

Association of Diet with Hirsutism in Females of Reproductive Age

Rabail Javed¹, Farkhanda Ghafoor¹, Attiya Mehboob², Muhammad Aasim¹

National Health Research Complex, Pakistan Medical Research Council, Sheikh Zayed Medical Complex¹,
Department of Dermatology², Sheikh Zayed Medical Complex, Lahore.

Abstract

Background: Causes of hirsutism range from minor illnesses like fever, nausea, headache to severe conditions like adrenal hyperplasia and polycystic ovarian syndrome while, in some cases the cause remains obscure and dietary factors are placed under this heading.

Objectives: To study the role of dietary factors in causing hirsutism.

Settings and duration: Department of Dermatology, NHRC, Sheikh Zayed Medical Complex, Lahore from Dec 2008-Dec 2009.

Subjects and Methods: Fifty clinically confirmed cases of hirsutism and 50 healthy females aged between 12-20 years were studied. A modified Ferriman-Gallwey (FG) score was used to determine the severity of hirsutism which were graded into 4 grades. Cases with virilism, post menopausal, menopause cushing's syndrome were excluded. Informed consent was obtained from all participants and their demographic data, height and weight and dietary pattern was recorded on specially designed performa.

Results: All 50 healthy controls had grade 1 or no hirsutism, while among hirsute females, 10(20%) had grade 2, 28(56%) grade 3 and 12(24%) grade 4 hirsutism. Consumption of red meat and broiler chicken was more in hirsute females whereas, intake of milk and vegetables was more in healthy controls.

Conclusions: Dietary habits also appear to play some role in hirsutism in females.

Key words: Hirsutism, diet, basal metabolic index.

Introduction

Hirsutism is defined as male-pattern growth of excessive terminal body hair in women in androgen-stimulated locations such as face, chest and areola¹. Principal circulating androgens are testosterone and the metabolites dihydrotestosterone (DHT), androstenedione, dehydroandrostenedione (DHA) and dehydroandrostenedione sulfate secreted from ovary and adrenal glands^{2,3}. Diseased ovaries are major cause of hirsutism while some may have combined effect with adrenal gland malfunctioning².

Idiopathic hirsutism is characterized by normal androgen concentration and lack of identifiable underlying disorders⁴. About 20% women with hirsutism have idiopathic hirsutism².

Diet and lifestyle modifications may be of benefit in the management of polycystic ovarian syndrome (PCOS)⁵ and hirsutism. In obese women

production of Sex Hormone Binding Globulin (SHBG) decreases⁶. This increases free testosterone levels as compared to women who are not obese. Eating balanced diet and getting adequate exercise can help to control weight, which may diminish or prevent hirsutism.

A diet with increased refined carbohydrates content leads to an excessive insulin response, which in turn can stimulate the androgen production that contributes to hirsutism and other PCOS symptoms however, increased consumption of omega 3 fats, plant based proteins helps in preventing against hirsutism in many cases⁷.

This study was aimed to see dietary factors which, may be responsible for causing hirsutism in women visiting the department of dermatology in tertiary care Sheikh Zayed Hospital.

Subjects and Methods

This case control analytical study was conducted after approval from Institutional Review Board of Sheikh Zayed Medical Complex (Ref No:1003). Females aged 12-20 years, registered in Outpatient Department of Dermatology department of the hospital who were with or without symptoms of facial hair growth were enrolled

Corresponding Author:

Rabail Javed

National Health Research Complex, Pakistan Medical Research Council, Sheikh Zayed Medical Complex Lahore.

Email: rabailjaved@hotmail.com

using Ferriman Galway score. Cases with virilism, Cushing's syndrome, non fertility along with hirsutism were excluded. The sample size was estimated by using 5% level of significance with expected frequency of 80% and 40% in hirsute and non hirsute women respectively, using more than 40% carbohydrate in their diet⁸. The sample size came to 30 in each group with 91% power and this was raised to 50 in each group to achieve 99% power. Purposive non probability sampling technique was applied. This study only focuses on diet as an idiopathic cause which might result in hirsutism in females of reproductive age.

An informed consent was obtained from all participants. A semi-structured questionnaire including the food frequency chart was filled for each study participant to assess their dietary habits. Each participant was also asked for usual intake of food during the last five years. To determine the severity of hirsutism and extent of hair growth at 9 key anatomical sites, Ferriman-Gallway (FG) score was used. Cases having a FG score of 8 or below were considered normal and FG score greater than 8 were considered hirsute.

Dietary intake of meat was defined as regular when it was consumed either daily or on alternative days or twice a week. It was defined as irregular when meat was consumed once in two weeks or once a month or never.

Data was analyzed using Statistical Package for Social Sciences (SPSS) version 15.0. Descriptive statistics of socio-demographic variables were computed. Dietary intake for various food items in cases and controls were expressed by using frequencies and percentages. Relation of age with severity of disease in cases was determined by using chi-square test. Comparison of diet intake pattern between cases and controls was performed using z-test for proportion for each pattern (regular, irregular and never) separately. Value of $p \leq 0.05$ was considered significant.

Results

A total of 50 females with hirsutism and 50 controls without hirsutism aged between 12-20 years were enrolled for the study. Among 50 hirsute females, 17(34%) were between 14-17 years and 33(66%) between 18-20 years. There was no case below the age of 14 years. In controls 23(46%) were between 14-17 years and 27(54%) between 18-20 years, showing no significant difference between the age of two study groups ($p < 0.221$).

Ferriman Gallway score for degree/severity of hirsutism showed an increase in the grade of hirsutism with the advancement of age (Table-1).

BMI showed 11(22%) hirsutes and 6(12%) controls to be overweight (BMI >25), 31(62%) hirsutes and 34(68%) controls were within normal limits (BMI 18.5-24.9), and 8(16%) hirsutes and 10(20%) controls were under weight (BMI <18.5).

Table 1: Grading of hirsutism in different age groups.

| Age (Years) | Grade2 (Mild hirsutism) GA 8-16 | Grade3 (Moderate hirsutism) GA 17-25 | Grade4 (Sever hirsutism) GA >25 | Total |
|-------------|---------------------------------|--------------------------------------|---------------------------------|----------|
| 14-17 | 05(29.41%) | 11(64.71%) | 01(5.88%) | 17(34%) |
| 18-20 | 05(15.15%) | 17(51.51%) | 11(33.33%) | 33(66%) |
| Total | 10(20%) | 28(56%) | 12(24%) | 50(100%) |

GA = Grading Assessment

The dietary intake showed a more frequent intake of proteins among hirsute females when compared with normal controls. The regular intake of meat was seen in 20(40%) of hirsute females and 11(22%) of controls, where as regular intake of chicken was seen in 43(86%) of hirsute females and 17(34%) control (Table-2a, b & c).

Table 2a: Frequency of diet intake by hirsute females.

| Diet intake | Meat | Fish | Chicken | Eggs | Fruits | Milk | Vegetables | Wheat | Rice | Pulses |
|-------------|---------------|----------|----------|----------|----------|----------|------------|----------|----------|----------|
| Regular | Daily | 1 (2%) | - | - | 40 (80%) | 7 (14%) | 22 (44%) | - | 41 (82%) | 1 (2%) |
| | Alternate day | - | 9 (18%) | 1 (2%) | - | 15 (30%) | - | 12 (24%) | 3 (6%) | 5 (10%) |
| | Twice a week | 13 (26%) | - | 25 (50%) | - | 13 (26%) | 28 (56%) | - | 5 (10%) | 29 (58%) |
| | Once a week | 6 (12%) | 5 (10%) | 17 (34%) | 2 (4%) | 5 (10%) | - | 25 (50%) | - | 5 (10%) |
| Irregular | Twice a month | 2 (4%) | 2 (4%) | 1 (2%) | - | --- | - | - | - | - |
| | Once a month | 16 (32%) | 18 (36%) | 5 (10%) | - | 8 (16%) | - | 5 (10%) | 1 (2%) | 1 (2%) |
| | Not eating | 12 (24%) | 16 (32%) | 1 (2%) | 8 (16%) | 2 (4%) | - | 8 (16%) | - | 12 (24%) |

Table 2b: Frequency of diet intake by normal females.

| | Diet intake | Meat | Fish | Chicken | Eggs | Fruits | Milk | Vegetables | Wheat | Rice | Pulses |
|-----------|---------------|-------------|-------------|-------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Regular | Daily | - | - | - | 50 (100%) | 8 (16%) | 40 (80%) | 19 (38%) | 44 (88%) | 2 (4%) | 39 (78%) |
| | Alternate day | - | - | - | - | 8 (16%) | - | 26 (52%) | --- | 1 (2%) | 4 (8%) |
| | Twice a week | 3 (6%) | 1 (2%) | 6 (12%) | - | 13 (26%) | 10 (20%) | - | 6 (12%) | 5 (10%) | --- |
| | Once a week | 8 (16%) | - | 11 (22%) | - | 7 (14%) | - | 5 (10%) | - | 41 (82%) | 2 (4%) |
| Irregular | Twice a month | - | - | - | - | - | - | - | - | 1 (2%) | - |
| | Once a month | 2 (4%) | 10 (20%) | 33 (66%) | - | 2 (4%) | - | - | - | - | - |
| | Not eating | 37 (74%) | 39 (78%) | - | - | 12 (24%) | - | - | - | - | 5 (10%) |

Table 2c: Comparison of p-values in hirsute and control groups by different dietary item.

| Dietary Intake | Hirsute | | | Normal | | | p-values | | |
|----------------|---------|-----------|---------|----------|-----------|---------|----------|-----------|-------|
| | Regular | irregular | Never | Regular | irregular | Never | Regular | irregular | Never |
| Meat | 20(40%) | 18(36%) | 12(24%) | 11(22%) | 2(4%) | 37(74%) | 0.047 | 0.000 | 0.000 |
| Fish | 14(38%) | 20(40%) | 16(32%) | 1(2%) | 10(20%) | 39(78%) | 0.000 | 0.025 | 0.000 |
| Chicken | 43(86%) | 6(12%) | 1(2%) | 17(34%) | 33(66%) | 0 | 0.000 | 0.000 | 0.312 |
| Eggs | 42(84%) | 0 | 8(16%) | 50(100%) | 0 | 0 | 0.002 | - | 0.002 |
| Fruits | 40(80%) | 8(16%) | 2(4%) | 36(72%) | 2(4%) | 12(24%) | 0.347 | 0.041 | 0.003 |
| Vegetables | 37(74%) | 5(10%) | 8(16%) | 50(100%) | 0 | 0 | 0.000 | 0.018 | 0.002 |
| Wheat | 49(98%) | 1(2%) | 0 | 50(100%) | 0 | 0 | 0.312 | 0.312 | - |
| Rice | 49(98%) | 1(2%) | 0 | 8(16%) | 42(84%) | 0 | 0.000 | 0.000 | - |
| Pulses | 38(76%) | 0 | 12(24%) | 45(90%) | 0 | 5(10%) | 0.058 | - | 0.058 |

Carbohydrate intake was seen more frequent in controls as compared to hirsute cases (Table-2a, b & c). Milk intake (daily) was more frequent in controls as compared to hirsute cases. Pasteurized milk was consumed by 26(52%) hirsute females as compare to 13(26%) controls (Table 2a & b).

No difference was seen in the intake of fruits and wheat in two groups. Consumption of white rice was significantly higher in hirsute females than in controls. However, difference in intake of pulses was insignificant among two groups p-value (0.058) indicates that trend of eating pulses was more common in control group (Table-2c).

Discussion

Hirsutism is a common endocrine disorder causing concern in young females. Its severity varies from mild to severe and is assessed by semi-objective scoring system of Ferriman & Gallway. The abnormal metabolism of androgens in the hair follicles is rarely a clearly defined pathological entity such as congenital adrenal hyperplasia or an androgen secreting adrenal or ovarian tumour which is the cause of the excessive stimulation of hair growth⁹. The excess of hirsutism may or may not cause disruption of regular ovulation. In present study expression of hirsutism was observed more in 18-20 years of age. Similar results were reported elsewhere¹⁰. A study in Kashmir reported majority of hirsute cases in the age group

of 21-25 years (41.7%), followed by 16-20 years (32.8%)¹¹.

In the present study using Ferriman Gallway score, 10(20%) cases had mild hirsutism, 28(56%) moderate hirsutism and 12(24%) had severe hirsutism. Another study using the same classification reported 43.8% cases with mild, 40.6% with moderate and 15.6% with severe hirsutism¹². This difference in staging of hirsutism could be due to geographical and ethnic variations.

Mostly in obese women, androgen production rates are elevated and sex hormone binding globulin (SHBG) levels are depressed to the same magnitude as observed in hirsute women. In the present study we did not find any association between obesity and hirsutism. However, studies done in USA reported strong primary relationship between obesity, polycystic ovarian syndrome and hirsutism¹³⁻¹⁴.

According to recommended diet of Royal College of Physicians and the British Cardiac Society in year 1976, eating less fatty red meat and more poultry is healthy because it is lean. This situation has changed over the years with striking increase in fat content of the standard broiler chicken. Different studies have reported that fats from modern organic food and broiler chicken provide more energy than proteins because of more fat content in respective diets¹⁵⁻¹⁶. In our study chicken broiler was seen as a major component of diet in hirsute females. The association between hirsutism and fatty content of chicken

could be due to steroids injected or present in the chicken feed to increase the meat content which may trigger their adipose tissues, when consumption by females disturb their hormone levels causing hirsutism¹⁷⁻¹⁹. However, in this study regardless of increase in fat content in diet, no association of obesity was seen with hirsute females.

Different studies emphasize on less cholesterol consumption by eating more lean meat than red meat^{14,20,21}. In this study in addition to broiler chicken, 13(26%) hirsute females and 3(6%) normal controls were taking red meat twice a week, whereas, one hirsute female was taking on daily basis. Vegetables and fruits are recommended as source of treatment for hirsutism²². In the present study vegetables and eggs intake was more common among controls, while fruits wheat and rice were consumed in same pattern in hirsute females and normal controls. In different parts of the world research has revealed that unprocessed carbohydrate diet is more appropriate than the processed²³. In the present study intake of white rice was more common in hirsute females than in controls. In USA, it was observed that consumption of dairy products especially milk is less popular in hirsute females than in controls¹⁰ and same was found in the current study.

This study explains importance dietary habits which may lead to hirsutism. The diet taken in western countries is more rich in vegetable proteins, fruits and dairy products in comparison to developing countries like Pakistan. In Pakistan most of the people cannot afford to buy fruits, dairy products, lean meat such as fish as a component of recommended, healthy diet. Moreover, the dietary style includes more fats, white rice, carbohydrates and meat product such as Chicken broiler which are against the recommended dietary guidelines²⁴. In the present study dietary habits seems to be a cause of hirsutism in young females.

Acknowledgement

Investigators would like to acknowledge all those who were involved in completion of this research project especially, Muhammad Akhtar, Yaseen Gujjar, Muhammad Rasheed and Muhammad Afzal of PMRC, NHRC, Lahore who made this task successful.

References

1. Basil MH. Dermatologic manifestations of Hirsutism. Available from URL: <http://emedicine.medscape.com/article/1072031-overview> [updated: Jun 30, 2009].
2. Sachdeva S. Hirsutism: evaluation and treatment. *Indian J Dermatol*. 2010;55:3-7.
3. Abdel-Rehman MY. Androgen Access. [Online] 2012 Aug [cited 2012 January]; Available from: <http://emedicine.medscape.com/article/273153-overview>
4. Harrison S, Somani N, Bergfeld WF. Update on the management of hirsutism. *Cleve Clin J Med*. 2010 Jun;77:388-98.
5. Barr S, Hart K, Reeves S, Sharp K, Jeanes YM. Habitual dietary intake, eating pattern and physical activity of women with polycystic ovary syndrome *European Journal of Clinical Nutrition* 2011; 65, 1126-32.
6. Betancourt-Albrecht, Cunningham GR. Hypogonadism and diabetes. *Int J Impot Res* 2003; 15 (Suppl 4): S14-S20.
7. Dunne N, Slater B. Hirsutism and PCOS [Online] [cited 2012 January]; Available from: <http://www.ovarian-cysts-pcos.com/hirsutism.html>
8. Dunne N, Slater B, editors. *The Natural Diet Solution for PCOS and Infertility*. [Online] 2005 [cited January 12]; Available from: tamarindball.org/lj/pcosbook2.pdf
9. Derksen J, Nagesser SK, Meindets AE. Identification of virilising adrenal tumours in hirsute women. *N Engl J Med* 1994; 331: 968-73.
10. Malik LM, Khursheed Haroon TS, Malik MA. An aetiological study of moderate to severe hirsutism. *Pak J Med Sci* 2007; 23: 167-71.
11. Ahmad QM, Shah IH, Sameem F, Kamili Q, Sul J. Hirsutism in Kashmir: an etiological study. *Indian J Dermatol* 2009; 54:80-2.
12. Samuel Dagogo-Jack, Nadia Al-Ali and Mohammed Q. Augmentation of Bone Mineral Density in Hirsute Women *J Clinl Endocrinol Metab* 82: 2821-5.
13. Samuel ST. What is polycystic ovarian syndrome (PCOS)? A fact sheet from the Center for Applied Reproductive Science. USA, OBGYN.net Editorial Advisor.
14. Marx TL, Mehta MD. Polycystic ovary syndrome: Pathogenesis and treatment over the short and long term. *Cleveland Clin J Med* 2003;70: 31-45.
15. Wang Y, Lehane C, Ghebremeskel K, Crawford MA. Modern organic and broiler chickens sold for human consumption provide more energy from fat than protein. *Public Health Nutr* 2009; 4: 1-9.
16. Farmers are producing Fatty Poultry. [Online] [cited 2012 January 20]; Available from: <http://www.now-science.com/food-science/farmers-are-producing-fatty-poultry/71/>
17. Red meat and health. [Online] [cited 2012 January 21]; Available from: <http://www.salagram.net/Vegeter-RedMeatTruths.html>
18. Muramatsu T, Tshuchiya S, Okumuraa J, Miyoshi S. Genetic differences in steroid induced protein synthesis in vivo of the liver and magnum in immature chicks (*Gallus Domesticus*). *Comp Biochem Physiol B* 1992;102:905-9.
19. U.S environmental protection agency. Poultry production. [Online] 2012 Jun [cited 2012 February 4]; Available from: <http://www.epa.gov/oecaagct/ag101/printpoultry.html>
20. Hughes P and Heritage J. Antibiotic growth promoters in food animal. [Online] [cited 2012 February 4]; Available from: http://www.fao.org/docrep/ARTICLE/AGRIIPA/555_EN.HTM
21. Collins A. The facts about eggs and cholesterol. [Online] [cited February 10]; Available from: <http://www.annecollins.com/diet-fats/eggs-cholesterol-advice.htm>
22. Aziz R. The evaluation and management of hirsutism. *Obstet Gynecol* 2003; 101(5Pt1): 995-1007.
23. Cespedes A. Unprocessed food diet. [Online] 2011 Jun [cited 2012 January]; Available from: <http://www.livestrong.com/article/240759-unprocessed-food-diet/>
24. Wikipedia. Dietary reference intake. [Online] [cited 2012 January]; Available from: http://en.wikipedia.org/wiki/Dietary_Reference_Intake