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Original Research Article

ASSESSMENT OF FASTING PLASMA GLUCOSE AND SERUM INSULIN LEVELS IN PATIENTS WITH ACNE VULGARIS: A CASE CONTROL STUDY FROM URBAN AREA OF MAHARASHTRA

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ABSTRACT

Background: Acne vulgaris is an androgen-dependent disorder with excessive sebum production and proliferation of *Propionibacterium acnes*. Metabolic syndrome (MetS) is a multisystem disorder that increases the risk of diabetes mellitus, stroke, and cardiovascular diseases. This study aims to analyse the association of MetS with acne vulgaris. 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) has also been shown to cause excess sebum production and cause acne independently. **Objective:** To assess the fasting plasma glucose and serum insulin levels in patients with Acne vulgaris and the control group.

Materials and Methods: The present case control study was carried out by involving 60 patients presenting with Acne and 60 age and sex matched controls at Department of Biochemistry at Government Medical College, Chhatrapati Sambhajinagar, Maharashtra during the study period from January-June 2025. Data was collected by using a structure proforma. Data entered in MS excel sheet and analysed by using SPSS 24.0 version IBM USA.

Results: When we compared the mean values of cases and controls, it was observed that there is statistically significant difference in the mean values of both groups. ($p<0.05$). It means the rise in fasting blood glucose in cases may be due to underlying condition. Mean fasting blood sugar level in cases was 96.63±18.29 whereas in controls it was 86.67±8.89. Mean serum insulin level in cases was 8.91±5.01 whereas in controls it was 7.84±3.95. When we compared the mean values of cases and controls, it was observed that there is no statistically significant difference in the mean values of both groups. ($p>0.05$). It means there is no much difference in the mean values of both groups.

Conclusion: Mean fasting plasma blood glucose was significantly raised in cases as compared to controls in our study. Mean fasting serum insulin level though found to be clinically raised in cases compared to controls, but it does not prove statistical significance.

Key words: Fasting plasma glucose, serum insulin, Acne vulgaris.

INTRODUCTION

Acne vulgaris is one of the most common inflammatory disorders of pilosebaceous unit characterized by comedones, papules, pustules and in severe cases presenting with nodules and pseudocysts. It is the most common disorder encountered in day-to-day practice by dermatologists.1 Although generally considered to be a benign, self-limiting condition, but it may sometime cause severe psychological upset or disfiguring scars. The greatest number of cases are seen in age group of

16-19 years in males and 14-17 years in females, after which the incidence steadily decreases. For most of the people, acne diminishes over time or decrease in severity after one reach twenties. However, there's no way to predict how long time it will take to disappear entirely, some individuals will carry this condition into thirties, forties and beyond age groups.[2]

AV is a disease of the pilosebaceous unit, characterized by the hyperkeratinisation process, comedones formation, and inflammatory reactions. There are four well-established processes in the development of acne lesions: alteration of the keratinization process, increase and alteration of sebum production under androgen control (or increased androgen receptor sensitivity), follicular colonization by Propionibacterium acnes, and inflammatory mediators released into the skin. Thegrowth of a new comedo and the maintenances or remission of fully developed acne lesions comprise several biological and microscopic processes of great importance for the follow-up of patients with acne.[3]

The choice of therapy depends on different factors such as the age of patients, site, and severity of acne. Topical therapies including antibiotics, benzoyl peroxide, retinoids, and sulfone agents are the first line treatment in mild to moderate acne. The most common approach for treating AV is oral antibiotics plus topical retinoid or benzoyl peroxide.[4,5]

There is increasing evidence in support of high glycaemicdiet which results in increased insulin levels and insulin-like growth factor-1 (IGF-1) signaling, having a significant role in the pathogenesis of acne during puberty. Thus, hyperglycaemic diets may represent a significant factor in the pathogenesis of acne.[6]

Studies prior to the last decade showed no correlation between the levels of glycaemic factors and insulin in the pathogenesis of acne. However, studies in the recent years have shown that acne can be influenced by high glycaemic load.[7-9]

Objective: To assess the fasting plasma glucose and serum insulin levels in patients with Acne vulgaris and the control group.

MATERIALS AND METHODS

Source of cases: Patients presenting with acne to the Out-patient Department of Dermatology at Government Medical College, Chhatrapati Sambhajinagar, Maharashtra

Source of controls: Age and sex matched controls without acne, presenting with other dermatological abnormalities to the Out-patient Department of Dermatology Government Medical College, Chhatrapati Sambhajinagar, Maharashtra.

Study design: Case control, observational study

Study period: January- June 2025

Place of study: Department of Biochemistry, Government Medical College Chhatrapati Sambhajinagar, Maharashtra.

Sample size: 60 patients presenting with Acne and 60 age and sex matched controls were included in the study.

Inclusion criteria

Inclusion criteria for cases:

- Female patients aged between 18-35yrs presenting with acne to the Out-patient department, Department of Dermatology, Venereology and Leprosy who are willing to give informed written consent.

Inclusion criteria for controls:

- Age and sex matched control group without acne who are willing to give informed written consent.

Exclusion criteria

- Patients with diabetes mellitus/ other endocrinological abnormalities.
- Patients on treatment for other systemic medical illnesses like tuberculosis, epilepsy.
- Pregnant women and women with polycystic ovarian syndrome.
- Previous use of topical/systemic anti-acne therapy in last 3 months.
- Patients with history of change of new cosmetics in last 2 months.

Methods of collection of data

A written informed consent will be taken from each subject included in the study. Data was collected using a pre-structured proforma. The proforma have the following headings:

Demographic data, Chief complaints & History of presenting illness, Past history, Personal history, Treatment history, General physical examination, Dermatological examination and Lab investigations like fasting plasma glucose and serum insulin levels were investigated in all cases and controls.

Statistical Analysis

Data was collected by using a structure proforma. Data entered in MS excel sheet and analysed by using SPSS 24.0 version IBM USA. Qualitative data was expressed in terms of proportions. Quantitative data was expressed in terms of Mean and Standard deviation. Association between two qualitative variables was seen by using Chi square/ Fischer's exact test. Comparison of mean and SD between two groups was done by using unpaired t test to assess whether the mean difference between groups is significant or not.

A p value of <0.05 was considered as statistically significant whereas a p value <0.001 was considered as highly significant.

RESULTS

Table 1: Distribution according to age

		Cases		Controls	
		Frequency	Percent	Frequency	Percent
Age in years	18-25	42	70	33	55
	26-30	10	16.7	14	23.3
	31-35	8	13.3	13	21.7
	Total	60	100	60	100

Out of 60 cases, majority i.e. 42 (70%) were from 18-25 years age group followed by 10 i.e. 16.7% from 26-30 years age group. Out of 60 controls, majority i.e. 33 (55%) were from 18-25 years age group followed by 14 i.e. 23.3% from 26-30 years age group.

Table 2: Distribution of cases according to age of onset

		Frequency	Percent
Age of onset	12 to 18	28	46.7
	19to 24	23	38.3
	25 to 29	9	15.0
	Total	60	100.0

In 28 (46.7%) cases, age of onset was between 12-18 yrs and in 38.3% cases it was between 19-24 years.

Table 3: Distribution of cases according to duration of onset of acne vulgaris

		Frequency	Percent
Duration	Less than 6 months	5	8.3
	6 months to 1 years	10	16.7
	More than 1 years	45	75.0
	Total	60	100.0

In our study, majority of the cases having the diseases more than 1-year duration i.e. 45(75%). We also have 10 cases i.e. 16.7% with onset duration between 6 months – 1 year.

Table 4: Distribution of cases and controls according to family history of acne

		Cases		Controls	
		Frequency	Percent	Frequency	Percent
Family history of acne	Yes	26	43.3	15	25
	No	34	56.7	45	75
	Total	60	100	60	100

Family history of acne was reported by 26 (43.3%) cases and 15 (25%) controls in our study.

Table 5: Distribution of cases according to grading of acne

		Frequency	Percent
Grading of acne	I	8	13.3
	II	41	68.3
	III	10	16.7
	IV	1	1.7
	Total	60	100.0

Grade II acne was commonly observed in 41 patients i.e. 68.3%. This is followed by grade III in 10 (16.7%) patients.

Table 6: Comparison of fasting blood sugar level between cases and controls

		N	Mean	SD	t	p	Inference
FBS	Cases	60	96.63	18.29	3.80	.00001	Highly significant
	Controls	60	86.67	8.89		(<0.001)	

Mean fasting blood sugar level in cases was 96.63±18.29 whereas in controls it was 86.67±8.89. When we compared the mean values of cases and controls, it was observed that there is statistically significant difference in the mean values of both groups. ($p<0.05$). It means the rise in fasting blood glucose in cases may be due to underlying condition.

Table 7: Comparison of fasting serum insulin level between cases and controls

		N	Mean	SD	t	p	Inference
SR. INSULINN	Cases	60	8.91	5.01	1.30	.19	Not significant
	Controls	60	7.84	3.95		(>0.05)	

Mean serum insulin level in cases was 8.91±5.01 whereas in controls it was 7.84±3.95. When we compared the mean values of cases and controls, it was observed that there is no statistically significant difference in the mean values of both groups. (p>0.05). It means there is no much difference in the mean values of both groups.

DISCUSSION

Out of 60 cases, majority i.e. 42 (70%) were from 18-25 years age group followed by 10 i.e. 16.7% from 26-30 years age group. Out of 60 controls, majority i.e. 33 (55%) were from 18-25 years age group followed by 14 i.e. 23.3% from 26-30 years age group. (Table 1)

Arvind Verma et al,[11] carried out the study at Mahatma Gandhi Medical College & Hospital (MGMCH), Jaipur. They found that the highest number of patients were 89 (29.6%) in between the age group 15-20, 62 (20.6%) patients in between the age group 20-25, 59 (19.6%) patients were in between the age group of 25-30 & 31 (10.3%) were present in between the age group 30-35. The least number of patients 15 (5%) were present in age group of above 35 years. The mean age of presentation was 20.9±6.1 years. Smithard A et al,[12] who noted maximum patients with acne between 14-16 years of age18. Goulden V et al,[13] observed that in 7-17% of individuals clinical acne persists beyond the age of 25 years.

In 28 (46.7%) cases, age of onset was between 12-18 yrs and in 38.3% cases it was between 19-24 years. (Table 2)

In our study, majority of the cases having the diseases more than 1 year duration i.e. 45(75%). (Table 3)

We also have 10 cases i.e. 16.7% with onset duration between 6 months – 1 year. Family history of acne was reported by 26 (43.3%) cases and 15 (25%) controls in our study. (Table 4)

Grade II acne was commonly observed in 41 patients i.e. 68.3%. This is followed by grade III in 10 (16.7%) patients. (Table 5)

Mean fasting blood sugar level in cases was 96.63±18.29 whereas in controls it was 86.67±8.89. When we compared the mean values of cases and controls, it was observed that there is statistically significant difference in the mean values of both groups. (p<0.05). It means the rise in fasting blood glucose in cases may be due to underlying condition. (Table 6)

Arvind Verma et al1reported that out of total 154 females, 106 (35.3%) had normal serum fasting insulin levels, the remaining 48 patients showed elevated levels (16%). These results were consistent with the study done by Asli Aksu et al5who found that out of 50 acne patients and 36 control groups, glycaemia index and glycaemia load values were significantly higher in the acne vulgaris group than in the healthy control subjects (p = .022 and p = .001, respectively). A study by Michela Del Prete et al,[14] included 243 patients with severe acne vulgaris and 156 healthy controls were included. Fasting blood glucose levels were not different between the groups (p > 0.05, 82.91 ±9.76 vs. 80.26 ±8.33).

Mean serum insulin level in cases was 8.91±5.01 whereas in controls it was 7.84±3.95. When we compared the mean values of cases and controls, it was observed that there is no statistically significant difference in the mean values of both groups. (p>0.05). It means there is no much difference in the mean values of both groups. (Table 7)

Arvind Verma et al,[1] reported that out of 146 male patients, 38 males had elevated level of serum insulin (12.7%) while remaining 108(36%) males demonstrated normal levelsi.e. total of 28.7% patients showed elevated levels of serum fasting insulin. Michela Del Prete et al,[14] reported that the fasting insulin levels were significantly higher in the patient group than in the control group (p < 0.001, 14.01±11.94 vs. 9.12 ±3.53). Munichandrappa P et al,[15] recruited 45 cases and 45 controls in the Department of Dermatology, Vydehi Institute of Medical Sciences & Research Centre and observed that fasting insulin in cases was 8.0 ± 3.2 and in controls 6.8 ± 3.3 with no significant difference in the mean fasting insulin level of cases and controls (p-0.05) which is consistent with our study findings.

CONCLUSION

- Mean fasting plasma blood glucose was significantly raised in cases as compared to controls in our study.
- Mean fasting serum insulin level though found to be clinically raised in cases compared to controls, but it does not prove statistical significance.

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