



Correlation between Serum Lipid Profiles and Severity of Acne Vulgaris among Young Patients

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ABSTRACT:

BACKGROUND:

Acne vulgaris is one of the most presenting skin diseases that affecting late adolescents not only in Iraq, but also worldwide. The disturbance of skin lipids arrangement are strongly related to acne occurrence and accordingly to that, further information and awareness campaigns are needed to establish the role of balanced lipid metabolism to control acne.

OBJECTIVE:

To establish the presence of lipid alteration in acne patients and its relation to the severity of acne.

PATIENTS AND METHODS:

This is cross-sectional study to investigate the correlation between serum lipid profiles and severity of acne vulgaris among young patients conducted in the Department of Dermatology and Venereology in Al-Kindy Teaching Hospital, Baghdad, Iraq during a period from June 2019 to November 2020. The study included 160 patients. For each patient, severity of acne vulgaris was assessed together with lipid profile, Body mass index and socioeconomic state.

RESULTS:

The mean age was 20.7 (\pm 2.1) years, with a minimum age of 15 years old, and a maximum of 24 years old. The males represented 55 (34.4%) with male to female ratio 1:2. Two third of them the BMI was above 25 kg/m². There were 85 (53.1%) patients have dyslipidemia. The distribution of mean total cholesterol was significantly higher among overweight and obese patients (p value = 0.001). There were only 3 patients out of 40 patients with mild acne group had dyslipidemia. While majority of patients (more than 80%) have dyslipidemia in severe and very severe group. There was a significant association between dyslipidemia and severity of acne (p value = <0.0001). There was significantly higher mean of total cholesterol and LDL among severe and very severe group in comparison to other groups (P value <0.0001). Also, There was significantly higher mean of TG among severe group in comparison to other group (P value <0.0001). The maximum contribution to the severity of acne was observed from total cholesterol and LDL, both were significantly associated with more severe acne (r = 0.565, P value <0.0001).

CONCLUSION:

The lipid profile alteration has a significant association with the severity of acne vulgaris among Iraqi patients. The cholesterol and LDL have the major impact than TG on the severity of acne vulgaris.

KEYWORDS: Acne vulgaris, body mass index, lipid profile

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INTRODUCTION:

Acne vulgaris is one of the most presenting skin diseases that affecting late adolescents not only in Iraq, but also worldwide. Teenagers almost have some degree of acne during their life. ^{(1),(2)} In literatures, the estimation of acne was ranging between 0.1% reaching to 85%, ⁽³⁾ in Iraq, many literatures look for acne vulgaris prevalence, only 2 community based researches were found with prevalence of 17% and 8.6% for acne vulgaris. ^{(1),(4)}

In other researches, acne vulgaris was range between 5.3% - 7.2%. ^{(5),(6), (7)}

As the skin is enriched in lipids, the disturbance of skin lipid arrangement was not only linked to development of acne, but also linked to development of atopic dermatitis and other skin conditions. ^{(8),(9)} The skin surface lipids result from mixture of lipids derived from the two main cutaneous lipid sources. Sebum; an amorphous

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lipid matrix secreted by the sebaceous gland, and epidermal lipids in the stratum corneum, which density is particularly higher in the scalp and forehead.^{(10), (11)} Changes in lipid profile are strongly related to acne occurrence and according to that, further informations and awareness campaigns are needed to establish the role of balanced lipid metabolism to control acne. Although a correlation between the incidence of acne and lipid profile levels has been observed before, it must be documented in each population with etiological characteristics.⁽¹²⁾

No reports are available on the relationship between plasma lipids and acne in our country. Hence, we aim to establish this study to estimate the presence of lipid alteration in acne patients and its contribution to severity of acne.

PATIENTS AND METHODS:

Study design, Setting and Data collection time

This was a cross-sectional study to investigate the correlation between serum lipid profiles and severity of acne vulgaris among young patients conducted in the Department of Dermatology and Venereology in Al-Kindy Teaching Hospital, Baghdad, Iraq during a period from June 2019 to November 2020.

Inclusion and Exclusion Criteria

Newly diagnosed acne vulgaris patients aged from 15 to 24 years with the *exclusion of*:

- 1) Pregnant and nursing women.
- 2) Patients suffering from certain skin conditions such as seborrheic dermatitis, psoriasis vulgaris,

rosacea or atopic dermatitis which could affect sebum and serum lipids.

- 3) Patients under systemic and topical medications for acne vulgaris (the minimum of a month prior to the study), under hormonal and estrogen contraceptives (the minimum of three months prior to the study), under antihyperlipidemic drug therapy (the minimum of a month prior to the study), and chronic use of steroid.

Ethical and official approval

All patients were verbally informed about the study and they were asked the permission to make them being part of the study. All personal information was kept anonymous. Data were exclusively used for the sake of this study.

Official approval was granted from the Iraqi Council of Medical Specializations. Approval from Dermatology and Venereology Department of Al-Kindy Teaching Hospital also was granted.

Diagnosis of Acne

All cases were diagnosed clinically by one dermatologist⁽²⁵⁾. The severity of acne were assessed depending on the clinical types and distribution of acne lesions as shown in (table 2.1) Then patients have been categorized according to the severity of acne vulgaris into four equal groups as the followings:^{(26), (27)}

- Group A: Mild acne (40 Patients).
- Group B: Moderate acne (40 Patients).
- Group C: Severe acne (40 Patients).
- Group D: Very severe acne (40 Patients).

Table 1: Severity of acne score.

Table 1 the Global Acne grading system	
Location	Factor
Forehead	2
Left cheek	2
Chin	1
Rhight cheek	2
Nose	1
Chest and upper back	3

Calculation: each type of lesion is given a value depending on

Severity: No lesion = 0 , Comedons = 1 , Papules = 2 , Pustules = 3 and nodules = 4.

The score for each area (local score) is calculated using the formula:

Local score = factor x grade (0 – 4). The global score is the sum of local scores and acne severity was graded using the global score. A score of 1 – 18 is considered Mild, 19-30 Moderate , 31 – 38 Severe and > 39 Very severe

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Socioeconomic State

Socioeconomic state have been calculated based Al-Hadithi⁽¹³⁾ publication of Developing a socioeconomic index for health research in Iraq, which is based on educational level, occupation, employment status, and some additional factors, calculation of points per each category (SES= Education +Occupation +House ownership *0.5+ Car ownership*1+[(AGE-20)/100]- retired/unemployed/deceased) will have final score. The minimum score would be 0 and maximum 14.05.

The data analyzed using Statistical Package for Social Sciences (SPSS) version 22. The data presented as mean, standard deviation and ranges. Categorical data presented by frequencies and percentages. Independent t-test (two tailed) was

used to compare the continuous variables among study groups accordingly. Pearson's Chi-square test was used to assess statistical association between categorical variables. A level of P – value < 0.05 was considered significant.

RESULTS:

The mean age was 20.7 (\pm 2.1) years, with a minimum age of 15 years old, and a maximum of 24 years old. The males represented 55 (34.4%) of patients and females were 105 (65.6%), with male to female ratio 1:2.

The weight was normal in one third of our patients, in two third of the patients, BMI was above 25 kg/m². Half of our patients their socio-economic status was fair and another half was good. (Table 2).

Table 2: The frequency of BMI and socio-economic status.

Variable	Frequency	Percentage %
BMI		
Normal	52	32.5
Over weight	78	48.8
Obese	30	18.8
Socio-economic status		
Fair	82	51.2
Good	78	48.8

Severity of acne

The mean age across all four groups was 21 years and there was no significant difference in the mean age across all groups (P value = 0.487).

Figure 1. The distribution of mean age across groups of acne.

The distribution of gender across groups of acne was equal, except very sever group of acne which showed more male than female, however, no statistical significant difference between groups. Table 3.

Table 3: The distribution of gender across acne groups.

		Severity of Acne				Total No. (%)
		Mild No. (%)	Moderate No. (%)	Sever No. (%)	Very Sever No. (%)	
Gender	Male	16 (29.3%)	15 (27.2%)	10 (18.1%)	14 (25.4%)	55 (100%)
	Female	24 (22.8%)	25 (23.8%)	30 (28.5%)	26 (24.7%)	105 (100%)
Total		40	40	40	40	160
X ² = 2.3, P value = 0.51						

The distribution of BMI across acne group was not

equal and BMI was associated with more severity of acne. Table 4.

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Table 4: The distribution of BMI across acne groups

		Severity of Acne				Total No. (%)
		Mild No. (%)	Moderate No. (%)	Sever No. (%)	Very Sever No. (%)	
BMI	Normal	20 (38.6)	12 (23.0)	8 (15.4)	12 (23.0)	52 (100)
	Overweight	12 (15.4)	26 (33.4)	20 (25.6)	20 (25.6)	78 (100)
	Obese	8 (26.6)	2 (6.8)	12 (40.0)	8 (26.6)	30 (100)
Total		40	40	40	40	160
$X^2 = 23.75$, P value = 0.007						

Also, the socio-economic status was not distributed equally across acne group and fair socio-economic status was significantly associated with severity of acne. Table 5.

Table 5: The distribution of Socio-economic State across acne groups.

		Severity of Acne				Total
		Mild No. (%)	Moderate No. (%)	Sever No. (%)	Very Sever No. (%)	
Socio-economic State	Fair	16 (19.5)	16 (19.5)	27 (32.9)	23 (28.0)	82 (100)
	Good	24 (30.7)	24 (30.7)	13 (16.7)	17 (21.8)	78 (100)
Total		40	40	40	40	160
$X^2 = 8.9$, P value = 0.031						

Association between Acne severity and lipid profile

There were only 3 patients out of 40 patients with mild acne group has dyslipidemia. While majority

of patients (more than 80%) have dyslipidemia in sever and very sever group. There was a significant association between dyslipidemia and severity of acne. Table 6.

Table 6: The association between dyslipidemia and severity of acne.

		Severity of Acne				Total
		Mild No. (%)	Moderate No. (%)	Sever No. (%)	Very Sever No. (%)	
Dyslipidemia	Yes	3 (3.5)	14 (16.5)	33 (38.8)	35 (41.2)	85 (100)
	No	37 (49.3)	26 (34.7)	7 (9.3)	5 (6.7)	75 (100)
Total		40	40	40	40	160
$X^2 = 71.5$, P value < 0.0001						

There was significantly higher mean of total cholesterol and LDL among severe and very severe group in comparison to other groups (P value <0.0001). Also, There was significantly higher mean of TG among severe group in comparison to other group (P value <0.0001). Despite of lower mean of HDL were observed among severe and very severe group, however, it did not reach statistical difference between acne groups. (Figure 2)

Figure 2. The effect of different combinations of lipid profile on the severity of acne. The maximum contribution to the severity of acne was observed from total cholesterol and LDL, both were significantly associated with more severe acne (r = 0.565, P value <0.0001).

DISCUSSION:

The prevalence of acne at its highest in teenagers^{(14), (15)} with different severity forms, which may impact not only the response to treatment but also may have a psychological impact on the patients. Multiple factors may contribute to the severity of acne and in our study, we investigated the association of dyslipidemia, as a potential factor for the severity of acne vulgaris, as well as other factors that may be contributed to the severity of acne. As the age of onset for acne is teenagers, however, the severity of acne is higher among older teenagers in comparison to younger teenagers.⁽¹⁶⁾ The reason behind that relies on the fact of an increase in sebum production leads to more severe acne through favor the growth of

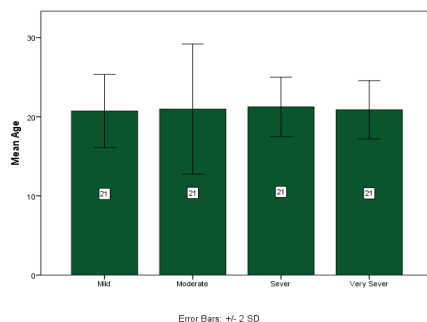
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Propionibacterium acnes, which impact the severity of acne by increase inflammatory lesions, in turn, the sebum is increased during puberty and in older teenagers due to increased production.⁽⁴⁹⁾

In acne, females are more affected than males due to multiple factors which are related to the hormonal difference and also, the females' patient is more vulnerable for anxiety and depression, which have an association with development of acne, in our study, the majority of our patients (65.6%) were females which in turn correlated with other studies.^{(17),(18)} Also, one of the factor which may affect gender is cosmetic reasons in which females are seeking for dermatological consultation more than males.

The weight has established a relationship with the development of acne, and new strategies in the management of such patients with acne directed not only toward acne itself but a lot to obesity.⁽¹⁹⁾ Having said that, our results show a 2/3 of patients with BMI more than 25 kg/m².

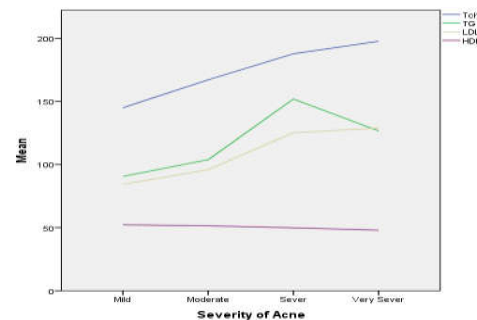
Despite the report of socioeconomic status of patients and its relation with acne that demonstrated a higher rate of unemployment in patients with acne vulgaris in UK epidemiology study⁽²⁰⁾, our results show comparable distribution between fair and good income and this could be related to the fact that majority of our patients have been recruited from out patients clinic that need patients with fair income at least to visit those dermatology clinic. There was a higher female percentage (57.1%) with dyslipidemia in comparison to males (45.5%), however, there was no statistical difference observed (P-value = 0.15), while only the distribution mean TG was significantly higher among females in comparison to males (p value = 0.016). This relationship have been demonstrated in recent study which showed a higher TG level among females normal individuals.⁽²¹⁾ The impact of higher physical activity among males may contributed to that results.



Severity of acne

The BMI and socioeconomic status were significantly associated with the severity of acne, which is comparable to other study that demonstrated BMI as significant risk factor for acne development.^{(22),(23),(24)} Relying on the increased level of cholesterol in patients with BMI more than 25 kg/m² and the effect of obesity in increasing hormonal disturbance, both factors could strengthening the association between BMI and severity of acne.⁽²¹⁾

There was significantly higher mean of total cholesterol and LDL among severe and very severe group in comparison to other groups (P value <0.0001). Also, There was significantly higher mean of TG among severe group in comparison to other group (P value <0.0001). Despite of lower mean of HDL were observed among severe and



very severe group, however, it did not reach statistical difference between acne groups. The importance of lipid profile in acne vulgaris is relying on its prognostic role and its association with the severity of acne vulgaris.⁽²⁴⁾ Inclusion of lipid profile in the diagnosis and monitoring of acne vulgaris will reduce the fraction of patients who had acne vulgaris without response or partial response to the current treatment panel and will enhance the treatment option to be near the perfect. And further study of lipid profile in correlation with other confounders factors [namely hormonal changes, diet, and anxiety with depression] could help to establish a full spectrum of severity factors for acne vulgaris.

CONCLUSION:

Lipid profile alteration has a significant association with the severity of acne vulgaris. Triglycerides

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have the major impact on the severity of acne vulgaris than cholesterol and LDL. High-density lipoprotein did not have a relationship with the severity of acne vulgaris. The BMI and socioeconomic status were significantly associated with the severity of acne vulgaris.

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