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Correlation Between Lipid Profile, Liver Function Tests, and Acne Vulgaris: A Cross-Sectional Study

Sankalp Awasthi[1], Ajai Kumar[2], Anurag Kapoor[3], Suhashini Arya[4], Ghiswant Tepan[5], Shweta Bhardwaj[6], Kailash Kumar Mittal[7]

[1]Professor, Department of dermatology, Mahatma Gandhi University of Medical Sciences & Technology, Jaipur
[2]Associate Professor, Department of Biochemistry, Uttar Pradesh University of Medical Sciences, Saifai
[3]Senior Resident, Department of Biochemistry, Uttar Pradesh University of Medical Sciences, Saifai
[4]PG JR-2, Grant Medical College and Sir J.J. Group of Hospitals in Mumbai, India
[5,6]PG JR-1, Department of Biochemistry, Uttar Pradesh University of Medical Sciences, Saifai
[7]Professor, Department of Radiotherapy, Uttar Pradesh University of Medical Sciences, Saifai

Corresponding Author

Kailash Kumar Mittal
Professor, Department of Radiotherapy,Uttar Pradesh University of Medical Sciences, Saifai

Email: drkkmittal@gmail.com

Abstract:

Background: Acne vulgaris is a common dermatological condition with multifactorial etiology, including hormonal, metabolic, and inflammatory factors. Emerging evidence suggests that lipid profile abnormalities and altered liver function may play a role in the pathogenesis or progression of acne.

Objective: To evaluate the correlation between lipid profiles, liver function tests (LFTs), and the severity of acne vulgaris.
Methods: A cross-sectional study was conducted on 100 patients diagnosed with acne vulgaris and 50 age- and sex-matched healthy controls. Lipid profile (Total cholesterol, HDL, LDL, Triglycerides) and LFTs (ALT, AST, ALP, and Total bilirubin) were measured. Acne severity was graded using the Global Acne Grading System (GAGS).

Results: Acne patients exhibited significantly elevated triglycerides ($p<0.001$), LDL ($p=0.004$), and reduced HDL ($p=0.006$) compared to controls. Mild elevations in ALT and ALP were noted in moderate-to-severe acne patients. A positive correlation was found between acne severity and triglyceride levels ($r=0.49$), while a negative correlation was observed with HDL ($r=-0.35$).

Conclusion: Alterations in lipid metabolism and mild liver dysfunction may contribute to the pathogenesis and severity of acne vulgaris. Monitoring these parameters may be beneficial for holistic acne management.

Keywords:

Acne vulgaris, Lipid profile, Liver function tests, Dyslipidemia, Triglycerides, ALT, Inflammation

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Introduction

Acne vulgaris is a long-lasting inflammatory skin condition most commonly seen in teenagers and young adults. Clinically, it includes seborrhea, comedones, and inflammatory papules and pustules, and occasionally nodules and cysts in more severe cases [1, 2]. The exact cause is multifactorial and includes androgenic stimulation, follicular hyperkeratinization, inflammation, and colonization by Propionibacterium acnes [3,4].

The most recent studies have focused on the systemic aspects associated with acne, particularly the role of lipid metabolism and liver function. Hormones control sebum production, which is lipid-rich, and may impact serum lipid levels [5-7]. Moreover, some treatments such as oral isotretinoin are hepatotoxic and require assessment of baseline liver enzymes [8,9]. Still, the question of whether acne is associated with hepatic or lipid metabolism disorders is poorly studied.

The current study aims to fill this gap by assessing the correlation between the severity of acne lesions and lipid profile and liver function test parameters, proposing new insights into the pathophysiology of acne.

Materials and Methods

Study Design

- Cross-sectional, case-control study.

Study Setting

- Department of Dermatology and Biochemistry, Uttar Pradesh University of Medical Sciences Saifai, over a period of 6 months

Participants

- Cases: 100 patients aged 15–35 years diagnosed with acne vulgaris.
- Controls: 50 age- and sex-matched healthy volunteers without acne.

Exclusion Criteria

- Systemic illness (e.g., diabetes, PCOS, thyroid disorders)
- Patients on lipid-lowering drugs or hepatotoxic medications
- Alcoholics or smokers

Assessments

- Acne Severity: Assessed using Global Acne Grading System (GAGS)
- Lipid Profile: Total cholesterol, HDL, LDL, Triglycerides (fasting sample)
- LFTs: ALT, AST, ALP, Total bilirubin
- All tests were performed using automated biochemical analyzers.

Statistical Analysis

- SPSS version 28.0 was used
- Independent t-test and for group comparisons
- Pearson correlation to assess relationships
- Significance at $p<0.05$

Results

Demographics

- Mean age of acne group: 22.3 ± 3.8 years
- Female: Male ratio = 1.2:1
- Acne severity: Mild (32%), Moderate (48%), Severe (20%)

Biochemical Parameters:

Parameter	Acne Patients (Mean ± SD)	Controls (Mean ± SD)	p-value
Total Cholesterol (mg/dL)	195.2 ± 28.6	182.4 ± 25.3	0.02
Triglycerides (mg/dL)	168.7 ± 42.1	121.9 ± 30.4	<0.001
LDL (mg/dL)	129.3 ± 25.6	112.5 ± 22.8	0.004
HDL (mg/dL)	36.1 ± 6.2	43.8 ± 7.1	0.006
ALT (U/L)	38.6 ± 12.4	30.1 ± 8.9	0.008

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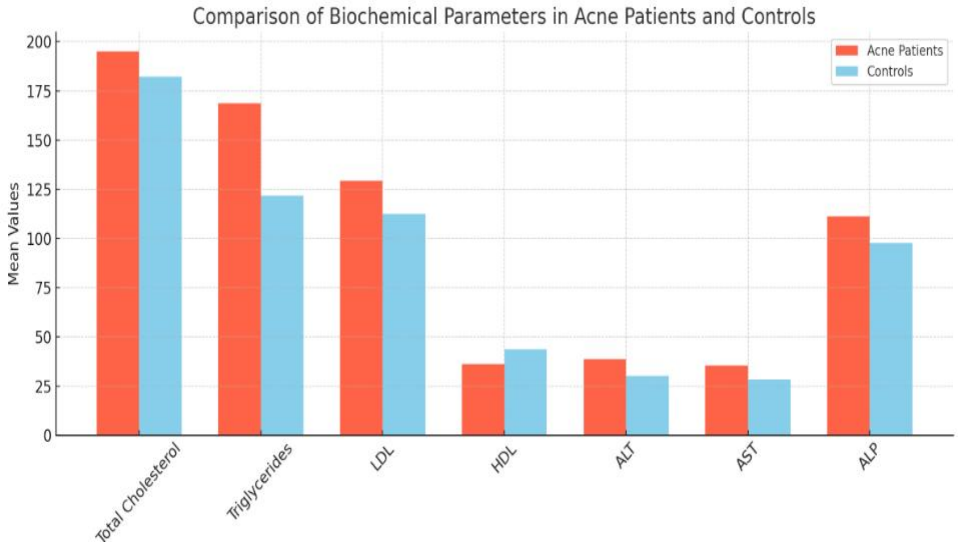
AST (U/L)	35.4 ± 11.7 U/L	28.3 ± 7.6	0.015
ALP (U/L)	111.2 ± 28.3	97.6 ± 22.1	0.03

Correlation with Acne Severity

- Triglycerides: r = 0.49, p<0.001
- HDL: r = -0.35, p=0.002
- ALT: r = 0.30, p=0.006



Here is the bar graph comparing biochemical parameters between acne patients and controls

Discussion

The findings demonstrate a clear association between dyslipidemia and acne severity, supporting the hypothesis that altered lipid metabolism plays a role in acne pathogenesis. Elevated triglycerides and LDL may contribute to increased sebum production, while low HDL, an anti-inflammatory lipoprotein, may reduce the skin's ability to combat inflammation [10].

Mild but statistically significant elevations in liver enzymes, particularly ALT and ALP, were observed. Although not indicative of clinical hepatic dysfunction, these may reflect systemic inflammation or early hepatic stress, especially relevant for patients who may be prescribed retinoids [11].

Other studies have similarly reported lipid derangements in acne patients, with some suggesting their use as biomarkers for severity [12,13]. However, this study also highlights the importance of routine metabolic evaluation in patients with moderate to severe acne.

Conclusion

There is a significant correlation between abnormal lipid profile, elevated liver enzymes, and acne severity, indicating the importance of considering systemic metabolic factors in acne management. Screening for these abnormalities may allow better risk stratification and treatment planning.

Limitations

- Cross-sectional design limits causal inference
- Single-center study
- Did not assess dietary habits or insulin resistance
- Lacked hormonal profiling (e.g., DHEA, testosterone)

Recommendations

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- Routine lipid and LFT screening in moderate-to-severe acne
- Larger multicenter studies to validate findings
- Inclusion of hormonal and dietary analysis in future research

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