



Original Research Article

Insulin resistance in adult Acne

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ABSTRACT

Introduction: Acne Vulgaris is considered to be a multifactorial disease, which is becoming highly prevalent amongst both teenagers and adults. Insulin resistance in adults suffering from Acne Vulgaris was assessed and found to be significant.

Conclusion: The present study showed significant insulin resistance in adults suffering from acne vulgaris as compared to controls.

Materials and Methods: This case-control study included 200 patients out of which 100 were adults with Grade 2-4 Acne Vulgaris and 100 were healthy controls. Blood samples were taken from all participants for the detection of Insulin and Fasting Blood Sugar levels following which Insulin resistance was calculated using HOMA-IR.

Objective: To evaluate the relationship of insulin resistance using the HOMA-IR model in adults suffering from Grade 2-4 Acne Vulgaris as compared to healthy controls.

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1. Introduction

Acne vulgaris (AV) is usually perceived as a disorder affecting teenagers primarily; however, preteens, post adolescents, and adults are also commonly affected. Over the past 10 years, the outpatient visits by patients 25 years of age or older has gradually increased. While many individuals experience AV that regress soon after they complete their teenage years, there is a subset of patients that note persistence throughout later adulthood, with some noting the onset of AV in their adult life.¹

Endocrine abnormalities can have a significant influence on AV. AV may be a common component of many systemic diseases or syndromes which are usually linked to insulin resistance.² Insulin resistance is clinically defined as the inability of a known quantity of endogenous or exogenous insulin to increase glucose utilization and uptake by the tissues.³ Many methods have been elicited to calculate insulin resistance in individuals, but for clinical purposes,

the Homeostasis Model Assessment for Insulin Resistance (HOMA-IR) has been found to be one of the ideal methods. It is advantageous as it is less time consuming, comparatively inexpensive and less invasive, hence, proving it to be ideal for clinical and epidemiological use.⁴

Studies suggest that acne may not correlate with plasma androgen levels. However, increased serum levels of insulin like growth factor (IGF-1) may possibly play a role in the development of AV. Further supporting the action of hyperinsulinaemia in acne.⁵

This study has been conducted in view of the paucity of studies of insulin resistance in adult patients suffering from acne among Indian population.

2. Materials and Methods

A case control study was conducted in the outpatient department of Dermatology, Venereology and Leprosy in Sri Guru Ram Das Institute of Medical Science & Research from December 2016 to August 2018 in the city of Amritsar, State of Punjab, India. In the current study, using the

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grading system for acne vulgaris used by various Indian authors, 200 subjects were included and divided into two groups: Study group i.e. Group A consisted of 100 patients of Acne Vulgaris as per the selection criteria and Control group i.e. Group B, consisted of 100 normal healthy subjects age and sex matched from the general population without any previous or present history of acne vulgaris. An informed consent was taken from each patient and data was collected.

The inclusion criteria for the study group were male and female subjects between 18–35 years of age suffering from grade 2–4 AV. Patients on treatment with oral retinoid or hormone treatment in previous three months and with Polycystic Ovarian Syndrome (PCOS) were excluded from the study. In Group B, healthy male and female subjects between 18–35 years of age were selected.

A detailed history of all the patients was taken in terms of demographic details including onset, duration of disease, rate of progression, associated symptoms and onset of menarche. Information was noted regarding any precipitating factors, use of cosmetics, drug intake prior to the onset, similar past history and family history. A detailed systemic examination was conducted. Local cutaneous examination was carried out to see morphology and distribution of lesions, extent of involvement of AV. Furthermore, patients were advised to remain fasting for 10–12 hours after which 5ml venous blood was collected from all the 200 subjects.

Insulin resistance was assessed using homeostasis model assessment of insulin resistance.

$HOMA-IR = \text{Fasting Blood Sugar (mmol/L)} \times \text{Fasting Insulin levels (microU/L)} / 22.5$

As per Adult Treatment Protocol III and International Diabetes Federation, insulin resistance is considered if $HOMA-IR > 2.5$.⁶

The results were tabulated and analysed statistically using SPSS software 20.0 version. Percentages and mean values with standard deviation were calculated wherever applicable. Chi-square test, t test, and Fisher's exact test were used.

3. Results

Out of total 200 patients, 87 were males and 113 were females. Out of 87 males, 44(50.6%) subjects belonged to the study group and 43(49.4%) were controls. Similarly, out of 113 female subjects, 56(49.6%) belonged to the study group and 57(50.4%) were controls. Difference between study and control group was statistically non-significant ($p=0.877$).

The mean fasting blood sugar (FBS) of the 100 acne patients was 83.7mmol/L and 83.8mmol/L in controls, which was statistically not significant (Table 1). Mean insulin level in the study group was 12.5 miU/L in comparison to 8.7 miU/L in the control group. The p-

value was 0.000, which was highly significant (Table 2). Mean Homa-IR value in acne patients was found to be much higher and highly significant ($p=0.000$) than the control subjects (Table 3). The mean value in the acne patients was 2.7 and 1.9 in the control group. Insulin resistance was present in 71 subjects out of which 47 i.e. 66.2% were acne subjects and 24 i.e. 33.8% controls (Table 4). The p-value of 0.001 was statistically significant in acne subjects compared to controls.

4. Discussion

Acne Vulgaris is a chronic multifactorial disease involving the pilosebaceous unit. In recent times, various other etiological and hormonal factors have been related to the development of acne.⁷ Research has led to the belief that dietary factors play a large part in the pathogenesis of hormonal derangement and acne. Previously, it was stated that high glycaemic foods lead to increase in insulin levels and IGF-1, but recently, milk consumption has also been associated with the development and aggravation of acne. Milk is a low glycaemic food, presence of IGF-1 in the milk results in keratinocyte proliferation, it also contains other comedogenic hormones such as estrogen, progesterone and androgen precursors. Hence, even in the absence of raised FBS levels, there can be derangement in insulin levels.⁸

Insulin resistance results in hyperinsulinaemia and increased androgen synthesis which causes raised levels of IGF-1 and reduced insulin-like growth factor binding protein 3. This results in increase in mean facial sebum excretion rate, sebocyte proliferation, increased epidermal growth factors, elevated plasma nonesterified fatty acids, finally, resulting in inflammation and acne.⁹

A direct relationship between mean sebum excretion rate and serum IGF-1 levels in post-adolescent acne patients was observed in a study by Vora S et al in 2008.¹⁰ It has been proposed that insulin and IGF-1 through induction of sterol response element-binding protein1 (SREBP1) may cause lipogenesis by stimulation of the sebaceous glands leading to the development of acne.¹¹

Furthermore, syndromes such as PCOS and HAIR-AN demonstrate a possible relationship between insulin resistance and acne.²

Our results demonstrated that insulin levels, HOMA-IR and insulin resistance were all significantly higher in the study group as compared to control group. Emiroglu N et al conducted a case-control study in which they observed insulin levels, HOMA-IR, and insulin resistance to be highly significant in acne patients.⁸ A study by Balta I et al. suggested that insulin resistance may not have much of a role to play in the pathogenesis of acne as no significant difference was found in FBS, insulin levels and HOMA-IR values between the study and control groups.¹²

Table 1: Comparison of average fasting blood sugar between cases and controls

Group	Mean FBS (mmol/L)	Standard deviation	p-value
Acne patients	83.7	10.5	0.957 ^{NS}
Controls	83.8	10.6	

Table 2: Comparison of mean insulin levels (miU/L) between cases and controls

Group	Mean Insulin Levels (miU/L)	Standard deviation	p-value
Acne patients	12.5	7.7	0.000*
Controls	8.7	4.9	

*highly significant

Table 3: Comparison of mean HOMA-IR between cases and control

Group	Mean	Standard Deviation	p-value
Acne patients	2.7	1.8	0.0000*
Controls	1.9	1.2	

*Highly significant

Table 4: Distribution of subjects in both groups according to insulin resistance

Insulin Resistance	Acne Patients (n-100)		Controls (n-100)		p-value
	N	%	N	%	
Yes	47	66.2	24	33.8	0.001*
No	53	41.1	76	58.2	

*Significant

5. Conclusion

Acne Vulgaris is believed to be a multifactorial disease. In our study, we found the association of insulin resistance and acne in adults to be statistically significant even in the absence of PCOS suggesting a direct relationship of insulin resistance with acne in adults.

6. Source of Funding:

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7. Conflict of Interest:

None.

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