

## Original Article

## CORRELATION OF ANTHROPOMETRIC PARAMETERS TO SEVERITY OF HIRSUTISM IN WOMEN

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**Objective:** To investigate the relationship between the anthropometric parameters and the severity of hirsutism.

**Methods:** A sample of sixty female subjects, aged 18-35 years, having hirsutism was selected, while ten normal healthy females were randomly included as controls. Height, weight and waist circumference of subjects were measured. Body mass index (kg/m<sup>2</sup>) was calculated. All subjects underwent an assessment of excess terminal hair growth using the modification of the method originally described by Ferriman and Gallwey (FG). Hirsutism was classified as mild (score 8-15), moderate (score 16-25), and severe (score >25).

**Results:** The mean SD waist circumference, weight and body mass index values in hirsute subjects were significantly higher ( $p < 0.05$ ) than those in controls. Significant positive correlations were observed between body weight, BMI and mild hirsutism score. However in moderate hirsutism, Ferriman Gallwey score was significantly and positively correlated with body mass index only.

**Conclusion:** The excess terminal hair growth is more common in overweight women having less hirsutism score.

**Keywords:** Hirsutism, body mass index, modified ferriman-gallwey score.

### Introduction

Structurally, there are three types of hair: lanugo is a soft hair densely covering the skin of the fetus, which disappears within the first few months of post-partum life; vellus hair are soft but longer than lanugo hair and are usually non-pigmented; and terminal hair which are longer, pigmented and coarser in texture. Eyebrows, eyelashes, scalp hair and pubic and axillary hair in both sexes, and much of the body and facial hair in men, are composed of terminal hairs.<sup>1</sup> Hirsutism refers to the presence of excessive terminal (coarse) hair in androgen-dependent areas of the female body. Its medical importance is highlighted by the high prevalence of androgen excess disorders reported among hirsute women.<sup>2</sup>

In 1961, Ferriman and Gallwey proposed a method to quantify the excessive hair growth in females.<sup>3</sup> This original method was modified in 1981 by Hatch *et al* and has now become the gold standard for the evaluation of hirsutism. This method scores nine body areas (upper lip, chin, chest, upper and lower back, upper and lower abdomen, arm, forearm, thigh and lower leg). Total score ranges from 0-36.<sup>4</sup>

Adipose tissue contributes up to 50% of the circulating testosterone in premenopausal women because of excessive androgen production in fat tissue.<sup>5</sup> Therefore, it seems that hirsutism must be more common in people with simple obesity but

controversies exist. The aim of this study was to determine the anthropometric profile of women with hirsutism and correlate it with severity of hirsutism.

### Methods

#### Study Design:

This case control study was conducted at the Institute of Molecular Biology & Biotechnology, University of Lahore, on sixty hirsute female subjects and ten normal healthy females aged 18-35 years.

#### Inclusion criteria:

Inclusion criteria taken into consideration were age (18-35 years) and clinical criteria. The clinical criteria were as follows:

- ⊙ All patients of hirsutism with modified Ferriman-Gallwey (mF-G) score of eight or more were included in the study.
- ⊙ Patients presenting with oligo/amenorrhea, ovulatory dysfunction, excess hair growth, virilization, alopecia, or acne.

#### Exclusion criteria:

- ⊙ Pregnant or lactating women.
- ⊙ Those who received oral contraceptive pills or/and other anti-androgen drugs in previous three months.
- ⊙ Those who received drugs known to cause hirsutism or interfere with the hormonal studies.
- ⊙ Patients with modified Ferriman-Gallwey (mF-G) score less than 8.

**Study Protocol**

The study was approved by the Ethical Review Committee of the Institute of Molecular Biology & Biotechnology, University of Lahore.

**Initial subject evaluation:**

All the subjects completed a standardized history and clinical proforma, including questions about age, family history of hirsutism, onset and duration of the disorder, marital status, menstrual cycle length and regularity, other illnesses, and medications.

**Physical Examination**

The following parameters were recorded:

Height (in centimeters without shoes against wall-fixed tape), weight (in kilograms with light cloths and without shoes), and waist circumference (in centimeters with the tape placed horizontally between the costal margin and iliac crest while the participant gently exhaled) were measured.

All the subjects also underwent an assessment of excess terminal hair growth using the previously described modification of the method originally described by Ferriman-Gallwey (i.e. mF-G), scoring the presence of terminal hairs over nine body areas (upper lip, chin, chest, upper and lower abdomen, thighs, upper and lower back, and upper arms). Hirsutism was classified as mild (score 8-15), moderate (score 16-25), and severe (score >25). The nurses made the initial assessment, after being trained on the use of the scoring system by the principal investigator. Body mass index (kg/m<sup>2</sup>) was derived, using the formula: <sup>6</sup> Body mass index = Body weight (kg)/ Height (m)<sup>2</sup>.

The normal range of BMI was taken as 18-24.9 Kg/m<sup>2</sup>. Women with BMI 25-29.9Kg/m<sup>2</sup> were labeled overweight and those having 30Kg/m<sup>2</sup> or more were labeled obese.<sup>7</sup>

**Data Analysis:**

The demographic variables were presented as simple descriptive statistics calculating mean and SD of numerical data like age, duration of disorder, waist circumference, body mass index (BMI), and modified Ferriman-Gallwey (mFG) scores of hirsutism. The significance of difference between the groups was analyzed by independent samples Student's t-test and Pearson's correlation coefficient was determined to find out correlation. Ap value < 0.05 was considered statistically significant. All statistical analyses were carried out with the SPSS version 17 (SPSS, Inc, Chicago, IL, USA).

**Results**

Sixty hirsute female subjects were enrolled in this study. Their ages ranged from 18-35 years with a mean age of 24.58± 0.57 years. All were evidently hirsute in various degree of the disorder. A batch of ten female subjects of matching age with a mean value of 25.6 ± 1.76 years were also enrolled in study as the control group. About 25% of the subjects had the hirsute symptoms for shorter duration i-e up to maximum of 5 years and less. The rest had the disorder more than 5 up to 11 years. The duration of the disease ranged from 1-14 year. Family history of hirsutism was positive in 12 (20%) patients. There was history of regular menstrual cycle in 47 patients (78.33%) and irregular menstruation in 13 patients (21.66%).

The mean waist circumference, weight, and body mass index (BMI) of the hirsute group were significantly more than the values in the control group. **(Table I).**

A total of 33 subjects had BMI in the normal range (18-24.9 Kg/m<sup>2</sup>). 16 subjects had BMI in the overweight range (25-29.9 Kg/m<sup>2</sup>). Out of these, 15 subjects had mild hirsutism and 1 subject had moderate hirsutism. 11 subjects had BMI in the obese range (25-29.9 Kg/m<sup>2</sup>). Out of these, 4 subjects had mild hirsutism and 7 subjects had moderate hirsutism. **(Table II).** Body weight and body mass index were significantly and positively correlated with mild hirsute subjects having mF-G score of 8-15 (r = 0.49; p< 0.05, r = 0.50; p< 0.05). **(Table III. Figures 1 & 2).**

**Table-1:** Anthropometric features of subjects in the control and hirsute groups.

Parameter	Hirsutes Mean±SD	Controls Mean±SD	P-value
Weight (cm)	88.92±7.4	81.00±7.2	0.003*
Weight (kg)	63.08±9.93	56.50±8.0	0.054*
Height (cm)	162.22±3.4	163.30±4.6	0.400
BMI (kg/m <sup>2</sup> )	23.93±3.43	21.2±2.11	0.015*

(\*p< 0.05, Statistically significant)

**Table-2:** BMI subgroups having mild and moderate hirsutism.

BMI	N	No of pts. having mild Hirsutism (Mean±SD)	No. Pts. having moderate Hirsutism (Mean±SD)
Normal (18.0-24.9 Kg/m <sup>2</sup> )	33	32 (9.69±1.77)	1 (16±0.00)
Overweight (25.0-29.9 Kg/m <sup>2</sup> )	16	15 (11.00±2.28)	1 (16±0.00)
Obese (30.0 Kg/m <sup>2</sup> or more)	11	4 (13.75±2.55)	7 (16.85±0.69)

In moderate hirsute subjects having mF-G score of 16-25, a significant and positive correlation was seen only between body mass index and moderate hirsutes( $r = 0.62$ ;  $p = 0.03$ ). (Table IV. Figure 3).

**Table-3:** Correlation of mild hirsutism with anthropometric parameters.

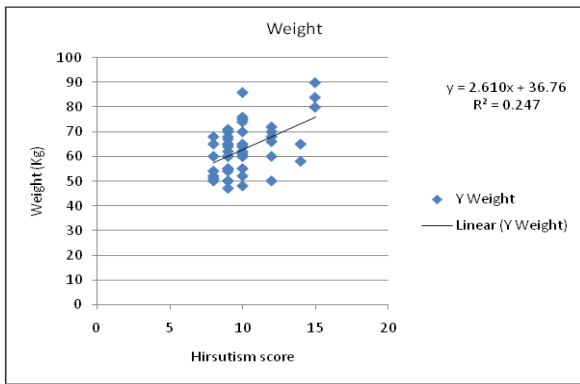
Mild Hirsutism	Correlation coefficient (r)	P-value
Waist circumference	0.231	0.107
Wight	0.498	0.001*
Height	0.106	0.463
Body Mass Index	0.506	0.001*

(\* $p < 0.05$ , Statistically significant)

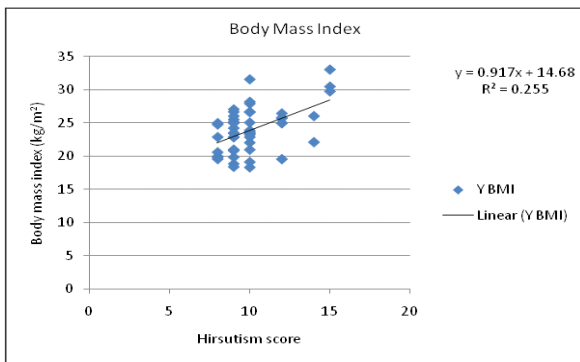
**Table-4:** Correlation of moderate hirsutism with anthropometric parameters.

Moderate Hirsutism	Correlation coefficient (r)	P-value
Waist circumference	0.040	0.914
Wight	0.601	0.066*
Height	0.099	0.785
Body Mass Index	0.626	0.035*

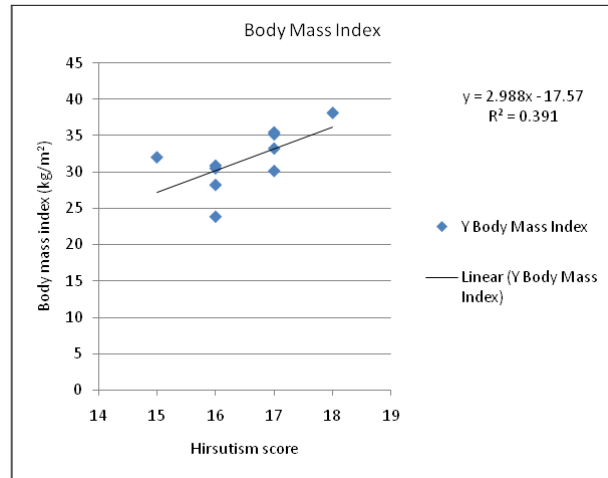
(\* $p < 0.05$ , Statistically significant)



**Fig-1:**Correlation of weight with mild hirsutism.



**Fig-2:**Correlation of body mass index with mild hirsutism.



**Fig-3:**Correlation of body mass index with moderate hirsutism.

### Discussion

Hirsutism has a strong, unpleasant impact on the health-related quality of women. It is also more common in women with simple obesity. The relation between obesity and hirsutism may be modified by racial and ethnic characteristics of different populations.<sup>8</sup>

In the present study, the anthropometric characteristics of a group of women with hirsutism and a group of age-matched healthy women was compared. The mean SD waist circumference, weight and BMI values in hirsutes were significantly higher than those in controls. However the differences of height between two groups was not significant ( $p > 0.05$ ). These results are comparable with results of a study about the relationship of mean weight, body mass index and waist hip ratio with hirsutism in Iran.<sup>9</sup>

Similarly a clinic-investigative study in India found association of hirsutism with obesity.<sup>10</sup> Another study exhibited that hirsutism was more frequent in patients with high BMI.<sup>11</sup> Schmidt *et al* also concluded that the presence of hirsutism was associated with increased body mass index<sup>12</sup>. In a prospective cohort study, Ollila *et al* found that hirsutism is associated with significantly increased weight gain, especially in early adulthood.<sup>13</sup>

In our study, hirsute subjects were divided into mild and moderate groups on the basis of their modified Ferriman-Gallwey scores. On the basis of BMI, majority of normal and overweight subjects (85%) had mild hirsutism while 15% obese subjects had moderate hirsutism. We found that body weight and body mass index were significantly and positively correlated with subjects having mild hirsutism.

However in subjects having moderate hirsutism, a significant and positive correlation was seen only with body mass index.

In another study, significant correlation was found between score of hirsutism and BMI of the patients.<sup>14</sup> However, Rehman *et al* reported that the correlation of menstrual irregularity, BMI and severity of hirsutism with its cause was found to be statistically not significant but in this study, the relationship of BMI with hirsutism severity was not focused upon.<sup>15</sup> In another study carried out in black and white population, the overall mF-G score was found to be not affected by age, BMI, the presence of hormonal therapy, oligomenorrhea, or menopause.<sup>16</sup>

An explanation for the differences between the

results of these studies is that these studies tended to include greater numbers of older and menopausal women, which may have accentuated the changes in hair growth occurring with age. In view of the findings of previous studies, the results of our study point towards a more investigative role of increased body weight in subjects with low hirsutism scores.

## Conclusion

We conclude that the excess terminal hair growth is more common in overweight women having less hirsutism score.

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