

**Acne Vulgaris: Association with Metabolic Syndrome**Yaswanthi Reddy K<sup>1</sup>, Shruthi Shree<sup>2</sup>, Poojitha Y<sup>3\*</sup>, Kallappa C H<sup>4</sup><sup>1</sup>Junior Resident, Department of Dermatology, Venereology and Leprosy, Navodaya Medical college & Hospital, Raichur, Karnataka, India<sup>2</sup>Senior Resident, Department of Dermatology, Venereology and Leprosy, Navodaya Medical college & Hospital, Raichur, Karnataka, India<sup>3</sup>Junior Resident, Department of Dermatology, Venereology and Leprosy, Navodaya Medical college & Hospital, Raichur, Karnataka, India<sup>4</sup>Professor & HOD, Department of Dermatology, Venereology and Leprosy, Navodaya Medical college & Hospital, Raichur, Karnataka, India

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**Abstract:**

**Introduction:** Acne vulgaris is a chronic inflammatory disease of pilosebaceous unit resulting in lesions like comedones, papules, pustules, nodules. It is mainly caused due to androgen dependant sebum production and propiobacterium acnes proliferation. Metabolic syndrome is a cluster of condition that increases the risk of heart disease, stroke, and diabetes. Analysing the association of acne vulgaris with metabolic syndrome (MetS) is the primary aim of this study.

**Methods:** This is a cross sectional study of 40 cases of acne vulgaris and 40 controls who are matched with age and sex. Acne severity grading was taken from IADVL 5<sup>th</sup> ed textbook of Dermatology. We used the criteria for the diagnosis of Met S according to the joint consensus of 2009.

**Results:** Grade 2 acne vulgaris is the most prevalent on clinical examination. Increased MetS observed in case group than in control group. As increased parameters of HDL, fasting blood glucose and abdominal waist circumference observed among cases.

**Conclusion:** patients with acne vulgaris are more prone to metabolic syndrome. Therefore, carefully systemic examination and anthropometric examination is required to prevent and treat MetS in acne vulgaris patients.

**Keywords:** Acne vulgaris; metabolic syndrome; MetS.

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**Introduction**

Acne vulgaris is a chronic inflammatory disease of a pilosebaceous unit resulting in lesions like comedones, papules, pustules and nodules [1]. Acne affects more than 85% of adolescents and young adults [2].

Therefore it is necessary to analyse and prevent other systemic diseases associated with acne vulgaris as a dermatologist. There are different types of pathophysiology to develop acne, few among them is increased sebum production, Propionibacterium acnes infestation, inflammation, increased androgen levels.

Apart from these, increased insulin level also aggravates acne leading to multiple syndromes like SAPHO, PAPA, PCOD, Alpert syndrome [3]. Hormones and lipid metabolism plays a role in differentiation of sebocytes and the ability to produce more sebum. Metabolic syndrome contains parameters which causes the disease like type 2 diabetes mellitus and cardiovascular diseases.

There parameters are based on laboratory and physical examination [4]. Central obesity is considered as one of the major parameter of Met S. Other parameters are decreased HDL, increased FBS, and increased triglycerides and increased blood pressure.

A patient consisting of 3 out of 5 parameters is labelled as Met S. As skin is the mirror of systemic diseases, a defragment may lead to skin manifestations and also vice versa [5]. Therefore identifying and preventing the route of acne vulgaris is important as a consulting dermatologist.

**Materials and Methods:**

This study was done in department of DVL in tertiary care centre. It is a cross sectional study. 40 cases and 40 control making the sample size of 80.

**Inclusion Criteria:** 40 clinically diagnosed acne vulgaris cases and 40 age and sex matched controls.

**Exclusion Criteria:** patients not willing to participate in the study, patients already undergoing treatment for acne vulgaris (for last 4weeks with retinoids & steroids), patients with CVS, hepatic & endocrine disorders, patients already having dermatological diseases related to Met S such as psoriasis, HS, rosacea, SLE, alopecia, vitiligo, atopic dermatitis etc.. Diagnosis and grading of the stage of acne is subjective therefore same dermatologist made diagnosis for all acne vulgaris patients along with other required parameters for the study.

1. Clinically grading of acne – by Indian grading system [6].
  - GRADE I - comedones, occasional papules
  - GRADE II - comedones, papules, few pustules
  - GRADE III – predominant pustules, nodules, abscesses

- GRADE IV – cysts, abscess, scars.
2. Height checked in cms
  3. Weight calculated in kilograms
  4. BMI – calculated with formula – weight (kg) / (height) 2 (mts).
  5. Waist circumference –
    - Checked using tape in cmts.
    - Measured half way between lower margins of last rib superiorly and over bilateral tips of ilio crest inferiorly.
  6. Blood pressure – checked through sphygmomanometer
  7. Laboratory investigations – FBS, lipid profile (early morning fasting samples taken).
  8. Statistical analyses by Microsoft excel spreadsheet, spss, chi square chart, ANOVA and t tests.

**Table 1: Normal values**

Parameter	Values
FBS	70 – 100mg/dl
HDL	above 40mg/dl
TG	normal less than 150mg/dl; borderline 150 – 199mg/dl; high 200 – 500mg/dl
BP	120/80 mmhg
BMI	normal - ( 18.5 – 24.9 kg/m <sup>2</sup> ) Over weight - (25 – 29.9 kg/m <sup>2</sup> ) Obese - ( > 30kg/m <sup>2</sup> )

**Table 2: Revised NCEP: ATP III Criteria [7]**

Parameters	Values
Elevated waist	Men > 90cm
Circumference	Women > 80cm
Elevated BP	SBP => 130mmhg, DBP => 85mmhg
Elevated triglycerides	> 150mg/dl
Reduced HDL	Men < 40mg/dl, Women < 50mg/dl
Elevated fasting glucose	> 100mg/ dl

3 out of five positive – considered as Met S

### Results:

40 cases of acne vulgaris and 40 age and sex matched controls participated in the study with mean age group being 22.25 +/- 4 years. And for cases 23.12 +/- 3.89 years. 50% cases of acne vulgaris had grade II severity followed by grade I (35%). There was highly statistically significant difference in waist circumference (p = < 0.0001) and HDL value (p = < 0.001) along with significant difference in FBS ( p = 0.0072), triglycerides ( p =

0.0339), whereas there's no statistical significance in BMI and blood pressure among cases and controls. According to NCEP: ACP III criteria of Met S, we observed 14(35%) of cases having Met S and 4 (10%) of controls with Met S, which is statistically significant. The mean values of parameters like BP, TG, HDL were comparable with p = 1.000. Elevated mean value for FBS between cases and controls noted with p value of 0.2062. Mentioned in table 4.

**Table 3: Distribution of subjects in the case and control groups according to different parameters relating to metabolic syndrome**

Parameters		Cases (n) (%)	Controls (n) (%)	P value, Result
Waist circumference (cm)	Normal	18(45)	40(100)	<0.0001,HS
	Abnormal	22(55)	0(0)	
SBP (mmHg)	Normal	30(75)	26(65)	0.3291, NS
	Abnormal	10(25)	14(35)	

DBP (mmHg)	Normal	31(77.5)	37(92.5)	0.06, NS
	Abnormal	9(23.5)	3(7.5)	
HDL-C (mg/dl)	Normal	22(55)	38(95)	<0.0001,HS
	Abnormal	18(45)	2(5)	
FBS (mg/dl)	Normal	25(77.5)	13(32.5)	0.0072, Sig
	Abnormal	15(37.5)	27(67.5)	
Triglycerides (mg/dl)	Normal	30(75)	37(92.5)	0.0339, Sig
	Abnormal	10(25)	3(7.5)	
Metabolic Syndrome (%)	Yes	14(35)	4(10)	0.0074,Sig

BMI: Body mass index, SBP: Systolic blood pressure, DBP: Diastolic blood pressure, HDL-C: High-density lipoprotein-cholesterol (S): Significant

**Table 4: Comparison of parameters for metabolic syndrome between the two groups**

Parameter	Group	N	Mean	Standard Deviation	P-value
Fasting Blood Sugar (mg/dL)	Control	40	93.13	13.17	0.2061,NS
	Case	40	83.85	14.29	
Triglycerides (mg/dL)	Control	40	114.44	55.06	1.000,NS
	Case	40	126.55	33.18	
HDL-C (mg/dL)	Control	40	41.48	7.49	1.000,NS
	Case	40	45.18	7.35	
Waist Circumference (cm)	Control	40	85.43	7.87	1.000,NS
	Case	40	79.45	13.6	
Systolic BP (mmHg)	Control	40	116.50	11.45	1.000,NS
	Case	40	111.75	10.35	
Diastolic BP (mmHg)	Control	40	76.88	9.52	1.000,NS
	Case	40	69.63	10.02	

## Discussion

Our study includes 80 patients with 40 cases of acne vulgaris and 40 age and sex matched controls. Acne is one of the chronic disorders in puberty and young adults.

Here, the mean age of cases are 22.25 +/- years, which is similar to Nagpat et al's observations as they mentioned 22.7 +/- 0.6 years for their acne vulgaris study [8].

In this study females are more affected than males, similar to observations of Podder et al in their study [9]. Most found grade of acne severity in Cases found to be grade II, which is also most common grade found in the Cunha et al's study [10]. A significantly high difference in waist circumference among cases and controls noted.

Statistically significant difference in HDL, FBS and triglycerides also reveal that acne vulgaris may be related to underlying Met S. As per the results, Met S is seen more in cases of acne vulgaris than in control group which indicates a possible association between the both disorders.

According to Chandak et al's study reports an increased incidence of Met S in the cases than in controls [11]. Del prete et al also reported a similar significant association in their acne study [12].

Nagpal et al also recorded Met S proportions are higher in acne cases than their counterparts [8]. Our study reveals a positive association with Met S

in patients with acne vulgaris. The limitations to the study were limited sample size.

## Conclusion

Acne vulgaris is chronic inflammatory disorder most commonly affecting adolescents and young adults. Significantly higher HDL, FBS, Triglycerides and waist circumference in acne vulgaris cases compared to that of controls reveals the possible association of Met S with acne vulgaris. According to NCEP AEP III criteria cases has Met S positive than controls. Therefore it is dermatologist's responsibility to workup on clinical biochemical and laboratory parameters to diagnose on rule out Met S among acne vulgaris patients. This helps in early prevention of future heart diseases and diabetes.

## References:

1. Acne vulgaris. Sardana. K, Narang I, IADVL textbook of dermatology 5<sup>th</sup> edition, 2022; (43)1519 – 1553.
2. Acne vulgaris and quality of life among young adults in south India. Durai PC, Nair DG. Indian J Dermatol. 2015; 60:33 – 40.
3. Insulin – like growth factor – 1 gene polymorphism in acne vulgaris. Tasli L, Turgut S, Kacar N, Ayada C, Coban M, Akcilar R, Ergin S. J Eur Acad Dermatol Venereol. 2013; 27:254 – 257.

4. Metabolic syndrome: Its history, mechanisms, and limitations. Oda E. *Acta Diabetol.* 2012; 49:89 – 95.
5. The skin function: a factor of anti – metabolic syndrome. Zhou SS, Li D, Zhou YM, Cao JM. *Diabetol Metab Syndr.* 2012; 4:15.
6. Acne Vulgaris. Sardana. K, Narang I, IADVL textbook of dermatology 5<sup>Th</sup> edition, 2022; 43:1526.
7. Harmonizing the metabolic syndrome: a joint interim statement of the International Diabetes Federation Task Force on Epidemiology and Prevention; National Heart, Lung, and blood institute; American Heart Association; World Heart Federation; International Atherosclerosis Society; and International Association for the study of Obesity. Alberti KG, Eckel RH, Grundy SM, et al. *Circulation.* 2009; 120:1640 – 1645.
8. Insulin resistance and metabolic syndrome in young men with acne. Nagpal M, De D, Handa S, Pal A, Sachdeva N. *JAMA Dermatol.* 2016; 152:399 – 404.
9. Metabolic status, obesity, and quality of life in patients with acne vulgaris: a cross – sectional case – control study. Podder I, Agarwal K, Anurag A. *Indian J Dermatol.* 2021; 66:223.
10. Study of lipid profile in adult women with acne. Da Cunha MG, Batista AL, Macedo MS, Machado Filho CD, Fonseca FL. *Clin Cosmet Investing Dermatol.* 2015; 8:449 – 454.
11. Acne vulgaris and metabolic syndrome: a possible association. Chandak S, singh A, Madke B, jawade S, Khandelwal R. *Cureus.* 2022; 14(5):e24750.
12. Insulin resistance and acne: a new risk factor for men? Del Prete M, Mauriello MC, Faggiano A, Di Somma C, Monfrecola G, Fabbrocini G, Colao A. *Endocrine.* 2012; 42:555 – 560.