] These findings reinforce the potential role of lipid metabolism in acne pathogenesis and suggest the need

ISSN: 2617-0817 E-ISSN: 2789-5912

for further research to elucidate underlying mechanisms and potential therapeutic implications.

Limitations of The Study

This study has several limitations. Its cross-sectional design prevents establishing causality between lipid abnormalities and acne severity. The single-center setting and predominantly female samples limit generalizability. Dietary habits, lifestyle factors, hormonal influences, and prior acne treatments were not considered, which may confound results. Additionally, the small proportion of overweight and obese participants restricts analysis of BMI's impact. A larger, more diverse, and longitudinal study is needed to confirm these findings and explore underlying mechanisms.

Conclusion

The study found a significant correlation between acne severity and elevated triglyceride, total cholesterol, and LDL levels, suggesting a possible link between lipid metabolism and acne progression. Routine lipid profile screening in acne patients may help identify metabolic imbalances early. Further research is needed to explore the underlying mechanisms and potential therapeutic interventions.

RECOMMENDAT IONS

Future studies should adopt a longitudinal, multicenter approach with a larger, more diverse sample to enhance the generalizability and statistical power of findings. It is essential to control for confounding factors like diet, lifestyle, and hormonal influences, and further research should explore the underlying mechanisms linking lipid metabolism with acne severity. Additionally, routine lipid profile screening could be incorporated into acne management to identify potential metabolic imbalances early.

Conflict of interest: None declared
Funding: Self

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