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A STUDY ON ASSOCIATION BETWEEN ACNE VULGARIS GRADE AND METABOLIC SYNDROME IN A TERTIARY CARE HOSPITAL

Dermatology

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ABSTRACT

Introduction- Acne vulgaris is a multifactorial, chronic inflammatory disease of the pilosebaceous gland characterised by follicular hyperkeratinisation, inflammation, interaction of Propionibacterium acnes with innate immune system and hormonal influence on increased sebum production & composition. **Aim-**To evaluate association of acne vulgaris grade with metabolic syndrome.**Material and Methods-**A Hospital Based Cross Sectional Observational Study conducted in a tertiary care hospital on 340 patients of Acne Vulgaris. **Results-** The mean age for the cases with acne in present study was found to be was 20.65±3.26 years, out of 340 subjects 121 (35.6%) subjects were females and 219(64.4%) were males, out of 340 subjects 27 have grade I acne, 163 have grade II acne, 108 have grade III acne and 42 have grade IV acne. The mean BP, mean Pulse, mean weight, mean Waist Circumference were comparable in different grades of acne. In present study the mean weight, mean Waist Circumference and mean FBS of study subjects were comparable in different grades of acne. However the serum TG was significantly higher in grade 3, and grade 4 Acne as compared to grade 1, and grade 2 Acne and HDL was significantly lower in grade 3, and grade 4 Acne as compared to grade 1, and grade 2 Acne i.e. prevalence of dyslipidemia was more in higher grades of acne as compared to lower grade acne. **Conclusion-**Acne vulgaris is chronic inflammatory disorder most commonly affecting adolescents and young adults. In present study the prevalence of Metabolic Syndrome was 3.82%. In present study the higher acne grade were significantly associated with high Triglyceride and low HDL.

KEYWORDS

Acne vulgaris, Dyslipidemia, Metabolic Syndrome.

INTRODUCTION

Acne vulgaris is very common skin disorders across the globe, and is characterised by chronic inflammatory infection of the pilosebaceous glands of the skin [1]. It affects more than 80% young population [2]. Owing to high prevalence and impact on social lives of the patients it is important for dermatological consultations.

The pathophysiology of acne involves increased sebum production leading to follicular hyperkeratinisation, followed by an infestation of Propionibacterium acnes which leads to increase in inflammatory mediators. Increased circulating androgen levels leads to acne in the pubertal age group. An increased insulin level may also aggravate acne [3].

The role of lipid metabolism and hormonal action in the differentiation of sebocytes are causative factors for acne. Insulin-like growth factor-1 (IGF-1) leads to excess sebum production leading to development of acne [4]. Cappel M et al. and Thiboutot D in their study found an association between elevated IGF-1 levels and acne, potentially indicating a possible influence of insulin and growth hormone levels [5,6].

The metabolic syndrome involves set of laboratory and physical parameters and is associated with cardiovascular diseases and Type-2 Diabetes Mellitus [7]. The parameters of metabolic syndrome (MetS) includes Central obesity (separate criteria for males and females), elevated triglyceride levels, low high-density lipoproteins, elevated blood pressure, and increased fasting blood sugar. The presence of any three out of the five parameters in a subject is labeled as MetS.

The pathophysiology of metabolic syndrome is closely associated with insulin resistance. The tissues like muscles, fat, and other cells, become insensitive to insulin levels in the bloodstream which leads to failure of absorption of blood glucose [8]. Central obesity and adipose tissue accumulation play a significant role in developing insulin resistance.

There is significant association between Systemic metabolic derangements and cutaneous manifestations [9]. The deposition of excess adipose tissue and insulin resistance in MetS initiates a spectrum of hormonal disturbances [10]. The inflammatory markers such as TNF-α, IL-17, and oxidative stress may have a role in the pathogenesis of metabolic syndrome [11].

In present study we aim to study the association between acne vulgaris grade and metabolic syndrome and analyze the changes in markers of MetS observed in patients with acne vulgaris which may help us to develop preventive measures for minimizing the burden of the Acne Vulgaris.

AIM AND OBJECTIVES- To evaluate association of acne vulgaris grade with metabolic syndrome.

MATERIALAND METHODS

A Hospital Based Cross Sectional Observational Study conducted in Skin &VD outpatient department of a tertiary care hospital on 340 patients of Acne Vulgaris.

Methodology

After taking written informed consent, detailed history taking and examination (including general physical examination and BP measurement by mercury sphygmomanometer) was done. All subjects clinically evaluated for their waist circumference (WC; as an indicator of obesity), weight, height, BMI, and blood pressure. After overnight (at least 8 h) fasting, 10 ml of peripheral venous blood was obtained from each participant to evaluate the glucose and lipid levels. The fasting blood sugar (FBS), triglyceride (TG), total cholesterol (TC), low-density lipoprotein (LDL), and high density lipoprotein HDL levels were evaluated in each subject using the Hitachi 917 Analyzer. The association between these variables and acne was subsequently evaluated. Systolic and diastolic blood pressures were recorded after five minutes of rest and then ten minutes later. The WC (cm) was measured at the midpoint between the lower margin of the rib and the top of the iliac crest while the height (cm) was measured from the top of the head to the bottom of the feet.

Metabolic syndrome

To evaluate the correlation between acne and metabolic syndrome, we investigated all cases considering the diagnostic criteria for metabolic syndrome based on the Third National Health and Nutrition Examination Survey (NHANES III). It requires at least 3 of the following 5 criteria.

1. Abdominal obesity: Waist circumference in men >102 cm (>40 inches) and in women >88 cm (>35 inches)
2. Serum triglycerides >150 mg/dl (>3.82 mmol/L)

3. High-density lipoprotein (HDL) cholesterol (< 40 mg/dl in males, < 50 mg/dl in females)
4. Systemic arterial blood pressure ≥130/85 mm Hg
5. Fasting blood glucose ≥110 mg/dl.

STATISTICAL ANALYSIS: Data was entered in Microsoft Excel worksheet and appropriate statistical test was applied for analysis. A p value of less than 0.05 was considered statistically significant.

RESULTS –

A total of 340 acne patients were included in the study. The majority of participants belonged to the 10–18 years age group (57%), followed by 19–25 years (41.8%), while only 1.2% were older than 25 years. Males constituted a higher proportion of the study population (64.4%) compared to females (35.6%). The mean age of the participants was 20.65 ± 3.26 years. The mean weight was 61.19 ± 11.82 kg and the mean waist circumference was 31.46 ± 5.27 inches. The average systolic and diastolic blood pressure were 119.61 ± 11.81 mmHg and 75.46 ± 7.79 mmHg respectively. The mean serum triglyceride level was 106.46 ± 32.69 mg/dl, mean HDL cholesterol was 46.66 ± 9.01 mg/dl, and mean fasting blood glucose was 91.86 ± 7.30 mg/dl. Metabolic syndrome was present in 3.82% of the study subjects, while 96.18% did not have metabolic syndrome. Regarding acne severity, Grade II acne was the most common (47.9%), followed by Grade III (31.8%), Grade IV (12.4%), and Grade I (7.9%).

On analyzing the association between acne grades and components of metabolic syndrome, elevated systolic and diastolic blood pressure did not show a statistically significant association with acne severity (p = 0.566 and p = 0.454 respectively). However, a statistically significant association was observed between acne grade and high serum triglyceride levels (p = 0.031), with higher grades of acne showing a greater proportion of elevated triglycerides. Low HDL cholesterol levels were also significantly associated with increasing acne severity (p = 0.001). Elevated fasting blood glucose and increased waist circumference did not demonstrate a statistically significant association with acne grade (p = 0.056 and p = 0.223 respectively).

Table-1: Age Distribution of Study Subjects

Age group	Number of Acne Patients	Percentage of Acne Patients
10-18 years	194	57%
19-25 years	142	41.8%
>25 years	4	1.2%
Total	340	100.0%

Table- 2: Distribution of Study Subjects according to Sex

Parameter		No.	%
Sex	Female	121	35.6%
	Male	219	64.4%
	Total	340	100.0%

Table- 3: Mean Age, weight, Waist Circumference, BP, Serum Triglyceride, HDL and Fasting Blood Glucose of Study Subjects

Parameter	Mean (SD)
Age (years)	20.65±3.26
Weight (Kg)	61.19±11.82
Waist Circumference (Inch)	31.46±5.27
Systolic BP (mm Hg)	119.61±11.81
Diastolic BP (mm Hg)	75.46±7.79
Serum triglycerides (mg/dl)	106.46±32.69
Serum HDL (mg/dl)	46.66±9.01
Fasting Blood Glucose (mg/dl)	91.86±7.30

Table- 4: Distribution of Study Subjects according to presence of Metabolic Syndrome

Parameter	No.	%	
Metabolic Syndrome	No	327	96.18%
	Yes	13	3.82%
	Total	340	100.0%

Table- 5: Distribution of Study Subjects according to Acne Grade

Parameter		No.	%
Acne Grade	I	27	7.9%
	II	163	47.9%
	III	108	31.8%
	IV	42	12.4%
	Total	340	100.0%

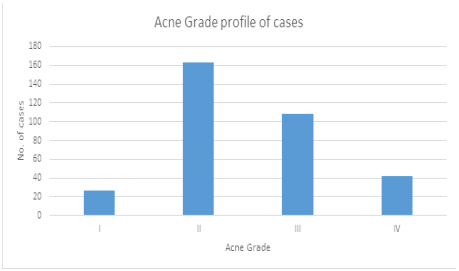
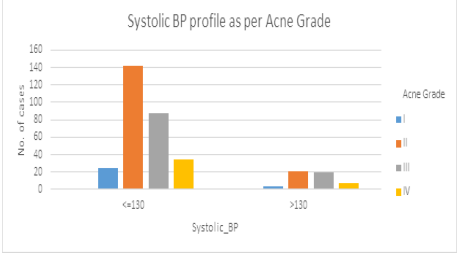
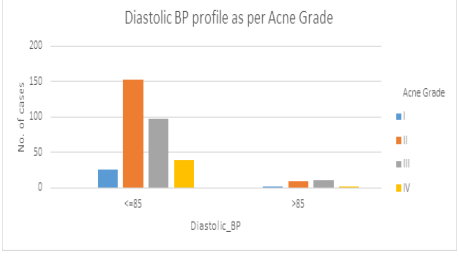


Table-7: Distribution of Study Subjects according to elevated BP as per acne grade

Parameters		Acne Grade										P Value
		I		II		III		IV		Total		
		No.	%	No.	%	No.	%	No.	%	No.	%	
Systolic BP	<=130	24	8.3%	142	49.1%	88	30.4%	35	12.1%	289	85.0%	.566
	>130	3	5.9%	21	41.2%	20	39.2%	7	13.7%	51	15.0%	
	Total	27	7.9%	163	47.9%	108	31.8%	42	12.4%	340	100.0%	
Diastolic BP	<=85	26	8.2%	153	48.4%	97	30.7%	40	12.7%	316	92.9%	.454
	>85	1	4.2%	10	41.7%	11	45.8%	2	8.3%	24	7.1%	
	Total	27	7.9%	163	47.9%	108	31.8%	42	12.4%	340	100.0%	
High Triglyceride	No	25	8.1%	154	50.2%	94	30.6%	34	11.1%	307	90.3%	.031
	Yes	2	6.1%	9	27.3%	14	42.4%	8	24.2%	33	9.7%	
	Total	27	7.9%	163	47.9%	108	31.8%	42	12.4%	340	100.0%	
Low HDL	No	15	7.3%	115	56.1%	58	28.3%	17	8.3%	205	60.3%	.001
	Yes	12	8.9%	48	35.6%	50	37.0%	25	18.5%	135	39.7%	
	Total	27	7.9%	163	47.9%	108	31.8%	42	12.4%	340	100.0%	
High Fasting Blood Sugar	No	24	7.2%	161	48.3%	106	31.8%	42	12.6%	333	97.9%	.056
	Yes	3	42.9%	2	28.6%	2	28.6%	0	0.0%	7	2.1%	
	Total	27	7.9%	163	47.9%	108	31.8%	42	12.4%	340	100.0%	
Elevated Waist circumference	No	25	7.6%	161	48.65	105	31.7%	40	12.1%	331	97.4%	.223
	Yes	2	22.2%	2	22.2%	3	33.3%	2	22.2%	9	2.6%	
	Total	27	7.9%	163	47.9%	108	31.8%	42	12.4%	340	100.0%	





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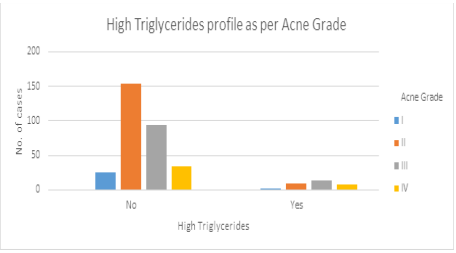

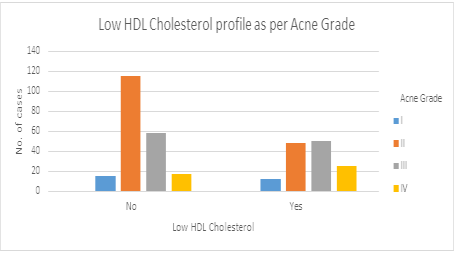

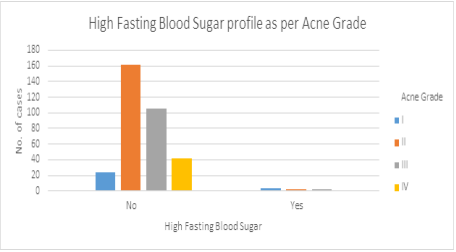

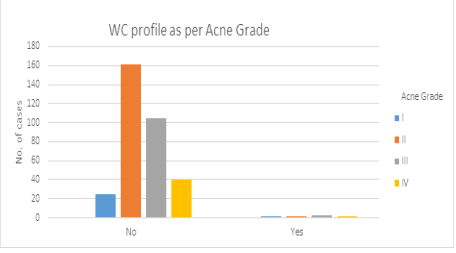

DISCUSSION

Acne is the most common facial disorder in the adolescent age group. The mean age of acne patients in present study was found to be 20.65±3.26 years. Similarly, Del Prete et al [12], Nagpal et al [13], and Podder et al [14] reported the mean age of 18.6 ± 2.5 years, 22.7 ± 0.6 years and 21 ± 4.9 years, respectively from their studies on acne vulgaris. However, in the study of Chandak S. et al. [15] the mean age of the Acne Vulgaris group was 23.43 ± 3.99 years which is somewhat higher than our age group.

In present study out of 340 subjects 121 (35.6%) subjects were females and 219(64.4%) were males. Similarly, Del Prete et al [11], Nagpal et al [13], and Podder et al [14] reported that the maximum patients of Acne belonged to female gender which is not seen with results of present study. Acne vulgaris has been known to affect females more than males [16].

In present study, the maximum cases were of grade 2 (47.9%), while the least were of grade 1 (7.9%) and grade 4 (12.4%). Similarly, Chandak S. et al [15] in their study found that the maximum cases were of grade 2 (40%), while the least were of grade 4 which is consistent with results of present study.[15] Furthermore, a study performed by da Cunha et al. on 416 patients of acne vulgaris also reported grade 2 to be the most prevalent [17].

In present study the prevalence of Metabolic Syndrome was 3.2%. Ghazal Shariatpanahi, et al. in their study found that the prevalence of metabolic syndrome in patients with acne was 18.2% which is much higher than our results.[18]

An increased prevalence of metabolic syndrome has been reported among adult patients with certain skin inflammatory disorders, such as acne inversa and psoriasis.[19-20] Del Prete et al.,[12] in a study with a limited sample size found that the prevalence of metabolic syndrome in male acne patients with a mean age of 18.6 years was 36%, which was much higher than the prevalence of Metabolic Syndrome in Acne in present study. The high difference between prevalence of Metabolic Syndrome in Acne could be attributed to the fact that the metabolic syndrome was diagnosed with the presence of two or more of the five parameters in Del Prete et al.,[12] study. In addition, the small sample size and lack of sampling based on age may also be responsible for high differences in the results.

The prevalence of metabolic syndrome is associated with age . A study on the urban population in Eastern India reported prevalence values of 6.7 and 65.6% in the age groups of 20-29 and 60-69 years, respectively [21]. The prevalence of metabolic syndrome in children is around 2% but varies significantly based on the diagnostic criteria applied [22]. The wide range for the prevalence of metabolic syndrome can be explained by racial differences.

In present study the mean weight, mean Waist Circumference and mean FBS of study subjects were comparable in different grades of acne. In present study the serum TG was significantly higher in grade 3, and grade 4 Acne as compared to grade 1, and grade 2 Acne. HDL was significantly lower in grade 3, and grade 4 Acne as compared to grade 1, and grade 2 Acne i.e. prevalence of dyslipidemia was more in higher grades of acne as compared to lower grade acne. da Cunha MG et al. in their study found that patients with grades II and III acne were more likely to have altered total cholesterol and low-density lipoprotein (LDL) levels. These findings suggest a potential link between acne severity and lipid profile abnormalities.[17] However Sobhan M et al. in their study found that lipid profile was comparable in different grades of Acne which is in disagreement with results of present study [23].

A study performed by Utamiet al. [24] concluded that there are three main types of blood lipids in our body: triglycerides, phospholipids, and cholesterol The levels of blood lipids in the body may play a dynamic role in determining the sebum lipid composition. Follicular infundibulum epithelial hyperplasia and hyperkeratosis lead to comedone formation when lipid peroxide increases. They also cause sebaceous gland proliferation. Peroxisome proliferator-activated receptors (PPARs) play a role in lipid control, lipoprotein metabolism, inflammatory response, epidermal cell proliferation, differentiation, and sebaceous gland cell apoptosis triggered by lipid peroxides [24]. The present study reveals a positive association with MetS in patients with acne vulgaris, due to biochemical and hormonal alterations expected in acne pathophysiology.

CONCLUSION

Acne vulgaris is a chronic inflammatory condition commonly seen in adolescents and young adults. In this study, the prevalence of metabolic syndrome was 3.82%. Although no significant association was found between acne and metabolic syndrome, certain abnormalities were noted: low HDL (39.7%), high triglycerides (9.7%), elevated blood pressure (14.7%), increased waist circumference (2.64%), and raised fasting blood sugar (2.05%). Regular monitoring of these parameters, along with lifestyle and dietary changes, and awareness in patients about the same, is essential to prevent future complications like diabetes and hypertension.

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