The comparison of dyslipidemia in patients with and without acne vulgaris

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Abstract

Objective Acne vulgaris (AV) is the most common skin disease worldwide. It affects pilosebaceous unit and leads to range of lesions. In acne patients the serum lipid levels are altered as compared to individuals without acne. The main objective of the study is to determine the association between dyslipidemia and acne vulgaris.

Methods This case control study was done in Dermatology Department, Mayo Hospital, Lahore between 16-10-2020 to 15-04-2021. Total 246 cases (123 acne patients and 123 controls) were enrolled by non-probability, consecutive sampling.

Results Among 123 cases; mean total cholesterol was 188.4±26.2 mg/dl in cases. Mean of TG was 189.8211±59.42884 (minimum was 119 and maximum was 305). Mean of LDL 153.3984±28.77007 (minimum was 120 and maximum was 290). Mean of HDL was 33.9106±8.24821 (minimum was 20 and maximum was 43). Among 123 controls; Mean Total cholesterol was 212.8±58.3 mg/dl in controls. Mean of TG was 163.4472±69.88916 (minimum was 109 and maximum was 352). Mean of LDL 137.3659±19.92620 ((minimum was 105 and maximum was 170). Mean of HDL was 40.4228±7.86047 (minimum was 29 and maximum was 50). Odds of having dylipidemia among cases were 1.9.

Conclusion BMI, LDL-C and Triglycerides were raised significantly in acne patients as compared to controls while HDL-C was markedly low in cases. Dyslipidemia found significant among cases as compared to controls. Acne patients of younger age, female gender and normal BMI were more likely to have dyslipidemia.

Key words
Acne vulgaris; Serum lipid levels; Dyslipidemia.

Introduction

The most prevalent skin condition in the world is acne vulgaris (AV). The pilosebaceous unit is afflicted by acne vulgaris, which results in non-inflammatory lesions like comedones (open and closed), and inflammatory lesions like papules, pustules, nodules, cysts and scars of varied

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degrees. AV is a condition that affects a large percentage of adolescents and has a lifetime prevalence of about 85%.[1] Acne can last into adulthood, with a prevalence percentage of 50.9% in women aged 20 to 29 years compared to 26.3% in those aged 40 to 49 years.[2]

Acne lesions are primarily caused by four pathogenic processes: *Propionibacterium acnes* follicular colonization; altered follicular keratinization that results in comedones formation; altered and excessive production of

sebum due to androgens and complex immune mechanisms.[3]

In people with acne, the levels of serum lipids are altered. Triglycerides (40–60%), wax esters (19–26%) and squalene (11–15%) make up the majority of human sebum, along with small percentage of cholesterol and its esters. Acne pathogenesis is largely influenced by increased sebum production and changes in its lipid composition. As androgens (adrenal and gonadal) are made from plasma cholesterol so total cholesterol levels may have an impact on the emergence of AV.[4]

In acne patients whether male or female, the levels of plasma high density lipoprotein cholesterol (HDL-C) are significantly low while values of total cholesterol and low-density lipoprotein cholesterol (LDL-C) are raised.[5]

In 2017 Usha *et al*. conducted a study and found that mean serum lipid levels were higher significantly in acne vulgaris patients as compared to control (184.06±45.38 vs. 167.41±36.41: $p<0.05$).[6] Similar results have been reported by Manzoor *et al*. in 2016. Total mean serum lipid levels found raised in acne patients as compared to controls (167.87±38.04 vs. 151.25±32.40:$p<0.0011$).[7] It also stated that 45.34% of acne patients had deranged lipid profile vs. 30% in controls.[7]

Thus in the light of this evidence, the total cholesterol, triglycerides and LDL levels showed a markedly increase trend in acne patients. However, the current evidence is limited and there is no such local published material. Therefore we conducted this study in local population. The aim of the current study was to compare the serum lipid levels in patients with acne vulgaris versus without acne vulgaris in local population in our setup which has added to the limited international evidence.

Material and methods

This case control study was done in Department of dermatology unit 1, Mayo Hospital Lahore, during 16 October 2020 to 15 April 2021, 246 cases (123 acne cases and 123 healthy controls) were enrolled by non-probability, consecutive sampling.

After informed consent, patients of either sex, aged between 18-45 years, diagnosed in the last 6 months with acne vulgaris (cases) and healthy persons (control) were included.

Both groups did not include obese people (BMI >30 Kg/m^2), those with a history of cardiovascular disease, lipid metabolic disorders, or those on lipid-altering medications. And those females who had poly-cystic ovarian syndrome, were using oral contraceptives or hormonal therapy, were pregnant or nursing a baby were excluded as well.

Patient's demographic details were recorded and grading of acne severity done by researcher herself.

After overnight fasting, venous blood sample (5cc) was collected from all participants. It was centrifuged at 3,000 rpm for 15 minutes. Serum lipid profile was determined by enzymatic methods. The commercial kits from Roche diagnostics Germany, on Roche/Hitachi Modular P-800 analyzer were used. All the samples were analyzed in Mayo hospital pathology lab to eliminate bias. Confounding variables were controlled by exclusion. All cases were managed as per standard guidelines.

All the collected data was entered into SPSS version 23. Numerical variables; BMI, age and total cholesterol, triglycerides, LDL and HDL were presented by mean±SD. Categorical variables i.e. gender and dyslipidemia were

presented as frequencies and percentages and compared in cases and controls. Data was stratified for age, gender, BMI and severity of acne. Post stratification chi square test was applied and p-value ≤0.05 considered as significant. Odds ratio was calculated to measure the association between dyslipidemia and acne vulgaris and value >1 considered as significant.

Results

The total participants were 246 in our study. 123 were cases and 123 were controls.

Among 123 cases; Mean age was 26.0000±5.04244 (minimum was 18 and maximum was 49 years). Mean BMI was 23.2114±2.42342 (minimum was 19 and maximum was 27). Mean total cholesterol was 188.4±26.2 mg/dl in cases. Mean of TG was 189.8211±59.42884 (minimum was 119 and maximum was 305). Mean of LDL 153.3984±28.77007 (minimum was 120 and maximum was 290). Mean of HDL was 33.9106±8.24821 (minimum was 20 and maximum was 43). Among all cases; 32.5% were male and 67.5% were female. 43.9% were equal to or less than 30 years and 56.1% were more than 30 years. 45.5% had equal to or less than 23 BMI and 54.5% were more than 23

BMI. Severity of acne was 13.8% (mild), 26.8% (moderate), 37.4% (severe) and 22% (very severe). Stratification of dyslipidemia (within cases) was performed with age groups, gender, BMI category, severity of acne and P value were found 0.536, 0.035, 0.00, and 0.00, respectively.

Among 123 controls; Mean age was 26.3984±6.17071 (minimum was 18 and maximum was 40 years). Mean BMI was 22.6911±2.98117 (minimum was 18 and maximum was 28). Mean Total cholesterol was 212.8±58.3 mg/dl in controls. Mean of TG was 163.4472±69.88916 (minimum was 109 and maximum was 352). Mean of LDL 137.3659±19.92620 (minimum was 105 and maximum was 170). Mean of HDL was 40.4228±7.86047 (minimum was 29 and maximum was 50). Among all cases; 30.1% were male and 69.9% were female. 49.6% were equal to or less than 30 years and 50.4% were more than 30 years. 56.1% had equal to or less than 23 BMI and 43.9% had more than 23 BMI. 100% had zero acne severity. Stratification of dyslipidemia (within controls) was performed with age groups, gender, BMI category, severity of acne and P value were found 0.020, 0.918, 0.041, and 0.00, respectively. Odds of having dylipidemia among cases were 1.9.

Table 1 Mean and standard deviation of different quantitative variables.

Quantitative variable	Cases (n= 123)		Controls (n= 123)		P value
	Mean	Standard Deviation	Mean	Standard Deviation	
Age (years)	26	5.04	26.3	6.2	0.7
BMI (kg/m2)	23.2	2.4	22.6	2.9	0.07
Total cholestrol (mg/dl)	188.4	26.2	212.8	51.3	0.00
Triglycerides (mg/dl)	189.8	59.4	163.4	69.9	0.001
LDL (mg/dl)	153.4	28.8	137.4	19.9	0.001
HDL (mg/dl)	33.9	8.2	40.4	7.9	0.001

Table 2 Distribution of Dyslipidemia among cases and controls.

Groups	Dyslipidemia		p-value	Odds ratio	Confidence Interval (95%)
	Yes	No			
Cases	69	54	0.01	1.9	1.2-3.2
Controls	49	74			
Total	246				

Table 3 Stratification of Dyslipidemia with regards to gender in both groups (n = 246).

Gender	Study group	Dyslipidemia		p-value	Odds ratio	Confidence interval (95%)
		Yes	No			
Male	Cases	17	23	0.8	1.08	0.4-2.7
	Controls	15	22			
Female	Cases	52	31	0.003	2.6	1.3-4.8
	Controls	34	52			
Total	246					

Table 4 Stratification of Dyslipidemia with regards to BMI in both groups (n = 246).

BMI Kg/m^2	Study group	Dyslipidemia		p-value	Odds ratio	Confidence interval (95%)
		Yes	No			
≤ 23	Cases	41	15	0.004	2.98	1.4-6.4
	Controls	33	36			
≥23	Cases	28	39	0.17	1.7	0.8-3.6
	Controls	16	38			
Total	246					

Discussion

Studies on the connection between dyslipidemia and acne have produced contradictory findings, therefore their relationship in the literature is not completely established. Some of them suggest that adult women with acne had higher total cholesterol (TC) and low-density lipoprotein (LDL) levels while lower levels of HDL. In people with acne, the levels of serum lipids are altered.

Triglycerides (40–60%), wax esters (19–26%), squalene (11–15%) and a trace amount of cholesterol and cholesterol esters make up the majority of human sebum. In the pathophysiology of acne, increased sebum production and changes to the lipid composition of sebum are important factors. Since cholesterol from the plasma is used to make both adrenal and gonadal androgens, total cholesterol levels may influence the emergence of AV.[4]

In acne patients whether male or female, plasma high density lipoprotein cholesterol (HDL-C) levels are significantly low while levels of total cholesterol (TC) and low-density lipoprotein cholesterol (LDL-C) are raised.[5]

Usha *et al*. (2017) conducted a study and found that mean serum lipid levels were significantly raised in patients with acne vulgaris when compared with control (184.06±45.38 vs. 167.41±36.41: p<0.05).[6] Similar results have been reported by Manzoor *et al*. in 2016. Total mean serum lipid levels were elevated in acne vulgaris patients as compared to controls (167.87±38.04 vs. 151.25±32.40:p<0.0011).[7] These findings are consistent with our study, LDL-C and Triglycerides were significantly higher in cases as compared to controls. HDL-C was significantly lower in cases as compared to controls.

Another study has shown, out of 60 females who were divided into an acute acne vulgaris group and a control group. The levels of both TC (214.83+5.19 mg/dL) and LDL (161.3+3.08 mg/dL) were higher among acne group when compared with healthy group,[8] findings are consistent with the final results of our study regarding LDL levels. Similarly, low HDL levels noted,[8] a fact that was observed in our study as well.

A case control study done on 166 patients of acne showed no significant variation in TC levels among two groups.[9] These results were contradictory to our study.

In a study by da Cunha MG, *et al*. the age range was 21 to 61 years (mean of 32.23 years).[10] However mean age of cases in our study was 26.0000±5.04244 years (minimum was 18 and maximum was 49 years). The high total cholesterol levels in 17.35% of the cases were noted.[10] This finding was also contradictory to our study. As in our study the level of total cholestrol was lower in cases. These different findings can be explained by variation in dietary habits, life style, socioeconomic and geographical factors. We need further studies to explain these variations.

Conclusion

There was no significant difference between ages and gender in both groups. BMI, LDL-C and Triglycerides were significantly raised in cases as compared to controls. HDL-C was markedly low in cases as compared to controls. While total cholesterol was lower significantly among cases. However over all; dyslipidemia was significantly more common in cases when compared to controls. Acne patients of younger age, female gender and of normal BMI were significantly more likely to have dyslipidemia.

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