Research Article

RELATIONSHIP BETWEEN ACNE VULGARIS AND HIRSUTISM TO INSULIN RESISTANCE AND TO ASSESS THE SEVERITY OF TWO CONDITIONS WITH INCREASED INSULIN RESISTANCE

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ABSTRACT

Background: Acne and hirsutism are common disorders that are simple to cure. They do, however, have a noticeable effect on how one perceives oneself. There is a lot of research on the pathophysiology of acne and hirsutism, and insulin resistance is one of them. They are not fully understood, though.

Aim: The purpose of this study was to determine how insulin resistance is related to acne vulgaris and hirsutism, as well as to evaluate how severe these two disorders are when it comes to insulin resistance.

Methods: A thorough clinical history was taken of each included individual, and then measurements such as height, weight, and BMI were noted, along with any indications or symptoms of underlying insulin resistance. The global acne grading system, or GAGS, was used to grade acne, while the modified Ferriman Gallwey score (mFG) was used to determine the severity of hirsutism. Results were formulated by analysing the data.

Results: Three groups of 174 patients were created, and the group with only acne (154 subjects) showed a strong association ($p<0.0001$) between acne severity and insulin resistance with recurrence. Twelve participants in the hirsutism-only group had a high association between the HOMA-IR and the mFG score and recurrence, indicating greater hirsutism severity and increased insulin resistance ($p<0.0001$ and $p<0.007$, respectively). Not severity, but BMI and insulin resistance were positively correlated in the combined hirsutism and acne group.

Conclusion: The current study comes to the conclusion that insulin resistance plays a significant role in the pathophysiology of hirsutism and severe, resistant acne. Since insulin resistance can have a substantial effect on the psychological well-being of those afflicted, treating these disorders may need a different strategy.

Keywords: Acne, global acne grading system, hirsutism, HOMA-IR, mFG

INTRODUCTION

Acne vulgaris and hirsutism are two typical dermatological conditions that are highly prevalent everywhere, especially in India. In Indian circumstances, dermatologists frequently treat these two disorders. Numerous studies have been conducted on the etiopathology and related processes of these entities, which are attributable to a variety of variables. The aetiology of acne vulgaris, a chronic and complicated inflammatory illness originating from the pilosebaceous unit, is multifactorial and includes host factors, genetics, and environmental variables. The aetiology is also associated with

increased sebum production, follicular hyperkeratinization, sebaceous gland hyperplasia and hypertrophy, and the growth of Cutibacterium acnes.1 Another dermatological disorder that causes the most anguish in female individuals is hirsutism. Especially the younger age brackets. Excessive terminal hairs in female individuals that resemble the male pattern in the thighs, upper arms, lower back, upper back, pelvis, belly, chest, chin, and/or upper lips are referred to as hirsutism.2 The pathophysiology of acne vulgaris and hirsutism is the subject of several theories. The function of insulin resistance (IR), which has lately been acknowledged and investigated by several physicians and academics, is one such notion. The combination of insulin resistance and decreased insulin-responsive tissues' ability to absorb glucose from the bloodstream at the same insulin concentration causes hyperglycemia, which has detrimental effects on both macro and microvascular health. The prevalence of insulin resistance has significantly grown due to contemporary technology and sedentary lifestyles.3

MATERIALS AND METHODS

Insulin resistance is linked to a number of dermatological disorders, such as vitiligo vulgaris, androgenetic alopecia, psoriasis, and acanthosis nigricans, in addition to hirsutism and acne. Additionally, there is a correlation between insulin resistance and several metabolic illnesses such as dyslipidemia, diabetes mellitus, and PCOS (polycystic ovarian syndrome) as well as ischemic heart disease. In addition to these negative effects, hirsutism and acne vulgaris in afflicted individuals have a major psychological influence.4 The current clinical investigation sought to determine the correlation between insulin resistance and hirsutism and acne vulgaris, as well as the degree of these two disorders. The purpose of the current cross-sectional observational study was to evaluate the severity of two conditions with elevated insulin resistance and to determine the link between hirsutism and acne vulgaris and insulin resistance.

The study was done at department of dermatology, venereology and leprosy after the clearance was given by the concerned Institutional Ethical Committee. The study population was recruited from the Department of Dermatology of the institute.

Subjects with hirsutism and acne vulgaris who visit the outpatient department of dermatology and meet the inclusion and exclusion criteria are included in the research. Prior to participation, informed consent, both written and verbal, was obtained from every study participant. The study's exclusion criteria included anyone taking alternative medications, undergoing hormonal therapy, having a history of using oral retinoid therapy, having systemic inflammatory diseases that affect insulin metabolism, being pregnant or lactating, having cancer, having atherosclerotic vascular diseases, having hypertension, or having thyroid dysfunction.

Following final inclusion, each participant had a thorough history taken, which was followed by a clinical assessment. All of the individuals' demographic information, including their height, weight, and body mass index, was entered onto a pre-made, organised proforma that also evaluated any symptoms or indicators of underlying insulin resistance.

Recurrent infections of the bladder, vagina, skin, or gums; irregular menstruation; deepening of the voice; excessive hair loss; seborrhea; decreased or increased appetite; weakness or exhaustion; and quick or unexplained weight loss or gain were among the concerns on the proforma.

The measurement of fasting insulin and blood sugar (FBS) levels was then performed in order to calculate the HOMA-IR, or homeostatic model assessment for insulin resistance. A HOMA-IR result over 2.5 was deemed noteworthy and indicated a possible case of insulin resistance. The global acne grading system, or GAGS, was used to grade the severity of acne, while the modified Ferriman Gallwey (mFG) scores were used to evaluate the severity of hirsutism. SPSS was used to do statistical analysis on the collected data, therefore software version 21.0 and Pearson correlation coefficient to assess the correlation between hirsutism and acne to insulin resistance. The confidentiality of the data was kept throughout. The p-value of <0.05 was considered statistically significant.

RESULTS

There were 174 participants in the research, who were split into 3 groups: Group I had 154 subjects with 88.50% of them having acne, Group II had 12 subjects with 6.89% of them having hirsutism, and Group III had 8 subjects with 4.59% of them having both hirsutism and acne vulgaris, respectively. The research participants were 24.81±4.32 years old on average.

49.35% (n=76) of the research participants in Group I were under the age of twenty. The majority of participants in

groups II and III (58.33% of n = 7 and 62.5% of n = 5) were between the ages of 21 and 30. In the current study, there were 50.57% females (n = 88) and 49.42% men (n = 86).

Of the participants in Group I, II, and III, 14.94% (n = 26) had a positive history of type 2 diabetes mellitus, compared to 14.28% (n = 22), 16.6% (n = 2), and 25% (n = 2) study subjects, respectively. Twenty female and 64 male participants showed positive indications and symptoms of insulin resistance. Insulin resistance was observed in 27 research participants out of 78 patients with naïve acne, and in 76 subjects with recurrent acne, insulin resistance was observed in 57 study participants, suggesting a substantial potential of association.

The majority of research participants had normal BMIs, with 76 having mean BMIs of 24.26 and BMIs ranging from 18.5 to 24.9. A noteworthy correlation with insulin resistance was seen in 41.4% (n=32) of the participants.

Eleven research participants from group I with a BMI of greater than thirty showed a 100% high correlation with insulin resistance. Six patients out of 40 who fell into the overweight group and had a BMI between 25 and 30 showed insulin resistance. Out of the twenty-one participants in the BMI <18.5 underweight category, two exhibited insulin resistance.

In the research, there were substantial increases in the mean HOMA-IR, mean fasting insulin, and mean fasting blood sugar. In this group, recurrence, age, GAGS, and elevated HOMA-IR all strongly correlated with BMI ($p<0.01$). Age and BMI were shown to be significantly correlated ($p<0.05$). However, when employing Pearson's correlation coefficient, as shown in Table 1, no significant link was found between BMI and gender with $p>0.05$.

The groups with the highest percentages of insulin resistance were those with very severe acne (59%), severe acne (88%), and moderate acne (46%), respectively.

Seven of the twelve female individuals in group II who had a verified diagnosis of hirsutism were found to have insulin resistance. Of the seven participants with insulin resistance, five were naïve, whereas the other three had recurrent hirsutism. The mean BMI of the hirsute patients was 24.26. One patient with a BMI of more than thirty had insulin resistance. Out of the five participants, four had a high BMI in the overweight range of 25–30, and three had a normal BMI. These subjects did not exhibit insulin resistance.

Using Pearson's correlation coefficient, age was the only significant factor connected with high BMI ($p<0.05$). Of the three study individuals with high BMI, twenty.8% (n=3) were in the age range of 31–40 years, while 25% (n=3) were in the age range of 21–30 years. In this group, recurrence, age, and a high HOMA-IR score of >2.5 were all linked with a high BMI ($p<0.01$). Table 2 indicates that no significant connection was seen in mFG scores with $p >0.05$.

Eight of the female participants in group III exhibited both acne vulgaris and hirsutism. Of these eight participants, six had just been diagnosed with acne and hirsutism, whereas two had recurring illness.

One of the two patients with recurrent illness was insulin resistant. Three of the seven naïve patients were insulin resistant. With a mean BMI of 26.6, participants with insulin resistance had a considerably higher BMI. Pearson's correlation revealed no link between elevated mFG or higher GAGS scores and BMI in eight patients in group III. Additionally, as shown in Table 3, there was no association found between increasing severity of acne or hirsutism and insulin resistance ($p>0.05$).

DISCUSSION

The current cross-sectional observational study was out to evaluate the severity of two conditions with elevated insulin resistance and to determine a link between hirsutism and acne vulgaris and insulin resistance.

Of the participants in Group I, II, and III, 14.94% (n = 26) had a positive history of type 2 diabetes mellitus, compared to 14.28% (n = 22), 16.6% (n = 2), and 25% (n = 2) study subjects, respectively. Twenty female and 64 male participants showed positive indications and symptoms of insulin resistance. Insulin resistance was observed in 27 research participants out of 78 patients with naïve acne, and in 76 subjects with recurrent acne, insulin resistance was observed in 57 study participants, suggesting a substantial potential of association. These findings aligned with research conducted in 2021 by Gayen R et al. and in 2012 by Ray S et al., both of whom found comparable demographics among their study participants.

The bulk of research participants, or 76 individuals, had a mean BMI of 24.26 and a BMI in the range of 18.5 to 24.9, according to the study data. A noteworthy correlation with insulin resistance was seen in 41.4% (n=32) of the

participants. Eleven research participants from group I with a BMI of greater than thirty showed a 100% high correlation with insulin resistance. Out of 40 participants, 46 individuals with a BMI of 25–30 and overweight were insulin resistant. Out of the twenty-one participants in the BMI <18.5 underweight category, two exhibited insulin resistance. These outcomes corroborated the findings of Gonzalzaz-Gonzalzaz J et al8 in 2016 and Balato N et al7 in 2014 where a similar association in BMI and insulin resistance was seen.

The study revealed that there was a substantial increase in mean HOMA-IR, mean fasting insulin, and mean fasting blood sugar. In this group, recurrence, age, GAGS, and elevated HOMA-IR all strongly correlated with BMI (p<0.01). Age and BMI showed a strong correlation (p<0.05). However, when utilising Pearson's correlation coefficient to analyse the relationship between BMI and gender, p>0.05 revealed a nonsignificant link. The majority of research participants had insulin resistance, and this was most noticeable in the groups with 59%, 88%, and 46% of study participants having very severe, severe, and moderate acne, respectively. These results were consistent with research conducted by Bloomgarden Z et al. (2009) and Lymn D et al. (2016), who found a similar relationship between BMI and a number of other characteristics.

According to the study's findings, seven of the twelve female participants in group II who had a verified diagnosis of hirsutism were found to have insulin resistance. Of the seven participants with insulin resistance, five were naïve, whereas the other three had recurrent hirsutism. The mean BMI of the hirsute patients was 24.26. One patient with a BMI of more than thirty had insulin resistance. Out of the five participants, four had a high BMI in the overweight range of 25–30, and three had a normal BMI. These subjects did not exhibit insulin resistance. These findings were consistent with earlier research by Abdelmawla M et al. (2011) in 2019 and Collier C et al. (2008), which found a similar correlation between hirsutism and BMI.

By evaluating the data using Pearson's correlation coefficient, it was also shown that age was the sole significant factor connected with high BMI (p<0.05). Of the study individuals with high BMI, 25% (n=3) were between the ages of 21 and 30. In contrast, 20.8% (n=3) of the study subjects with high BMI were between the ages of 31 and 40. In this group, there was a significant p-value correlation between a high BMI, a high HOMA-IR score of >2.5, recurrence, and age. Nevertheless, there was no discernible correlation between the mFG scores and p >0.05. These findings were in line with earlier research by Munichandrappa P et al.(2017) and Bhate K et al.(2013), who revealed a substantial correlation between BMI and HOMA-IR and age.

It was seen that in group III having both hirsutism and acne vulgaris, 8 female subjects had hirsutism and acne. Of these eight participants, six had just been diagnosed with acne and hirsutism, whereas two had recurring illness. One of the two patients with recurrent illness was insulin resistant. Three of the seven naïve patients were insulin resistant. With a mean BMI of 26.6, participants with insulin resistance had a considerably higher BMI. Pearson's correlation revealed no link between elevated mFG or higher GAGS scores and BMI in eight patients in group III. Furthermore, no association (p>0.05) was seen between higher severity of acne or hirsutism and insulin resistance. These outcomes were consistent with the research conducted in 2013 by Nagpal M et al. and in 2019 by Wankhede V et al. where authors reported no correlation between BMI to mFG and GAGS as in the present study.

CONCLUSION

Taking into account its limitations, the current study comes to the conclusion that insulin resistance plays a significant role in the pathophysiology of hirsutism and severe, resistant acne. The psychological well-being of individuals with insulin resistance can be greatly impacted, necessitating the use of an alternative treatment strategy.

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TABLES

	Recurrent/Naive	Gender	Age	GAGS	HOMA-IR	BMI
Recurrent/Naive						
Pearson correlation	1	-0.016	0.002	0.363	0.277	0.384
p-value	-	**0.73**	**0.000**	**0.000**	**0.000**	
Number (n)	154	154	154	154	154	154
Gender						
Pearson correlation	-0.016	1	-0.037	0.001	0.055	-0.076
p-value	0.73	-	0.47	0.93	0.34	0.15
Number (n)	154	154	154	154	154	154
Age						
Pearson correlation	0.004	-0.037	1	0.093	0.101	0.184
p-value	0.95	0.47	-	0.08	0.05	**0.001**
Number (n)	154	154	154	154	154	154
GAGS						
Pearson correlation	0.34	0.001	0.07	1	0.749	0.625
p-value	**0.000**	0.73	0.07	-	**0.000**	**0.000**
Number (n)	154	154	154	154	154	154
HOMA-IR						

Pearson correlation	0.277	0.037	0.101	0.749	1	0.812
p-value	**0.000**	0.319	0.068	**0.000**	-	**0.000**
Number (n)	154	154	154	154	154	154
BMI						
Pearson correlation	0.384	0.076	0.184	0.625	0.812	1
p-value	**0.000**	0.171	**0.001**	**0.000**	**0.000**	-
Number (n)	154	154	154	154	154	154

Table 1: Pearson's correlation of various parameters in study subjects with acne vulgaris

	Recurrent/Naive	mFG score	HOMA-IR	BMI	Age
Recurrent/Naive					
Pearson correlation	1	0.473	0.535	0.632	0.318
p-value	-	**0.017**	**0.007**	**0.001**	**0.125**
Number (n)	12	12	12	12	12
mFG					
Pearson correlation	0.473	1	0.715	0.311	0.189
p-value	**0.017**	-	**0.000**	0.134	0.368
Number (n)	12	12	12	12	12
HOMA-IR					
Pearson correlation	0.535	0.715	1	0.491	0.336
p-value	**0.007**	**0.000**	-	**0.014**	0.105
Number (n)	12	12	12	12	12
BMI					
Pearson correlation	0.632	0311	0.491	1	0.489
p-value	**0.001**	0.134	**0.012**	-	**0.013**
Number (n)	12	12	12	12	12
Age					
Pearson correlation	0.318	0.189	0.336	0.489	1
p-value	0.125	0.368	0.105	**0.013**	-
Number (n)	12	12	12	12	12

Table 2: Pearson's correlation of various parameters in study subjects with hirsutism

	Recurrent/Naive	mFG score	GAGS	HOMA-IR	BMI	Age
Recurrent/Naive						
Pearson correlation	1	0.074	-0.064	0.176	0.317	0.269
p-value	-	0.786	0.815	0.505	0.217	0.302
Number (n)	8	8	8	8	8	8
mFG score						
Pearson correlation	0.074	1	-0.137	-0.248	0.237	-0.197
p-value	0.786	-	0.597	0.343	0.367	0.455
Number (n)	8	8	8	8	8	8
GAGS						
Pearson correlation	-0.064	-0.137	1	0.463	0.259	0.487
p-value	0.815	0.597	-	0.061	0.316	**0.047**
Number (n)	8	8	8	8	8	8
HOMA-IR						
Pearson correlation	0.176	-0.248	0.463	1	0.519	0.586
p-value	0.501	0.343	0.061	-	**0.032**	**0.012**

Number (n)	8	8	8	8	8	8
BMI						
Pearson correlation	0.317	0.237	0.259	0.519	1	0.157
p-value	0.217	0.367	0.316	**0.032**	-	0.551
Number (n)	8	8	8	8	8	8
Age						
Pearson correlation	0.269	-0.197	0.487	0.586	0.157	1
p-value	0.302	0.455	**0.047**	**0.012**	0.555	-
Number (n)	8	8	8	8	8	8

Table 3: Pearson's correlation of various parameters in study subjects with hirsutism and acne vulgaris both