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The Prevalence of Hirsutism in Adolescent Girls in Yazd, Central Iran

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Abstract

Background: Hirsutism is a distressing problem especially among girls. This study was conducted to evaluate the prevalence of hirsutism and other hyper-androgenic symptoms in adolescent girls in Yazd, central Iran.

Methods: Nine hundred high school girls (mean age of 17.26 and range of 15-19 years) were evaluated for prevalence of hirsutism and other hyper-androgenic syndromes. The selected girls were examined for the presence of hirsutism, acne, hypertrichosis, history of menstruation, and family history of known cases of hirsutism. Hirsutism was determined by the modified Ferriman-Gallwey index. Laboratory tests and ultrasound were requested for hirsute only.

Results: Among girls, 10.8% suffered from hirsutism. Other accompanying hyper-androgenic disorders were separately studied in two groups of hirsute and non-hirsute subjects. The most prevalent accompanying disorders were acne (42.7% vs 38.4%), hypertrichosis (42% vs 18.3%), first degree relatives' family history of hirsutism (25.5% vs. 7%), and menstrual irregularity (14.6% vs. 10.2%), respectively. In the hirsute group, based on the hormonal and ultrasound tests, the most prevalent revealed causes were polycystic ovary syndrome (60.8%), hyper-prolactinoma (7.2%), idiopathic hirsutism (28.9%), and undetermined (3.1%).

Conclusions: A high prevalence of hirsutism was observed which was more prevalent at higher ages in comparison to other societies showing that definition and scoring system of hirsutism need to be based on racial differences.

Keywords: Hirsutism; Acne; Hypertrichosis; Irregular menstruation; Prevalence; Iran

Introduction

Hirsutism, the presence of terminal hairs in females in a male pattern area, affects between 5% to 15% of women surveyed.[1-4] The presence of hirsutism is extremely distressing to patients, with a significant negative effect on their psychosocial development.[5,6] It is estimated that there are more than 4 million hirsute premenopausal women in the United States, who probably account for about 1.5 billion dollars spent annually on hair removal products and procedures.[4,7]

Androgens, testosterone and dihydrotestosterone (DHT) transform vellus hair to terminal, but only in areas of the body that is androgen sensitive. This occurs over several growth cycles and is relatively irreversible. The hairs of some areas as axilliary and pubic hair during puberty exhibit greater sensitivity to physiological increases in circulating androgens. By comparison, abnormal elevations of serum androgens or products stimulate excessive hair growth on the face, neck, chest and lower abdomen. This may be produced by adrenal, ovary or stimulated by pituitary hormones, many of which have underlying PCOS.[4] However, not all women with excessive terminal hairs in the mentioned area will have abnormal androgens or metabolites, so they are classified as having "idiopathic hirsutism". This group is gradually becoming smaller and smaller as diagnostic techniques for PCOS becomes more refined.

Asian people have less hair density than Caucasians, whereas Southern Europeans have more hair follicle density than Northern Europeans.[8] In addition, the rate of hair growth varies due to genetic differences

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in the activity of 5a-reductase, the enzyme that converts testosterone to DHT.[9] It is proposed that hirsute women may have increased activity of 5a-reductase type 2, isoenyme in their hair follicles. The activity of 5a-reductase is stimulated by hyper-androgenism, insulin and insulin-like growth factor.[10]

Hirsutism prevalence is mostly affected by its definition criteria, study population, and races as well. The most common way of determining hirsutism frequency is modified F&G method described in 1981by Hatch *et al.*[11]

With respect to relatively high hirsutism prevalence and its difference in various areas and races[2,12-17] as well as the importance of determination of its prevalence in Iran, the current study was conducted on the basis of determining the prevalence of hirsutism in adolescent girls in Yazd Province, central Iran.

Materials and Methods

The protocol of hirsutism was prepared in Dermatology Department and approved by the Ethics Committee and the research council of the Yazd University of Medical Sciences. Since high school education is compulsory in Iran, the girls in the last three grades of high school were enrolled in this study.

Sample size was calculated using the formula $N=Z_{\alpha}^{2}\times P\ (1-P)/d^{2}$ for prevalence surveys with an expected proportion P at 10%, an alpha of 0.05, and a level of precision (d) of 0.02. The calculated sample size was 865. The total study population was about 7,500 students in nine centers. Using cluster sampling proportionate to population size, each center as a cluster and each class as a sub-cluster, we randomly selected ten classes in each center and ten girls as subjects in each class, on the basis of center or class list (9×10×10=900). Ultimately, 900 subjects were enrolled. The lower age limit for inclusion was 15 years since the mean age of menarche among Yazdi girls as reported by Barzegari *et al.* in 2005 was (12.41±1.07) years.[18] Also, 1.5 years after menarche was required to exclude the period of menstrual irregularity that usually follows menarche.

The selected girls were examined for the presence of hirsutism, acne, and hypertrichosis, and asked for irregularity of menstruation and family history of known cases of hirsutism. The degree of hirsutism was determined by modified F&G score, which quantified the presence of terminal hair over nine body parts: the upper lip, chin, chest, upper and lower abdomen, thighs, upper and lower back, and upper arms. They were divided into five classes and grades zero to four (0-4) were assigned to them as follows: (0) in case of no hair, (1) only vellus hair, (2) terminal hair lower than 10, (3) more than 10 terminal hairs but restricted, and (4) high terminal hairs and countless. The grades may be variable from zero to thirty six. The subjects with a score of 8 or higher were defined as hirsute.[1,11] A questionnaire was prepared and the data related to hirsutism and accompanying symptoms or diseases including menstrual irregularity, acne, and hypertrichosis were gathered through asking questions and clinical examinations, laboratory investigation, and ultrasound scanning if indicated.

Analysis of the data was performed, using Chi Square or other related tests for comparing the groups. $p<0.05$ was considered significant. Hirsutism prevalence with 95% confidence interval was performed, using the following formula: $[P=X/N\pm1.96\sqrt{p\ (1-P)/N}]$

Results

Nine hundred subjects were enrolled and 898 of them participated in the study (mean age 17.26, range: 15-19 years). The results of examination for hirsutism on modified Ferriman-Gallwey protocol are shown in Table 1. At least, 25% were completely hairless (at nine objected area), 15% had less than ten terminal hairs especially in the lower abdomen (11.2%), chin (1.8%), and only 1.2% on the upper lip. But more than ten terminal hairs were seen in 8% and too many terminal hairs only in 1% of the study population.

On the basis of modified Ferriman-Gallwey total scores of the population as shown in Table 2, 75% of the girls had a score of less than six; in other words, 25% of them had a score more than six, and only 10.8% of them were scored more than eight. If the scores more than eight are counted as hirsutism, 10.8% of girls were hirsute. Therefore, hirsutism prevalence among Yazdi adolescent girls with 95% confidence interval is between 8.8% and 12.8%.

As shown in Table 3, 97 (10.8%) hirsute and 801 (89.2%) non-hirsute girls were evaluated for accompanying disorders showing that 41 (42.7%) of the hirsute subjects suffered from acne; however, among non-hirsute girls, 308 (38.4%) did not. There was no statistically significant relation between hirsutism and acne ($p=0.413$). The most prevalent accompanying disorder among hirsute and non-hirsute subjects was acne (42.7%, 38.4%); showing that 39% of the study population had acne vulgaris (Table 3).

Table 1: Distribution of terminal hairs according to modified F&G Method in study population

Body parts	Hair less	Fair hairs	< 10 terminal hairs	> 10 terminal hairs	Too much
	No (%)	No (%)	No (%)	No (%)	No (%)
Upper lip	231(25.7)	651(72.5)	11 (1.2)	0 (0)	5 (0.5)
Chin	769(85.6)	57(6.3)	54(6)	18(2)	5(0.5)
Chest	795(88.5)	72(8)	16(1.8)	15(1.7)	0(0)
Upper back	832(92.7)	66(7.3)	0(0)	0(0)	0(0)
Lower back	447(49.8)	446(49.7)	5(0.5)	0(0)	0(0)
Upper abdomen	764(85)	131(14.6)	3(0.3)	0(0)	0(0)
Lower abdomen	264(29.4)	491(54.7)	101(11.2)	42(4.7)	0(0)
Arm	552(61.5)	343(38.2)	3(0.3)	0(0)	0(0)
Thigh	282(31.4)	581(64.7)	21(2.3)	14(1.6)	0(0)

Table 2: distribution of study population according to modified F&G score

Total Score	No	%	Cum. %
Zero	85	9.5	9.5
One	112	12.5	22
Two	84	9.3	31.3
Three	65	7.2	38.5
Four	95	10.6	49.1
Five	234	26	75.1
Six	59	6.6	81.7
Seven	67	7.5	89.2
Eight	35	3.9	93.1
Nine	12	1.3	94.4
Ten	12	1.3	95.7
Eleven	14	1.6	97.3
Twelve	9	1	98.3
Thirteen	5	0.6	98.9
Fourteen	5	0.6	99.5
Fifteen	0	0	99.5
Sixteen	4	0.4	99.9
Seventeen	1	0.1	100
18 to 36	0	0	100
Total	898	100	-

Table 3: Accompanying diseases or symptoms in hirsute and non hirsute girls

Hirsutism	Yes	No	Total	*P value*
Accompanying conditions	No. (%)	No. (%)	No. (%)	
Acne vulgaris				
Yes	41 (42.7)	308 (38.4)	349 (38.9)	
No	55 (57.3)	494 (61.6)	549 (61.1)	0.413
Total	96 (100)	802 (100)	898 (100)	
Hypertrichosis				
Yes	39 (42)	147 (18.3)	186 (20.7)	
No	54 (58)	658 (81.7	712 (79.3)	<0.001
Total	93 (100)	805 (100)	898 (100)	
Menstruation				
Irregular	14 (14.6)	2 (10.2)	96 (10.7)	
Regular	82(85.4)	720 (89.8)	802 (89.3)	0.191
Total	96 (100)	802 (100)	898 (100)	
Hirsutism family history				
Positive	24 (25.5)	57 (7)	81 (9)	
Negative	70 (74.5)	747 (93)	817 (90.1)	<0.001
Total	94 (100)	804 (100)	898 (100)	
Total population	97 (10.8)	801 (89.2)	898 (100)	

Thirty nine (42%) of the hirsute and 147 (18.3%) of non-hirsute subjects had hypertrichosis. It was revealed that hypertrichosis was more prevalent among hirsute girls than non-hirsute ones with a significant relationship ($p<0.001$) (Table 3). Twenty four (25.5%) of the hirsute girls and 57 (7%) of non-hirsute ones had first class family history of hirsutism (Table 3) ($p<0.001$).

In the study of menstrual history of population (Table 3), 14 (14.6%) hirsute and 82 (10.2%) non-hirsute individuals had irregular menstruation and there was no significant relationship between hirsutism prevalence and menstrual disorder in our study population ($p=0.191$). Only in the hirsute group (97 subject), laboratory evaluation and ultrasonography for causes of disease were performed. Fifty nine subjects (60.8%) were diagnosed to have polycystic ovary syndrome, 7 (7.2%) hyperprolactinemia, 28 (28.9) idiopathic hirsutism, and 3 (3.1%) were undetermined.

Most of therapeutic measurements were topical ones (37.1%); however, only 5 individuals received treatments orally.

Discussion

Some studies have been carried out on hirsutism, its symptoms, accompanying diseases, and therapeutic methods. The main subject is clinical diagnosis. Various methods, based on visual assessment of hair type and growth, have been proposed to evaluate patients suspected of hirsutism. For the first time in 1961,[1] Ferriman and Gallwey described a protocol based on the presence of hair growth in 11 different androgen sensitive body sites, and then in 1981,[11] Hatch *et al.* suggested a method scoring of 9 of 11 areas assessed by F&G, excluding lower legs and lower arms, other methods scoring only five body sites.[19] The protocol suggested by Hatch *et al.*, usually named modified F&G, is the preferred method today for the assessment of hirsutism. Therefore, we selected this method. However, this system is semi quantitative and is influenced by racial and genetic factors. More importantly, there is a lack of consensus on what score (over 6 or 8) can be defined as hirsutism.

Our study was conducted on hirsutism prevalence and the accompanying disorders as well. Some studies have been conducted on the basis of hirsutism prevalence in European countries. In Carmina *et al.* study in 1998,[13] 558 hirsute patients were engaged, among whom 6% had primary hirsutism. In another study in 1998[14], among 130 premenopausal hirsute women, 17% had primary hirsutism. In another study by Mcknight[2], among 400 students, 9% suffered from hirsutism.

In the present study, the hirsutism prevalence rate was 10.8%. Hirsutism prevalence is higher in eastern societies, especially among Asians in comparison to western communities. This is confirmed by a study on university girls performed at Tehran Medical School,[15] where among 800 students, 22.8% suffered from hirsutism (17.3% low, 5.1% medium, and 0.3% acute, respectively).

Since our subjects' mean age was near 17 years, there was no sign of hyper-androgenic index, but in higher ages it may prevail with more chances. Therefore, hirsutism prevalence among our girls is certainly above this range. On the basis of F& G scoring system, our study population was divided into three groups. The first group, comprising about 75% of the subjects, had a score less than six. This group was not hirsute. The second group, comprising about 25% of the population, had scores of six or more. In some references, such patients are considered as hirsute.[4,11,20] The third group, comprising 10.8% of the subjects, had scores eight, or more. In some references, such patients are considered as hirsute.[1] Considering the above mentioned issues, one may conclude that the subjects with scores of 6 and 7 might be called “endangered group” Hence, this group, in addition to the third group, is in need of urgent diagnostic measures and follow-up together with therapeutic procedures if needed.

In a study conducted by Italian Degli University,[21] among 46 women who suffered from acute and late acne, 24 women had PCO and some amount of androgen, DHEA, DHEAS, and LH/FSH in PCO. In addition, acne affected women were much higher than those who suffered from acne alone. Therefore, this shows a strong relationship between PCO and acne.

In a study by Peserico *et al.*,[22] 119 women affected by acne (without menstrual disorders, no obesity and hirsutism) were compared with 35 healthy women (without acne). There were 45.37% and 17.14% PCO in the case and control groups, respectively. In the case of acne presentation, PCO was threefold more than that in normal individuals; therefore, this study indicated a significant relationship between PCO and acne. The two previous studies indicated that the two diseases of acne and PCO are regarded as the source of hyper-androgenism;

and certainly other symptoms of hyper-androgenism like hirsutism were also present in theses subjects.

In the present study, the prevalence of acne was determined. It was revealed that 42.7% of hirsute patients and 38.32% of non-hirsute individuals suffered from acne. The difference was not statistically significant. This may stem from various causes such as the number of samples and age, considering the common source of the two illnesses (hirsutism and acne). As mentioned in references, hyper-androgenic acnes occur in higher ages. Therefore, by increase in the disease prevalence, the difference would be significantly meaningful.

In a study conducted by Adams *et al.*,[23] 173 women were affected by menstrual disorders, among whom the percentages of hirsutism, oligomenorrhea, and amenorrhea were 92%, 87%, and 26%, respectively. These three groups showed PCO as well and 50% of amenorrhea and PCO affected women were hirsute. Most of the hirsute women with regular menstruation were PCO-affected, too; however, this definition of idiopathic hirsutism might be inappropriate.

In a study conducted at Dermatology Department of Razi Hospital in Rasht in 1992,[24] 107 hirsute women were studied. Among them, 32% had menstrual disorders; nevertheless, the rate of menstrual disorder among non-hirsute women was 7%. In our study, 14.6% of the hirsute patients and 10.2% of non-hirsute individuals had menstrual disorder. The difference between the two groups was not statistically significant.

In a review of various studies of hirsutism, there was little trace of hypertrichosis. In our study, 42% of the hirsute patients and 18.3% of non-hirsute individuals had hypertrichosis. The difference in the prevalence of hypertrichosis in the two groups of hirsute and non-hirsute girls was statistically significant.

Increase in hirsutism prevalence among the relatives of hirsute patients is pronounced. In a study done by Mcknight,[2] 14% of the hirsute Welsh women had positive family history, and in the study of Razi Hospital in Rasht,[24] 57% of the hirsute women had family history of hirsutism. In our study, 25.53% of the hirsute girls and 7% of non-hirsute individuals showed family history of hirsutism in the first degree relatives, the difference of which was statistically significant. In addition, we determined the occurrence of hirsutism in the second degree relatives of hirsute and non-hirsute individuals. It was shown that 12.87% of the hirsute patients and 11.5% of non-hirsute individuals had a second degree relatives' positive family history; their difference was not statistically significant.

Hirsutism is a symptom and not only a reflection of hyperandrogenism, but many factors such as familial, ethnic causes, abnormalities of corticosteroid, GH, thyroid hormone production, or some drugs may induce or influence it. The etiology of approximately 70% of hirsutism in women is polycystic ovary syndrome (PCO); hirsutism reported among PCO patients varies from 60-80% in American patients to 20% in Japanese.[25] On the basis of paraclinical and laboratory investigations, 60% of our hirsute subjects had PCO. This observation is similar to that in Ansarian *et al.*'s study on Iranian premenopausal hirsute women, showing 62.5% PCO,[17] Gatee *et al.* reported the presence of PCO in 91% of 102 hirsutes in the United Arab Emirates.[26] In a study of 60 hirsute patients in India by Mithal *et al.*, PCO was found in 75% of the cases.[27] In similar studies, Zargar *et al.* found an incidence of 37.3% of 150 patients in Kashmir.[28] In another study, Farnaghi and Seyrafi evaluated 110 Iranian hirsute patients and found 49% of them had evidence of PCO.[29]

Idiopathic hirsutism in our study population was near 29%. The corresponding figure has been 5% in the United Arab Emirates,[26] 15% in the USA,[30] 17% in India,[27] 25% in Mexico,[31] and 38% in Finland[32] and England.[33] The study by Azziz *et al.* showed 40% of anovulation in hirsute patients which is considered as IH.[19] The difference between these observations is related to many factors. The most important one is unclear definition of idiopathic hirsutism. In 1950s to 1970s, hirsutism with unknown etiology, from 1980s hirsutism with a history of regular menstrual cycles and since 1990s to present, hirsutism with normal ovulatory function and normal circulating androgen concentrations has been defined as idiopathic hirsutism. Various laboratory tests and imaging techniques that have become more progressive every day for detection of ovary dysfunction and other sources of androgen production or metabolite that provides to better known of hirsutism. Causes may be other ones, so this group (IH) will every day become smaller.

In the present study, the patients' accomplished therapeutic measures were also investigated. Only 37.1% of the hirsute subjects were being treated with different therapeutic methods, among which the most applied methods were physical approaches. Physical methods were mostly dealt with because of achieving pulchritude or beauty through plucking, shaving, and finally electrolyzing. Only 5 patients were referred to

a doctor and medically treated. This is an indication that individuals and their parents pay less attention to the importance of this disease and its prognosis.

A high prevalence of hirsutism was observed which was more prevalent at higher ages in comparison to other societies showing that definition and scoring system of hirsutism need to be based on racial differences. Regarding the fact that the chance of hyper-androgenic symptoms might increase through aging, the prevalence of hirsutism in our province should be studied among older subjects and premenopausal woman population.

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