

Impact of Insulin Resistance in Acne Vulgaris and Hirsutism Patients: An Analytical Cross-Sectional Study

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ABSTRACT

Objective: The study's goals are to identify a causal connection between insulin resistance (IR) and hirsutism and acne vulgaris, as well as to evaluate the severity of the two conditions in relation to rising IR.

Study design: An analytical cross-sectional study

Place and Duration: This study was conducted at Primary Health Care Corporation, Qatar from August 2021 to August 2022.

Methodology: In a predetermined proforma, a patient's entire clinical history as well as required variables, such as height, weight, body mass index (BMI), etc., were recorded in order to establish a link between IR and acne with/without hirsutism and only hirsutism. A HOMA-IR value of more than 2.5 was regarded as important and indicative of IR. Global Acne Grading System (GAGS) was used to determine the degree of acne, and the Modified Ferriman Gallwey Score was used to determine the severity of hirsutism (mFG).

Results: The 354 participants in our study were divided into three groups: There was a statistically significant connection between IR and the severity and recurrence of acne in the Acne-only (N = 310) group. The homeostatic model assessment for insulin resistance (HOMA-IR), the modified Ferriman-Gallwey score, and recurrence were substantially correlated in the hirsutism-only (N = 26) group, demonstrating that insulin resistance increased with hirsutism severity and recurrence. In the sample of 18 people with acne and hirsutism (N = 18), higher BMI was positively linked with IR but not with the severity of both disorders.

Conclusion: Causing serious, resistant acne and hirsutism, IR has come to be recognized as a significant contributory, if not causal, event. The mental stress affected by these conditions is greatly impacted, requiring a different approach to case management.

Keywords: Acne, Hirsutism, Dermatology practice, Psoriasis, PCOS, Insulin resistance

INTRODUCTION

In dermatology practice, the conditions of hirsutism and acne vulgaris are commonly encountered. Their etiopathologic processes vary. Insulin resistance is a metabolic condition in which the body's cells become less responsive to insulin, resulting in increased blood sugar levels. It has been suggested that insulin resistance may play a role in the development of acne vulgaris and hirsutism, both of which are conditions that affect the skin and hair.

Acne vulgaris is brought on by an increase in sebum production, sebaceous pore hyperplasia and hypertrophy, and bacterial growth that causes acne.^[1]

Hirsutism is the name for excessive terminal hair on a woman's upper lip, chin, chest, belly, that develop in a masculine pattern. For females, especially those of younger ages, it is one of the most upsetting conditions.^[2]

One of the numerous novel explanations for the pathophysiology of acne and hirsutism that has gained scientific momentum recently is insulin resistance (IR). Hyperglycemia is the key pathogenic mechanism for negative macro- and microvascular consequences in IR with a relative fall in circulation glucose uptake by insulin-responsive tissues under conditions of constant plasma insulin concentration. The rise of contemporary technology and sedentary lifestyles have only served to increase this incidence.

Along with contributing to hirsutism and acne, IR also affects a number of other skin conditions, including acanthosis nigricans, etc. It is also linked to a number of serious metabolic conditions, including ischemic heart disease, cholesterol, polycystic ovarian syndrome, and diabetes mellitus (DM). Along with the aforementioned effects, acne vulgaris and hirsutism have continued to have a psychological impact.

Treatment of insulin resistance can help improve symptoms of both acne vulgaris and hirsutism. Lifestyle changes such as a healthy diet and regular exercise can improve insulin sensitivity and reduce the levels of androgens in the body. Medications such as metformin, which is commonly used to treat type 2 diabetes, can also improve insulin sensitivity and reduce androgen levels.

The study compares IR with hirsutism and acne vulgaris in an effort to identify early clinical markers that could be utilised to identify potentially significant consequences.

METHODOLOGY

The dermatology department conducted a cross-sectional observational study after gaining approval from the institutional review board. Patients who met the inclusion and exclusion criteria and presented to the dermatology outpatient division with complaints of hirsutism and acne were included in the study after providing written informed consent.

Subjects with hirsutism and acne vulgaris who were under 12 years old, not willing to participate, and with a diagnosis of other conditions were excluded, as were those who had previously received oral retinoids or hormone therapy for any reason.

The patient's full clinical history, necessary measurements like height, weight, and body mass index (BMI), as well as particular questions regarding signs and symptoms of underlying IR were recorded in a prepared proforma. These questions addressed subjects including unexplained weight gain or loss, fatigue and feelings of weakness, changes in appetite, the existence of seborrhea, excessive hair loss, deepening of the voice, irregular menstruation. Patients' fasting blood sugar (FBS) and fasting insulin levels were assessed in order to obtain the homeostatic model assessment for insulin resistance (HOMA-IR).

A HOMA-IR value of more than 2.5 was regarded as important and indicative of IR. Global Acne Grading System (GAGS) was used to determine the degree of acne, and the Modified Ferriman Gallwey Score was used to determine the severity of hirsutism (mFG). To determine the relationship between IR and hirsutism and acne, the collected data was entered into SPSS statistics version 23 and subjected to Pearson's correlation analysis.

RESULTS

A total of 354 study participants were split into three categories. Overall 310 individuals in Group 1 (87.5%) had only acne when

they were first seen. A total of 26 (7.34%) patients in group 2 had only hirsutism, while group 3 included 18 (5.08%) patients who had both hirsutism and acne.

The study's median participant age was 25 years old. The majority of patients in the acne-only group (N = 15) were under the age of 22 years, whereas the majority of patients in groups 2 (N = 15) and 3 (N = 9) were in the age range of 23 to 32 years.

There was not much gender inequality as found (female (N = 179): male (N = 175) ratio = 1.01:), despite group 1 having 175 (56.17%) males and 136 (43.83%) females, with a male: female ratio of 1.28:1, indicating a minor male preponderance. The number of female group members in groups 2 and 3 was 25, and 18, respectively.

54 people overall (15.26%) had a confirmed family history of type 2 diabetes. In total, 46 people (14.28%) in group 1 had a positive family history of type 2 diabetes, compared to 5 subjects (16.67%) and 5 subjects (23.52%) in groups 2 and 3, respectively.

There were 174 men and 136 women among the 310 patients in group 1 in our research. Overall 44 females and about 130 males were discovered to have the same positive IR signs and symptoms. The majority of the participants (N = 158) had a normal BMI of 18.5 to 24.9, with a mean BMI of 24.38, and 65 patients (42.32%) demonstrated a significant association with IR.

Mean values for fasting blood sugar (FBS), fasting insulin, and HOMA-IR were all considerably above average. In this cohort, BMI was significantly correlated with increased HOMA-IR (>2.5 s/o IR), GAGS, age, and recurrence (P 0.01). According to Table 1's Pearson's correlation, there was a striking link between BMI and age (P 0.05), but not gender (P > 0.05).

In group 2, 16 of the 26 females with hirsutism who were included in the research also had IR. Overall 9 out of 16 IR patients had no infection, while the other patients had recurring hirsutism. Correlation in the hirsutism-only group is shown in Table 2

A total of 18 females in group 3 had hirsutism as well as acne. In this group of 18 patients, 14 had hirsutism with acne that had just been identified, while 4 had the condition recur. A total of 3 of the 4 individuals with the recurrent disease also had IR. Those with IR had BMIs that were notably elevated. (Table 3)

Table 1: Correlation in Group 1 (n=310)

	BMI	Homa-IR	Gags	Age	Gender
BMI	1	0.82	0.629	0.188	0.079
Homa-IR	0.82	1	0.754	0.105	0.059
Gags	0.629	0.753	1	0.095	0.004
Age	0.188	0.105	0.095	1	-0.038
Gender	-0.075	0.059	0.004	-0.039	1

significant at the 0.01 level

Table 2: Correlation in Group 2 (n=26)

	Age	BMI	Homa-IR	mFG Score
BMI	1	0.493	0.339	0.189
Homa-IR	0.489	1	0.495	0.316
Gags	0.335	0.494	1	0.718
Age	0.195	0.321	0.718	1

significant at the 0.01 level.

Table 3: Correlation in Group 3 (n=18)

	Age	BMI	Homa-IR	Gags	mFG Score
Age	1	0.158	0.586	0.492	-0.196
BMI	0.158	1	0.521	0.259	0.242
Homa-IR	0.586	0.5210	1	0.462	-0.242
Gags	0.488	0.259	0.463	1	-0.138
mFG Score	-0.196	0.238	-0.249	-0.141	1

DISCUSSION

Three groups of 354 study subjects were created. When they were first observed, 310 members of Group 1 (87.5%) only had acne. Group 3 contained 18 (5.08%) patients who had both hirsutism and

acne, while group 2 contained 26 (7.34%) patients who only had hirsutism.

After reaching early adulthood, acne show a declining tendency with advancing age^[4], which is consistent with our results that the study's fewest patients were over the age of 41 years.

Out of 308 patients, 174 were men and 136 were women in group 1, while Nagpal et al.^[3] included 100 cases of men and 100 controls of men of the same age, and Munichandrapa et al.^[5] included 45 cases and controls of men and women of the same age and sex, with 19 men and 26 women in each group. According to Collier et al study,^[6] acne affects women more frequently than men, most likely because puberty affects women sooner.

Studies that take the family history of type 2 DM into account as a risk factor for causing hirsutism and IR are currently hard to find in the literature for the Asian community. Skin symptoms of IR, such as acrochordons, acanthosis nigricans, provide an accurate and timely method to identify IR.^[7, 8]

Although not explicitly IR-related, the signs and symptoms of increased hunger, weight gain, and weariness may be helpful in identifying patients who are at risk. In our study, unexplained rapid weight gain was the most common complaint across all three groups, followed by tiredness and weakness in groups 1 and 2.

In group 1, 76% of those with recurrent acne also had IR, suggesting a possible substantial link and indicating the need for more study. IR was seen in groups with moderate, severe, and very severe acne, which was comparable to the last two groups in the study by Nagpal et al.^[3].

Obese and overweight people typically have greater androgen and glycemic loads, which may help acne lesions to develop. Blood glucose levels and acne severity have a favourable correlation, according to Ray et al.^[9]

The current investigation discovered that BMI and HOMA-IR in group 1 were substantially associated with GAGS and recurrence, contrary to Gayen et al^[10] finding that there was no statistically significant correlation between BMI and acne severity. This implies that increased acne severity and recurrence are substantially linked to elevated BMI and IR.

Our findings, which are in line with relevant studies, show a substantial correlation between elevated IR and increased hirsutism severity and recurrence. HOMA-IR and recurrence had a high correlation with the modified Ferriman Gallwey score. Only hirsutism patients showed a positive connection between IR and hirsutism. The syndrome is characterized by increased levels of testosterone and insulin-like growth factor (IGF).

While increasing androgen synthesis, insulin and IGF also inhibit the synthesis of sex hormone-binding globulin, improving androgen bioavailability.

These androgens make vellus hair on the body terminal, giving women a manly appearance^[11].

It was noted that the majority of the subjects in grades 3 and 4 with acne on their zygomatic arch, chin, and mandibular area, who belonged to the very severe and severe groups, had IR.

In group 3, which includes individuals with both hirsutism and acne, 75% of the respondents had recurrent disease, which may indicate that IR may be the cause if both conditions are present at the same time. BMI was notably elevated in IR patients, according to Ünlühizarci et al.^[12] and Wankhade et al.^[13]. Increased BMI was discovered to be positively related to IR but not with the severity of hirsutism or acne. Additionally, it demonstrated a lack of correlation between the severity of diseases and IR, which requires further evaluation with a bigger sample size because our study's sample size for this group was smaller (18).

We advise a high level of clinical suspicion of IR in cases with severe, recurring acne that is accompanied by hirsutism. So that therapy can start as soon as feasible, early diagnostic tests should be performed.

Limitations: The third category (acne with hirsutism) had a limited sample size. Also, the study lacked control groups, which might have helped in assessing relationships between IR and the

severity of the acne and hirsutism and informing more precise results.

CONCLUSION

Acne and hirsutism, despite being prevalent and easily treatable conditions, may have a significant negative impact on a vulnerable adolescent's mental health and sense of self-worth, leading to disorders of body image. To enable effective and prompt treatment, it is therefore, crucial to identify a possible cause of these common conditions.

It is now understood that IR contributes significantly to the development of severe and resistant acne as well as hirsutism, necessitating a different approach in such cases. Fasting insulin levels and HOMA-IR will undoubtedly help in identifying at-risk individuals, estimating the degree of recurrence and treatment resistance, and predicting risk factors for relapse.

IR is now understood to be a substantial contributing, if not primary, event in the development of severe, resistant acne and hirsutism. These conditions have a significant negative impact on people's psychological health, necessitating a particular method of case management.

Funding Source: None

Conflict of Interest: None

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