

The relationship of body mass index and hirsutism in adult females

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ABSTRACT

Introduction: Hirsutism is a common clinical condition that usually has a benign course but extremely distressing symptom for women. Hirsutism is a perplexing issue, having variable presentations including different severity of hirsutism, with menstrual history regular or irregular, body mass index (BMI) within normal range or obese or overweight and yet some have a family history of hirsutism. Hirsutism may be associated with obesity, insulin resistance, diabetes, polycystic ovary syndrome (PCOS), hypertension, infertility, and menstrual irregularities. Studies suggested that it affects between 5 percent and 15 percent of women, varying according to characteristics and at least 5 percent of women of reproductive age suffer from this problem. Body mass index (BMI) classifications were developed based on associations between BMI and chronic disease and mortality risk in healthy populations. **Aim:** This study was designed to investigate the relationship between body mass index (BMI) and hirsutism. **Material and methods:** All patients were examined clinically, then interviewed and detailed questionnaires were completed for each of them. The study involved 300 individuals; 150 hirsute patients and 150 healthy people as control group. Hirsutism was determined by the Ferriman-Gallwey scoring system. Height and weight were measured by a physician mechanical scale. Body mass index was calculated weight/height² (kg/m²), and collected data were analyzed by Microsoft excel-chi-square statistical test. **Results:** There were no significant differences between the two groups regarding age and height. However, BMI and weight were significantly higher in the cases group than the control group ($P < 0.05$). The chi square test revealed significantly higher differences between the case and control groups regarding BMI ($P < 0.001$). **Conclusion:** Our study clearly establishes that hirsute women had higher body mass index and moderate hirsutism was more prevalent among hirsute women.

Key words: Body Mass Index (BMI); Hirsutism; Obesity; Ferriman-Gallwey scoring system

INTRODUCTION

Hirsutism is defined as excessive terminal hair that appears in male pattern (i.e. sexual hair) in women. Hirsutism affects 5% to 10% of women [1]. What constitutes hirsutism is difficult to define, as it depends on a variety of cultural and racial factors, media-driven perceptions of normality, and the perceptions of the individual physician and patients. Not surprisingly, therefore, estimates of the frequency of hirsutism in the female populations have varied widely. In London, 1.2 percent of women were significantly hirsute. Other studies have reported frequencies of up to 18 percent [2].

Even the criteria for the definition of hirsutism used by physicians vary widely. In order to resolve this issue, different groups have evolved different grading schemes for body hair growth. The scheme employed in the study by Ferriman and Gallwey, which has become the standard grading system, defined hirsutism purely on quantitative grounds. Hirsutism is graded as numerical scores beyond an upper limit of twice the standard deviation from the mean. Scoring can be on global basis assessing 8-11 body sites, or it can be based on a single site [3].

Obesity and a BMI of more than 30 kg/m² are associated with decreased lung function, respiratory symptoms

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and cardiovascular diseases such as arteriosclerosis, ischaemic heart disease, stroke and hypertension, type 2 diabetes and metabolic syndrome [4].

With worldwide rates of obesity increasing steadily, the National Institutes of Health (NIH) and the World Health Organization (WHO) recently adopted similar body weight guidelines for overweight and obesity. Values of body weight adjusted for height, referred to as body mass index (BMI; in kg/m^2), in excess of 25 and 30 are considered to indicate overweight and obesity, respectively. A lower healthy BMI limit of 18.5 was also identified by both organizations. These body weight guidelines are useful for practitioners when screening patients for excessive adiposity and when prescribing treatment for overweight patients [5].

Androgen-dependent growth areas affected include the upper lip, cheeks, chin, central chest, breasts, lower abdomen, and groin. This altered growth pattern of the hair may be associated with other signs of virilization, which include temporal balding, masculine habitus, deepening voice, clitoral hypertrophy, and amenorrhea [6].

Most common causes of hirsutism are polycystic ovarian syndrome (PCOS) and idiopathic hirsutism. Other causes include late onset congenital adrenal hyperplasia and Cushing's syndrome. Pituitary, ovarian and adrenal tumors are rare causes of hirsutism [7].

Interestingly, serum androgens are positively associated with BMI not only in PCOS, but also in women with simple obesity. It seems that hirsutism is more common in people with simple obesity. The relation between obesity and hirsutism may be modified by racial and ethnic characteristics of different populations. For example in a retrograde 2 year cohort study by Khalil et al. of adult Saudi populations the associations between obesity and certain skin diseases such as hirsutism, dry skin, pruritus, and planter keratosis were all nonsignificant [8].

The sensitivity of the hair follicle to androgens is largely governed by the alpha reductase activity in the skin, which is responsible for the conversion of testosterone to dihydrotestosterone. The severity of hirsutism does not correlate well with the level of androgens, because the response of the androgen dependent hair follicle varies considerably within and between individuals. The source of testosterone in a female is the ovaries and the adrenals. Androgen dependent hirsutism

may be caused by disorders affecting the adrenals or ovaries, exogenous administration of androgens or a combination of these factors [9].

Hirsutism must be distinguished from hypertrichosis—generalized excessive hair growth that occurs as the result of either heredity or the use of medications such as glucocorticoids, phenytoins, minoxidil, or cyclosporine. Hypertrichosis, in which hair is distributed in a generalized, nonsexual pattern, is not caused by excess androgen (although hyperandrogenism may aggravate this condition) [10].

MATERIAL AND METHODS

This is a cross sectional case control clinical trial. The study was conducted in Tikrit Teaching Hospital during the period from November 2012 to the end of May 2013. All patients were examined clinically, then interviewed and detailed questionnaires were completed for each of them. The study involved 300 individuals; 150 hirsute patients and 150 healthy people as control group. The participants' ages were between 15 to 45 years. Demographic data were collected by a questionnaire.

Height was measured without shoes and weight with light clothing and without shoes on a platform scale with a 1.5 kg subtraction to correct for clothing weight.

Height and weight were measured by a physician mechanical scale. Body Mass Index was calculated by dividing the body weight with the square of height (kg/m^2). According to the guideline proposed by the World Health Organization, the normal range of BMI is between 18.5 and 24.9, and values below 18.5 imply underweight, while overweight is defined by a BMI over 25 and obesity over 30 kg/m^2 [11].

Ferriman and Gallwey, used a scoring system loosely based on that of Garn, evaluating 11 body areas, including the upper lip, chin, chest, upper back, lower back, upper arm, forearm, upper and lower abdomen, thighs and lower legs. A score of 0–4 was assigned to each area examined, based on the visual density of terminal hairs, such that a score of 0 represented the absence of terminal hairs, a score of 1 minimally evident terminal hair growth, and a score of 4 extensive terminal hair growth. Terminal hair hairs can be distinguished clinically from vellus hairs primarily by their length (i.e., 0.5 cm), coarseness, and pigmentation. In contrast, vellus hairs generally measure, 0.5 cm in length, are soft and non-pigmented [12].

Collected data were analyzed by Microsoft excel-chi-square statistical test.

Ethics

This study was performed on human subjects; thus, all patients were aware of the presence of the study and they were fully informed about the drug and its side-effects.

RESULTS

The mean age and the mean height of cases and control are shown in Table 1. There were no significant differences between the two groups regarding age and height. However, BMI and weight were significantly higher in the case group than the control group ($P < 0.05$) as shown in the Table 1.

Frequency of distribution of BMI is shown in Table 2. The chi square test revealed significantly higher differences between the case and control groups regarding BMI ($P < 0.001$).

Among hirsute women it was found that, 61.54 % with moderate hirsutism, 37.69% of patients had mild hirsutism, while one patient with severe hirsutism as shown in the Table 3.

DISCUSSION

In the current study hirsutism was more common in patients with increased BMI. In this sample there was a positive relation between body mass index and hirsutism. This may be a sign of an underlying metabolic disorder, which will lead to the greater risk of the development of cardiovascular disease and type-2 diabetes.

There were no significant differences between the two groups regarding age and height. However, Body Mass Index and weight were significantly higher in the case group than the control group. The chi square test revealed significant differences between the case and control groups regarding Body Mass Index ($P < 0.001$).

Hirsutism causes significant anxiety and lack of self-esteem in women. Although it is itself a benign condition, it is often the sign of an underlying and possibly serious endocrine condition. The diagnosis begins with a detailed history and physical examination, with laboratory testing and imaging as needed to confirm or rule out underlying causes [13]. As part of the physical examination, the

Table 1: BMI, weights, age, and heights in cases and controls groups

	Numbers	Cases (Mean±SD)	Control (Mean±SD)	P-value
Age	130	28.46±6.97	29.28±8.18	Not significant
Weight	130	78.75±16.32	68.10±13.31	Significant (<0.05)
Height	130	158.67±14.38	159.42±7.01	Not significant
BMI	130	30.58±5.77	26.71±5.54	Significant (<0.05)

Table 2: BMI frequency of distribution in cases and controls groups

BMI	WHO (Kg/m ²)	Cases		Control		All	
		Nr	%	Nr	%	Nr	%
Underweight	<18.5	0	0	3	2.31	3	1.15
Normal	18.5-24.9	18	13.84	48	36.92	66	25.38
Overweight	25-29.9	49	37.7	45	34.62	94	36.15
Obese	>30	63	48.46	34	26.15	97	37.31
Class 1	30-34.9	31	49.2	19	55.9	50	51.54
Class 2	35-39.9	23	36.5	13	38.23	36	37.1
Class 3	>40	9	14.29	2	5.9	11	11.34
Total		130	100	130	100	260	100

The two-tailed P value is less than 0.0001. Statistically significant

Table 3: Ferriman-Gallwey score of hirsutism

Hirsutism score	Number	%
Non hirsute	<8	0
Mild	8-16	49
Moderate	17-25	80
Severe	>25	1
Total		130
		100

clinician should also look for other cutaneous signs of hyperandrogenism, such as acne, androgenetic alopecia, and seborrhea. Acanthosis nigricans is a sign of insulin resistance. Height and weight should be measured and the body mass index calculated [14].

In this study the prevalence of overweight and obesity was higher among hirsute women than non hirsute women. In the study carried out in various hospitals of Lahore found that 20% were overweight among hirsute women [15].

In other study carried out in India found that girls with hirsutism were overweight 46.03%. The same study showed association of BMI with hirsutism, subjects with normal BMI were 6.78% shows signs of hirsutism, whereas subjects with BMI of more than 25 were 46.03% showed signs of hirsutism [16]. There is no evidence of association of hirsutism and abnormal BMI value in the study carried out in Tirana university students [17].

The prevalence of obesity in patients with hirsutism is different in various populations. Obesity was found in 63 patients (48.46) of our sample cases. This is similar to reported figure of 51% in Saudi Arabia [18].

In the instant study, a total of 49 (37.69%) patients had mild hirsutism, 80 (61.54%) had moderate and remaining one (0.76%) patients had severe hirsutism. In our study moderate hirsutism was more prevalent than mild and severe form. These observations were similar to study by Adams *et al*; Ram Krishan Gautam New Delhi -India; our findings were in disagreement with studies by Ansarin *et al*.who reported mild hirsutism in 65%, moderate in 32.5%, and severe in only 2.5% of their patients [19].

Our study clearly establishes that hirsute women had higher body mass index and moderate hirsutism was more prevalent among hirsute women.

This is likely to be due to hyperandrogenemia which will promote the development of hirsutism. This will add to our understanding of hirsutism and may help us in a precise targeted approach for management of such patients.

Considering the side effects of obesity and significant relationship between BMI and hirsutism, weight loss of obese and overweight is strongly recommended. Height and weight should be measured and the body mass index calculated.

Statement of Human and Animal Rights

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2008.

Statement of Informed Consent

Informed consent was obtained from all patients for being included in the study.

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